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SAVANNAH HARBOR EXPANSION PROJECT CHATMAN COUNTY, GEORGIA AND JASPER COUNTY, SOUTH CAROLINA: FINAL GENERAL RE-EVALUATION REPORT AND ENVIRONMENTAL IMPACT STATEMENT JANUARY 2012

COMMUNICATION

FROM

THE ASSISTANT SECRETARY OF THE ARMY, CIVIL WORKS, THE DEPARTMENT OF DEFENSE

TRANSMITTING

THE CORPS' FINAL GENERAL RE-EVALUATION REPORT AND ENVIRONMENTAL IMPACT STATEMENT

PART 11 OF 15

NOVEMBER 9, 2012.—Referred to the Committee on Transportation and Infrastructure and ordered to be printed

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U.S. GOVERNMENT PRINTING OFFICE

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FINAL
ENVIRONMENTAL IMPACT STATEMENT
SAVANNAH HARBOR EXPANSION PROJECT
Chatham County, Georgia and Jasper County, South Carolina

January 2012
(Revised July 2012)

Appendix A

Volume 2

US Army Corps of Engineers
Savannah District
South Atlantic Division

ENVIRONMENTAL IMPACT STATEMENT
APPENDIX A: Comments Received During Review of November 2010 Draft EIS and Draft GRR

SAVANNAH HARBOR EXPANSION PROJECT

Chatham County, Georgia and Jasper County, South Carolina

January 2012

US Army Corps of Engineers
Savannah District
South Atlantic Division

Comments Received During Review of November 2010 Draft EIS and Draft GRR

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Summary of Comments Received on Draft EIS and GRR

Upon distribution of the Draft EIS and GRR on November 15, 2010, Savannah District received over 1,100 written letters, e-mails, and dictated responses from Federal and state agencies, environmental groups, civic organizations, and private citizens.

The majority of the 684 commenters provided general statements in support of the project. A demographic summary of the statements of support is provided below in Figure 1.

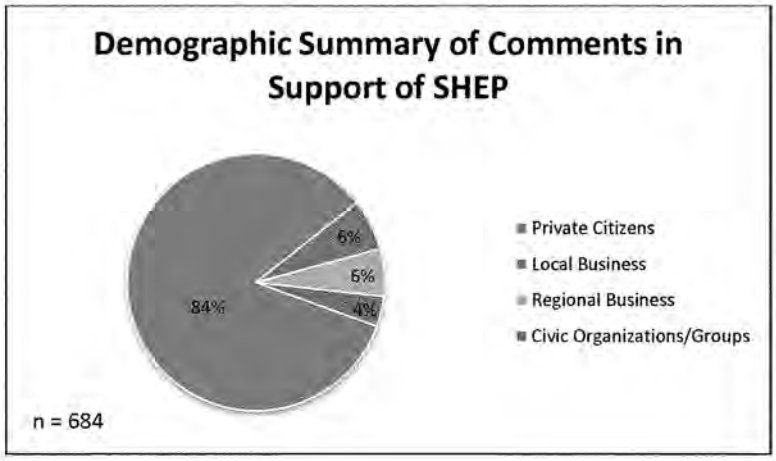

Figure 1

Many commenters submitted more than one comment. As a result, the District received a total of 2,540 comments. The comments contained in the letters were generally grouped (despite some overlap) into four broad categories as follows: Support the Project (684), Environmental (1,247), Economics (356), and Engineering (258). Figure 2 shows the distribution of the comments.

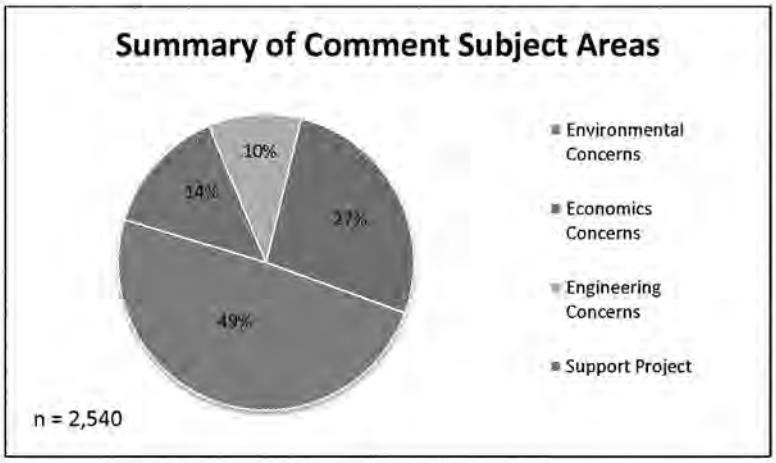

Figure 2

As illustrated above, the majority of the comments were related to the environmental analyses and predicted impacts associated with the proposed project. In general, the environmental comments focused on two major issues: the proposed monitoring and adaptive management plan and the impacts to endangered species, specifically the Shortnose sturgeon. The District received comments from all the Federal Cooperating Agencies (Department of Interior (DOI), Department of Commerce (DOC), and the Environmental Protection Agency (EPA)) regarding the post-construction monitoring period. Both the DOI and EPA requested that the monitoring period be extended to as much as 10 years. The Federal Cooperating Agencies and the state resource agencies, in particular the Georgia Department of Natural Resources Environmental Protection Division (GA DNR-EPD), requested additional elements be included in the monitoring plan to ensure the actual impacts of the project do not exceed those expected for a particular resource.

Several resource agencies expressed concern that a 5-year monitoring period may be too short to adequately test the performance of the mitigation features. Some of the project's mitigation features are designed to address impacts that only become evident during low river flows. River flows are dependent upon climate conditions and it is possible to go through a 5-year monitoring period without experiencing substantial low flows. The risk of not experiencing

significant low-flows is greatly reduced over a 10-year monitoring period. Historic records from the Savannah River at the Clyo streamflow gage indicate that 5 years of above-average flows are not uncommon, but even during so-called "wet decades" there have always been a few years of below normal flow.

To address these concerns, the Corps added elements to the monitoring plan and lengthened the monitoring period over for some elements to as much as 10 years. Elements added to the plan include determinations of the location of the freshwater interface, addition of a twelfth wetland monitoring site, expanded monitoring of CDF effluent, and additional biological monitoring in the CDFs. The Corps believes the adaptive management plan, as proposed, would allow for any necessary changes to the project should the environmental impacts exceed what is predicted or the mitigation features do not function as intended.

A number of commenters expressed concern about funding assurance for the construction of the mitigation features, construction of any needed adaptive management features, and long term operation and maintenance of the mitigation features. To address their concerns, the State of Georgia has indicated that it would place costs for mitigation feature post-construction monitoring and adaptive management in an escrow account so the funds would be available if/when needed. The District intends to obtain its share of the adaptive management costs at the same time as the funds for the dredging work are obtained. By obtaining the Federal funds as the construction progresses, they would be available to make adjustments to the project's mitigation if/when needed. In this way, all the funds identified in the final project documents for adaptive management would be obtained by the time the dredging is complete. With regard to operation and maintenance of the mitigation features, the Corps' highest budget ranking is given to funding requests for operation of mitigation features.

In addition to the monitoring plan, a large number of comments (particularly from the DOC) were concerned with the proposed mitigation for impacts to Shortnose sturgeon habitat. In the Draft EIS, the project proposed to compensate for adverse impacts to Shortnose sturgeon habitat by constructing a horseshoe rock ramp so sturgeon could move around the New Savannah Bluff Lock and Dam near Augusta, Georgia to historic upstream spawning areas. In their comments, the DOC indicated that the proposed design was inadequate because the percentage of river flow passing through the structure (5%) did not provide adequate assurance that Shortnose sturgeon could find or use the structure. Based on these comments, the Corps held a fish passage workshop and invited representatives from the Federal and State natural resource agencies, fishway engineers, and academic experts to review the design. As a result of the input provided at the workshop and a follow-up site visit, the Corps revised the rock ramp design to accommodate 100% of the river flow a majority of the spring spawning season, while not increasing flooding upstream and maintaining an acceptable pool level. The revised design is presented in Section 5 and Appendix C of the EIS.

Both the GA DNR-CRD and the City of Tybee Island submitted comments regarding the proposed beneficial use of dredged materials, i.e. nearshore placement of new work sediments from the entrance channel. GADNR-CRD's initial finding was that the SHEP is generally

consistent with the enforceable provisions of the Georgia Coastal Management Program. However, certain changes were requested regarding the dredged sediment placement plan, viz., the State expressed concern about the proposed deposition in the nearshore sites and the two offshore [fish enhancement] sites. In light of GA DNR-CRD and the City of Tybee Island's concerns about the quality of the sediments, the Corps revised the dredged sediment placement plan and now intends to deposit all sediments from the entrance channel in either the Ocean Dredged Material Disposal Site or approved upland confined sediment placement sites. Consequently, proposed dredged sediment placement areas: Site MLW 200, Site MLW 500, ERDC Nearshore, Site 2 Mound, Site 2 Extension, and Sites 3, 4, 5, 6, 11, and 12, were deleted from the proposed action, and the Corps would not deposit new work dredged sediments in those locations as part of the Savannah Harbor Expansion Project.

The City of Savannah submitted comments concerning the potential impacts of increased chlorides to their water supply intake on Abercorn Creek. As a result of their comments, the Corps, Georgia Ports Authority, and the City of Savannah closely coordinated to perform additional impact analyses. The results of those analyses are summarized in Section 5.02 of the Final EIS. The analyses indicated that during drought conditions and high tide, the increased chloride concentrations would cause an increase in lead corrosion and disinfection byproducts, both of which are regulated by the EPA, at the City's municipal and industrial plant. Based on the outcome of the updated studies, the Corps has added a raw water storage impoundment to mitigate for these expected impacts.

A number of comments were also submitted concerning the engineering and design of the channel, in particular the entrance channel and channel extension. Respondents were concerned that the channel design presented in the Draft documents was not adequate to allow safe transit of the larger ships expected to call after the harbor is deepened. The preliminary channel design was developed using the US Army Corps of Engineers' design standards and procedures outlined in EM-1110-2-1613, Hydraulic Design of Deep Draft Navigation Projects. In accordance with ER-1110-2-1403, final channel dimensions and navigation requirements were developed using the Corps' state-of-the-art Ship Simulator, with input from the Savannah Harbor Pilots Association (SHPA). The use of ship simulators to establish final design parameters for deep-draft navigation channels is the standard practice worldwide and ensures that channels are safe and economical and result in minimal environmental impact and long term maintenance requirements. The use of ship simulators also provides the harbor pilots that work in the channel on a daily basis the opportunity to provide input into the design and ensure the navigability and safety of the channel. The ship simulation study verified that the entrance channel could be deepened and widened at one bend to maintain two-way traffic capability for the design vessel. In the inner harbor, two-way traffic could be maintained for the design vessel and a Panamax vessel with inclusion of two bend wideners. Two meeting areas in the inner harbor would allow for meeting of two design vessels.

Currently the Savannah Harbor Pilots safely bring in vessels with a minimum of 4-foot underkeel clearance. The Corps expects this practice to continue with the deepened channel.

The vertical motion study, which included the channel extension out to a maximum of Station -98+600B, showed that the pilots can safely navigate the design vessel through the deepened entrance channel at a ship speed of 14 knots or less. Documentation for both the ship simulation and vertical motion studies can be found in Engineering Appendix Supplemental Materials.

With respect to economics, most respondents commented or asked questions about how deepening the harbor is economically justified if the expected growth in cargo volume remains the same in the without- and with-project conditions. As discussed in Section 5 of the GRR, under both the without- and with-project conditions, the District expects the Garden City Terminal to reach its build-out capacity near 2030 when the total number of TEUs processed reaches 6.5 million. is the Corps anticipates that without deepening, more vessels would be required to transport a given volume of cargo, when compared to the with-project condition in which the vessels could load more completely (thereby requiring fewer vessels).

No increase in cargo is expected to occur as a result of the proposed harbor deepening. As a result, the number of containers that transit the areas that surround the port would not change as a result of a deeper harbor. The project's economic benefits accrue from the use of larger, more cost-effective container ships, not an increase in the number of containers moving through the port. These transportation cost savings are predicted to result in an average net benefit of over $170 million annually to the Nation.

Organization and Approach to Response to Comments

Documentation of the Corps' responses to all comment letters, e-mails, and dictated comments is included on the following pages. Comments have been addressed in the order shown in the Table of Contents. Typically, comments were scanned, which may have resulted in some typographical errors but those should not detract from the substance of the comment.

The responses are intended to assist the public and decision makers in understanding how the Corps has addressed the issues raised in the comments. However, the General Re-Evaluation Report and the Final Environmental Impact Statement (FEIS or EIS) are the official documents that present the information and analysis for the SHEP. In the event any particular response to a comment is inconsistent with the GRR and/or EIS, or is inconsistent with any other responses to comments, the information and analysis in the GRR and/or EIS controls. In addition, while it usually should be clear from the substance of each response whether the Corps disagrees with a particular comment, in no case may the lack of any express statement of disagreement be taken to mean or imply that the Corps agrees with the comment.

DEPARTMENT OF THE ARMY
SAVANNAH DISTRICT, CORPS OF ENGINEERS
100 W. OGLETHORPE AVENUE
SAVANNAH, GEORGIA 31401-3640

REPLY TO ATTENTION OF

NOV 15 2010

Executive Office

RECEIVED NOV 19 2010

Mr. George Wickliffe
Chief
United Keetoowah Band of Cherokee
Post Office Box 746
Tahlequah, Oklahoma 74464

...ofcomed
...facts or other
...please cease
...ect us at 918-456

11-29-10
...NAGPRA POC Date

Dear Mr. Wickliffe:

The Savannah District, US Army Corps of Engineers has prepared a Draft Tier II Environmental Impact Statement (DEIS) and General Reevaluation Report (GRR) to incrementally evaluate deepening the Savannah Harbor Federal Navigation Project to a maximum authorized depth of -48 feet Mean Lower Low Water (MLLW) as authorized by the Water Resources Development Act of 1999 (Public Law 106-53, Section 102(b)(9). The studies evaluated the engineering, environmental, and economic acceptability of various alternatives for the present and future harbor conditions over a 50-year analysis period. The DEIS is being circulated to agencies and the public for a 45-day comment period.

Recommended improvements as outlined in the Maximum Authorized Plan and the tentative National Economic Development (NED) Plan include: channel deepening from the sea through the Harbor Entrance Channel to the Garden City Terminal; channel widening to create meeting areas at Long Island and Oglethorpe Ranges; widening and deepening of the Kings Island Turning Basin; and channel widening at three bends.

In order to avoid, minimize, or compensate for adverse environmental impacts associated with the proposed action, the following mitigation features are proposed:

(1) Acquire and preserve lands adjacent to the Savannah National Wildlife Refuge

(2) Construct a diversion structure, deepen, and close the lower arm of McCoys Cut

(3) Close Rifle Cut

(4) Remove the Tidegate abutments and piers

(5) Construct a rock sill at the mouth of Back River

(6) Fill a broad berm in the Sediment Basin

(7) Construct a sill in Middle River near Disposal Area 2A

DEPARTMENT OF THE ARMY
SAVANNAH DISTRICT, CORPS OF ENGINEERS
100 W. OGLETHORPE AVENUE
SAVANNAH, GEORGIA 31401-3640

REPLY TO ATTENTION OF

NOV 15 2010

Executive Office

RECEIVED NOV 19 2010

Ms. Lisa Stopp
United Keetoowah Band of
Cherokee Indians in Oklahoma
NAGPRA Representative
Post Office Box 746
Tahlequah, Oklahoma 74464

...ke Indians
...e referenced
...ations or other
...please cease
...ct us at 918-456

11-29-10
...al NAGPRA POC Date

Dear Ms. Stopp:

The Savannah District, US Army Corps of Engineers has prepared a Draft Tier II Environmental Impact Statement (DEIS) and General Reevaluation Report (GRR) to incrementally evaluate deepening the Savannah Harbor Federal Navigation Project to a maximum authorized depth of -48 feet Mean Lower Low Water (MLLW) as authorized by the Water Resources Development Act of 1999 (Public Law 106-53, Section 102(b)(9). The studies evaluated the engineering, environmental, and economic acceptability of various alternatives for the present and future harbor conditions over a 50-year analysis period. The DEIS is being circulated to agencies and the public for a 45-day comment period.

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(5) Construct a rock sill at the mouth of Back River

(6) Fill a broad berm in the Sediment Basin

(7) Construct a sill in Middle River near Disposal Area 2A

Catawba Indian Nation
Tribal Historic Preservation Office
1536 Tom Steven Road
Rock Hill, South Carolina 29730

Office 803-328-2427
Fax 803-328-5791

December 2, 2010

Attention: Jeffrey M. Hall
Department of the Army
100 W. Oglethorpe Avenue
Savannah, Georgia 31401-3640

Re. THPO #	TCNS#	Project Description
2011-46-1		Draft Tier II EIS and GRR to incrementally evaluate deepening of the Savannah Harbor Federal Navigation Project

Dear Mr. Hall,

The Catawba have no immediate concerns with regard to traditional cultural properties, sacred sites or Native American archaeological sites within the boundaries of the proposed project areas. **However, the Catawba are to be notified if Native American artifacts and / or human remains are located during the ground disturbance phase of this project.**

If you have questions please contact Caitlin Totherow at 803-328-2427 ext. 226, or e-mail caitlinh@ccppcrafts.com.

Sincerely,
Caitlin Totherow for
Wenonah G. Haire
Tribal Historic Preservation Officer

Catawba Indian Nation
Tribal Historic Preservation Office
1536 Tom Steven Road
Rock Hill, South Carolina 29730

Office 803-328-2427
Fax 803-328-5791

#1795

January 18, 2011

Attention: William G. Bailey
Savannah District
US Army Corps of Engineers
100 West Oglethorpe Avenue
Savannah, GA 31401-3640

Re. THPO # TCNS # Project Description
Evaluate deepening the Savannah Harbor Federal Navigation Project

Dear Mr. Bailey,

The Catawba have no immediate concerns with regard to traditional cultural properties, sacred sites or Native American archaeological sites within the boundaries of the proposed project areas. **However, the Catawba are to be notified if Native American artifacts and / or human remains are located during the ground disturbance phase of this project.**

If you have questions please contact Caitlin Totherow at 803-328-2427 ext. 226, or e-mail caitlinh@ccppcrafts.com.

Sincerely,
Caitlin Totherow for
Wenonah G. Haire
Tribal Historic Preservation Officer

SEMINOLE TRIBE OF FLORIDA
TRIBAL HISTORIC PRESERVATION OFFICE

TRIBAL HISTORIC
PRESERVATION OFFICE

SEMINOLE TRIBE OF FLORIDA
AH-TAH-THI-KI MUSEUM

34725 WEST BOUNDARY ROAD
CLEWISTON, FL 33440

PHONE: (863) 983-6549
FAX: (863) 902-1117

TRIBAL OFFICERS
CHAIRMAN
MITCHELL CYPRESS
VICE CHAIRMAN
RICHARD BOWERS JR.
SECRETARY
PRISCILLA D. SAYEN
TREASURER
MICHAEL D. TIGER

Judy Wood
Department of the Army
Savannah District, Corps of Engineers
100 W. Oglethorpe Avenue
Savannah, Georgia 31401-3640

December 6, 2010

Subject: Draft Tier II EIS and GRR Savannah Harbor Federal Navigation Project in Jasper County, South Carolina and Chatham County, Georgia

Dear Ms. Wood,

The Seminole Tribe of Florida's Tribal Historic Preservation Office (STOF-THPO) has received the Savannah District Corps of Engineers' correspondence concerning the aforementioned project. The STOF-THPO has no objection to your findings at this time. However, the STOF-THPO would like to be informed if cultural resources that are potentially ancestral or historically relevant to the Seminole Tribe of Florida are inadvertently discovered during the construction process. We thank you for the opportunity to review the information that has been sent to date regarding this project. Please reference ***THPO-007292*** for any related issues.

We look forward to working with you in the future.

Sincerely,

Direct routine inquiries to:

Willard Steele
Tribal Historic Preservation Officer
Seminole Tribe of Florida

Anne Mullins
Compliance Review Supervisor
annemullins@semtribe.com

JLP:am

From: McIntosh, Margarett (Mackie) SAS
To: CESAS-PD_SAS
Subject: FW: USACE-Notice SAS- Savannah Harbor Navigation Project (UNCLASSIFIED)
Date: Monday, December 20, 2010 10:35:33 AM

Classification: UNCLASSIFIED
Caveats: FOUO

Mackie McIntosh
(912) 652-5320 - Office
(912) 677-6080 - Cell

-----Original Message-----
From: Ball, Nathaniel I SAC
Sent: Tuesday, December 07, 2010 12:58 PM
To: McIntosh, Margarett (Mackie) SAS
Subject: FW: USACE-Notice SAS- Savannah Harbor Navigation Project (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: FOUO

FYI- It does not appear they sent this comment to anyone at SAS.

Hope all is going well.

Nat

-----Original Message-----
From: Kim Jumper [mailto:auntweezer@msn.com]
Sent: Tuesday, December 07, 2010 10:18 AM
To: Ball, Nathaniel I SAC
Subject: RE: USACE-Notice SAS- Savannah Harbor Navigation Project

This letter is in regard to the above referenced project.

The Shawnee Tribe's Tribal Historic Preservation Department concurs that no known historic properties will be negatively impacted by this project. We have no issues or concerns at this time, but in the event that archaeological materials are encountered during construction, use, or maintenance of this location, please re-notify us at that time as we would like to resume consultation under such a circumstance.

Thank you for giving us the opportunity to comment on this project.

Sincerely,

Kim Jumper, THPO

Shawnee Tribe

> Subject: USACE-Notice SAS- Savannah Harbor Navigation Project
> Date: Mon, 15 Nov 2010 14:16:29 -0500
> From: Nathaniel.I.Ball@usace.army.mil
> To: ls-sc-publicnotice@lst.usace.army.mil
>
> U.S. Army Corps of Engineers
> Savannah District Public Notice
>
> Savannah Harbor Navigation Project
> Chatham County, Georgia and Jasper County, South Carolina Savannah
> River
>
> The Savannah District, US Army Corps of Engineers (USACE) announces
> the availability to the public of a Draft Tier II Environmental Impact
> Statement (Draft EIS) and Draft General Reevaluation Report (Draft
> GRR). The proposed project includes discharge of fill into navigable
> waters of the US to construct and maintain submerged berms and
> nearshore berms, continued discharge of effluent from existing
> confined disposal facilities into waters of the US, and transportation
> of sediments dredged from the entrance channel (both new work and
> continued maintenance material) to the Savannah Ocean Dredged Material Disposal Site (ODMDS).
>
> The proposal also includes discharge of dredged material into
> navigable waters of the US for several mitigation features, including
> closing Rifle Cut, construction of a flow diversion structure and
> other modifications at McCoys Cut, deepening the upper portions of
> Middle and Back Rivers, removing the Tidegate and its abutments,
> construction of additional features including a submerged sill and
> berm at the mouth of Back River, a submerged sill at the mouth of
> Middle River, three dissolved oxygen systems, a fish passage structure
> at the New Savannah Bluff Lock and Dam, a boat ramp on Hutchinson Island, and restoration of
Disposal Area 1S.
>
> A public workshop will be held during the comment period and is
> currently scheduled to occur December 15, 2010 at the Savannah Civic
> Center in Savannah, Georgia from 4:00 to 8:00 P.M. (subject to
> change). US Army Corps of Engineers officials will be available to
> answer questions, provide information, and accept written and dictated comments.
>
> Electronic copies of the Draft EIS and Draft GRR can be obtained from
> the following website: www.sas.usace.army.mil, and hard copies are
> available upon email request to Mr. William Bailey at the following address:
> CESAS-PD@usace.army.mil.
>
>
> Public Notice is attached.
>
> --- If you have comments regarding the document described above,
> please do not reply to this email. Your response should be provided to
> the project manager as described in the attached notice.
>
> ---- If you wish to be added or removed from receiving these notices,
> please visit our website:
> http://www.sac.usace.army.mil/?action=publicnotices.signup
>
>
>

15, 16, 17, 745

Comment: *The Cherokee, Catawba, Seminole, and Shawnee Native American Tribes requested notification of any cultural resources that are historically or ancestrally relevant to their respective tribes.*

Response: The Savannah District will inform Native American Nations of any cultural resources found during construction of the Savannah Harbor Expansion Project.

#551

Choctaw Nation of Oklahoma
P.O. Box 1210 • Durant, OK 74702-1210 • (580) 924-8280

Gregory E. Pyle
Chief

Gary Batton
Assistant Chief

December 14, 2010

Judy Wood
Dept of the Army
Savannah District, Corps of Engineers
100 W. Oglethorpe Ave
Savannah, Georgia 31401-3640

Dear Judy Wood:

We have reviewed the following proposed project (s) as to its effect regarding religious and/or cultural significance to historic properties that may be affected by an undertaking of the projects area of potential effect.

Project Description: Draft Tier II DEIS and General Reevaluation Report for Savannah Harbor Federal Navigation Project

Comments: Thank you for seeking to consult with the Choctaw Nation of Oklahoma on this project. However, it located outside of our areas of historical interest. If we may be of any further assistance, or if you would like a list of states and counties, in which we do have a historical interest, please contact us at 1-800-522-6170 ext. 2137.

Sincerely,

Terry D. Cole
Tribal Historic Preservation Officer
Choctaw Nation of Oklahoma

By: Caren Johnson
Caren A. Johnson
Administrative Assistant

CAJ:vr

Choctaws, growing with pride, hope and success!

551

Comment: *Thank you for seeking to consult with the Choctaw Nation of Oklahoma on this project. However, it located outside of our areas of historical interest. If we may be any further assistance, or if you would like a list of states and counties, in which we do have historical interest, please contact us at 1-800-522-6170 ext. 2137.*

Response: Comment noted.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

January 28, 2011

Colonel Jeffrey M. Hall
District Engineer
U.S. Army Corps of Engineers, Savannah District
Attn: Mr. Bill Bailey, Chief, Planning Division
100 West Oglethorpe Avenue
Savannah, Georgia 31401-3640

SUBJ: EPA Review of COE's "Savannah Harbor Expansion Project" (November 2010); Tier II DEIS; Chatham County, Georgia and Jasper County, South Carolina; CEQ No. 20100453; ERP No. COE-E32083-00

Dear Colonel Hall:

Pursuant to Section 102(2)(C) of the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, the U.S. Environmental Protection Agency (EPA) Region 4 has reviewed the subject U.S. Army Corps of Engineers (COE), Savannah District, Tier II Draft Environmental Impact Statement (DEIS) for the Savannah Harbor Expansion Project (SHEP). The project is proposed by the Georgia Ports Authority (GPA) of the Georgia Department of Transportation, the non-federal project sponsor (sponsor). This DEIS discloses the environmental impacts associated with deepening the inner harbor and entrance (ocean bar) navigation channel to alternative incremental depths of up to -48 feet (ft)[1], with an additional -2 ft allowable over depth dredging and -6 ft advance maintenance dredging in shoaling areas. Over the last 15 years, EPA has coordinated extensively with the Savannah District and other agencies on SHEP technical issues and draft documentation. This letter outlines and summarizes several of the issues identified and analyzed during EPA's review; however, EPA's detailed substantive conclusions, recommendations and comments on the DEIS are contained in the Enclosure to this letter (*EPA Recommendations and Additional Comments*).

The 1999 Water Resources Development Act (WRDA) authorized the COE to dredge Savannah Harbor to a maximum depth of -48 ft ("Maximum Authorized Plan"), which is a -6 ft deepening of the existing conditions. Moreover, WRDA 1999 also addressed the project review process by requiring that the EPA Administrator and Secretaries of the U.S. Departments of Commerce (DOC), the Interior (DOI) and Army approve the selected plan and determine that the associated mitigation plan adequately addresses the potential environmental impacts of the project. EPA, the National Oceanic and Atmospheric Administration (NOAA) of DOC and the U.S. Fish and Wildlife Service (FWS) of DOI are also NEPA Cooperating Agencies for this COE EIS.

The COE also issued a Chief of Engineers' Report in 1999 which provided further direction on the additional studies that needed to be conducted, including a General

[1] All referenced depths are at Mean Low Water.

Re-evaluation Report (GRR). The GRR accompanies the DEIS, and EPA understands from WRDA 1999 that taken together, these two documents are intended to completely describe the investigative work conducted and present information and analysis to satisfy the conditional authorization, NEPA, and the direction of the Chief of Engineers' Report.

Background

The historic natural depth of the Savannah River is only -12 ft. The present navigation channel for the Port of Savannah was last dredged in 1993-1994[2] to -42 ft (inner harbor) and -44 ft (entrance channel)[3]. Since the City of Savannah was settled far upstream by the English in 1733 on the Savannah River's southern bluff, the navigation channel from the Atlantic Ocean to the port today totals 32.7 miles (mi) in length (21.3 mi inner harbor and 11.4 mi entrance). The channel is also 200-500 ft wide in the inner harbor and 600 ft wide in the outer entrance channel. and includes six turning basins.

The NEPA review for SHEP has an extensive and complex history. Early NEPA efforts (Tier I) consisted of the Savannah District adopting a GPA feasibility study and issuing an EIS in 1998. Because of resource agency environmental concerns with the Tier I EIS, the present Tier II NEPA was initiated in early 2002 with both a public and a NEPA scoping meeting. Approximately 10 years of technical field studies, modeling and other analyses have been conducted since Tier I, involving the study of water quality, wetlands, sediments, fisheries, air quality and other environmental factors affected by the proposed harbor deepening. EPA has been extensively involved with the interpretation of water quality modeling data, with emphasis on predicting dissolved oxygen (DO) concentrations within the riverine system augmented by direct oxygen injection as project mitigation. EPA understands that such DO and other project mitigation is estimated to cost over $150 million, with an overall project cost approximating $500 million.

Independent of this Tier II NEPA process, the GPA sponsor is providing ongoing efforts to reduce port air emissions by reducing the use of diesel fuel through efficiency and electrification (pg. 5-151[4]; pg. 101: App. K). These initiatives together with EPA's new ultra-low sulfur diesel standards have progressively reduced port emissions for various landside diesel engines. Similarly, separate lower sulfur standards specific to marine vessels will become effective in 2015 to further reduce port emissions. In addition, EPA understands from GPA that they are in the process of independently contracting with a university to conduct air dispersion modeling to determine landside effects of port air emissions.

EPA requests participation in the design of this modeling study to ensure that it evaluates potential impacts on criteria pollutants (National Ambient Air Quality Standards: NAAQS) and air toxics relative to sensitive port landside receptors. EPA expects that the modeling will be completed and recommends that results be fully described in the Final EIS (FEIS) for public review. Importantly, the review of current and future project emissions for various containerized

[2] After initial navigation channel construction in 1874, channel deepenings prior to 1994 occurred in 1912, 1936 and 1945.
[3] However, certain channel portions such as the Kings Island Turning Basin may be considerably deeper.
[4] Referenced page numbers generally refer to the DEIS main document (Vol. 1) unless otherwise noted.

vessel sizes should use a standard unit of comparison (e.g., emissions per container unit). Further, EPA anticipates that there may be additional ways to reduce emissions from the project. Therefore, in these NEPA comments (see Enclosure), EPA is providing recommendations for additional streamlining and mitigation (e.g., shore power to reduce emissions from vessel idling) to further offset port diesel emissions and enhance the sponsor's environmental management system for the port.

COE Collaboration with Stakeholders

EPA commends the COE for its significant efforts to inform the public, the Stakeholders Evaluation Group (SEG), local communities, and numerous State and federal resource agencies regarding the many issues associated with the proposed harbor deepening. EPA understands that since its inception in January 1999, the COE has met with the SEG approximately 65 times to discuss the proposed deepening. In addition to the scoping meetings of 2002, a number of meetings with the public and agencies have been held to discuss project issues such as salinity changes, lowered DO, conversion of freshwater to brackish wetlands, benthic organisms, contaminated sediments, economics, and cumulative impacts related to the proposed harbor deepening.

Purpose and Need

The Port of Savannah consists of two publicly-owned and 20 privately-owned terminals, with GPA providing the public Garden City Terminal (GCT) and Ocean Terminal. The DEIS (pp. 2-2 & 5-149; pg. 61: App. K) describes the economic importance of the Port of Savannah to Georgia if not the southeast. Dry bulk, liquid bulk and general cargo/container commodities are shipped into the port, with GCT presently handling 2.6 million twenty-foot equivalent container units (TEUs) from containerized vessels. The COE predicts a long-term approximate 3 percent per year growth rate[5] in TEUs and a maximum GCT operating capacity of 6.5 million TEUs. Through the proposed harbor deepening project, GPA wishes to continue to be competitive by being able to readily accommodate large post-Panamax-sized vessels (i.e., having a vessel capacity for 6,000 or more TEUs and a design draft of 46 feet (pg. 3: App. K) or greater).

At its current dredged depth of -42 ft (inner harbor) and -44 ft (entrance channel), Savannah Harbor cannot accommodate post-Panamax container vessels without waiting on high tides and/or limiting cargo weight. According to the DEIS, in excess of 70 percent of the fleet of calling vessels were not at their maximum load and design draft.[6] The proposed harbor deepening project is proposed to minimize existing depth navigational problems by allowing commerce with "more fully loaded and deeper draft vessels" (pg. 2-2). Because river/channel widths are relatively narrow, larger vessels calling on the port are also further constrained by not being able to pass each other while navigating the channel, which results in one-way inbound and outbound vessel traffic.

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[5] The FEIS should discuss the source and rationale of this projected 3 percent growth rate referenced on page 61 (App. K) over the 50-year life of the project.

[6] The DEIS Abstract (pg. 1) offers no timeframe with this statement, although Appendix K (pg. 3) references a 2006 date. The FEIS should also include this timeframe in the Abstract.

Regarding project and associated timeframes, project startup is expected in 2015-2016 after four to five years of proposed dredging, the life of the project is 50 years (2065), the port will reach operational capacity by 2032 (according to the COE[7]) based on the one-way vessel traffic constraint in the Savannah River channel, the Panama Canal expansion to accommodate international post-Panamax-sized vessels is to be completed by 2014-2015, and use of lower sulfur fuels would be required for marine vessels (such as those calling on the port) in 2015.

Alternatives

The DEIS evaluates five harbor deepening Action Alternatives and the No Action Alternative (no deepening). These incremental deepenings and their predicted volume of new work dredged material (in million cubic yards: mcy) are as follows (pp. 3-16 to 3-18):

- -42 ft (0 ft deeper: 0 mcy) – No Action Alternative (Without Project Condition)
- -44 ft (2 ft deeper: 10.3 mcy) – Action Alternative
- -45 ft (3 ft deeper: 14.6 mcy) – Action Alternative
- -46 ft (4 ft deeper: 19.0 mcy) – Action Alternative
- -47 ft (5 ft deeper: 23.6 mcy) – Action Alternative (COE's Tentatively-identified National Economic Development (NED[8]) Plan and Possible Tentatively Recommended Plan)
- -48 ft (6 ft deeper: 28.3 mcy[9]) – Action Alternative (WRDA's Maximum Authorized Plan, Sponsor's Locally Preferred Plan, and COE's possible Tentatively Recommended Plan)

COE's Tentative NED and Recommended Plan Options

The -47 ft alternative is the COE's tentatively-identified NED Plan because the COE found it to be the alternative with the maximum net economic benefit. According to the DEIS, the NED Plan would be recommended for implementation (Recommended Plan) unless there are "overriding conditions" to favor another plan (pg. 3-19). However, such conditions may exist in this case as GPA supports the -48 ft alternative and it could become the non-federal, cost-share sponsor of that deeper alternative (pg. 2) and fund the additional cost difference between its -6 ft deepening and the NED Plan's -5 ft deepening (the FEIS should verify if this will be the case). For the purposes of the DEIS, however, the COE did not identify a single Tentatively Recommended Plan, so that both the -47 ft and the -48 ft alternative are the COE's Tentatively

[7] As discussed herein, EPA believes that port landside activities could still grow beyond 2032 throughout the life of the project.

[8] Per page 2 of the DEIS (Vol. 1), the NED is "the plan that maximizes net economic benefits to the Nation and fully complies with Army policy."

[9] Page 5-97 indicates that 38.8 mcy, instead of 28.3 mcy, would be dredged for the -48 ft alternative. The FEIS should clarify this apparent inconsistency.

Recommended Plan at this time (pg. 3-22). A final COE Recommended Plan should be identified in the FEIS and selected in the COE's Record of Decision (ROD).

Dredging associated with the -47 ft or -48 ft alternative would generate significant volumes of dredged material excavated from the navigation channel, turning basins, bend wideners, harbor berths, and construction of a lengthy extension of the entrance (ocean bar) channel. The large volume of dredged material is primarily due to the upstream location of the existing Port of Savannah and therefore the long length (and depth) of the navigation channel for ocean access.

Projecting Port Growth

The DEIS alternatives analysis assumes some port growth over the life of the project. However, it appears that the COE and EPA maintain different perspectives on the economic and environmental effects of implementing the proposed action (SHEP harbor deepening) versus continuing the no action (existing condition without the project).

The DEIS states that the COE believes that the proposed action (Recommended Plan) would not increase the number of containers (TEUs) that would be processed at the port when compared to the No Action Alternative – even though the fleet mix would change to fewer vessels (larger post-Panamax) compared to the current greater volume of smaller vessels. The COE agrees that there would be port growth over time, but maintains that growth would be the same with or without the proposed action. Accordingly, the number of TEUs would stay constant (or the growth rate would stay the same) with or without the project so that port vessel, truck and train emissions would be the same (or would grow the same). A consequence of this assumption is the belief that the port air quality would not change due to the project and would improve with the replacement of multiple smaller vessels with fewer larger ones (as well as the required use of lower sulfur fuels by calling vessels in 2015). The DEIS provides insufficient information for EPA to agree with these statements, and we request additional modeling to evaluate these statements and other general conclusions regarding air emissions.

EPA acknowledges that the ability to fully accommodate larger (and presumably efficient) vessels could result in operational efficiencies that could – at least initially – reduce the number of vessel trips. Fewer vessel trips for the same amount of projected cargo weight (e.g., TEUs) along with introduction of cleaner diesel fuels by 2015 could result in a net reduction in ship emissions. However, in contrast to the COE's perspective, EPA believes that over the life of the project, the projected growth in port commerce could cause a commensurate increase in the overall vessel trips and in the number of TEUs, thereby resulting in possible increases in vessel, truck and train emissions. That is, compared to the No Action Alternative, EPA believes that the number of vessels, cargo and emissions would likely increase more over time with the operational efficiencies of the harbor deepening project, despite the use of larger vessels and cleaner fuels.

Notwithstanding these issues, EPA is pleased that the DEIS (App. K) provided an emissions inventory for the pollutants of various port sources (i.e., several criteria pollutants and other parameters such as CO, CO_2, SO_2, NOx, HC, PM2.5, PM10 and/or VOC). Moreover, in

addition to current emissions data, some air quality data for the future condition[10] were also provided to help determine any changes in emissions due to port growth. Disclosure of future air emissions for the No Action Alternative or the proposed action – regardless if considered the same or different scenarios from an air quality perspective – is useful in documenting an estimate of port air quality changes from the current to future condition.

Project Environmental Impacts

Overall, the proposed action has the potential to lower DO water quality, impact tidal freshwater wetlands by excavation and conversion to brackish wetlands or saltmarsh, and reduce fishery habitat for the federally-endangered Shortnose sturgeon and other anadromous fishes. Impacts to these important resources would occur as a direct result of sediment removal during the dredging of the navigation channel and widening of turning basins, as well as indirect impacts through increasing upstream salinities through exacerbating saltwater intrusion.

Our major concern during the Tier I and II NEPA process has been the ability to mitigate project DO impacts attributable to dredging. After extensive interpretation of DO hydrodynamic modeling data, EPA finds that project DO depletions can be reasonably restored to pre-project conditions and evenly distributed within the affected river reaches using Speece Cones for direct oxygen injection into the River. The modeling concluded that such oxygen injection would be sufficient to not only serve as DO mitigation for project losses but also for underestimated DO deficiencies associated with the last harbor deepening to -42 ft. Such artificial injection is expected to elevate DO concentrations by +0.42 mg/l on average, which would raise these river reaches to levels approaching 3.5 mg/l. To ensure that the DO mitigation is sufficient under drought conditions, EPA requests the COE assess and document in the FEIS the August 1999 low-flow conditions similar to the August 1997 normal-flow data analysis provided in the DEIS.

To achieve success in project DO mitigation, EPA expects three assurances from the COE and/or GPA sponsor. These are: 1) post-construction field monitoring of DO levels to ensure the above-described level of DO restoration. 2) guaranteed mitigation throughout the life of the project, and 3) installation and operation of the Speece Cones before dredging begins to ensure that the project's predicted impacts to DO are minimized and mitigated from the outset in order to avoid any potential temporary impacts on the aquatic community while dredging occurs.

EPA's conclusion concerning the sufficiency of the proposed DO mitigation focuses on a water quality perspective to ensure that pre-project DO levels are maintained. We therefore defer to NOAA and FWS for their ecological interpretation of these concentrations relative to DO effects on fishery (e.g., Shortnose sturgeon) and refuge (e.g., Savannah National Wildlife Refuge: SNWF) mandates under their purview.

Project DO mitigation would primarily only restore DO levels to pre-project conditions, and there remains a continuing need to improve the overall DO water quality of the Savannah River system. In this regard, EPA is currently working to revise the DO Total Maximum Daily

[10] The Appendix K emissions inventory provides current and future (to 2032) emissions data for air toxics, but limits emissions data to the current condition for several criteria pollutants and other measured emissions from port sources.

Load (TMDL) for Savannah Harbor. Consistent with 40 CFR §122.44(d)(1)(vii)(B), EPA expects that the wasteload allocations for the oxygen-demanding substances contained in the TMDL, along with any relevant assumptions and requirements, will be implemented through the state National Pollutant Discharge Elimination System permit program. EPA proposed a draft DO TMDL for Savannah Harbor in May 2010 based on Georgia's revised water quality standard, which would require an approximate 85 percent aggregate reduction in point source loads. Successful implementation of the loadings required by a TMDL for DO, and any additional DO mitigation provided by the Speece Cones beyond the impact of this deepening project, would together ecologically benefit the Savannah River system.

In addition to these EPA-related issues, EPA emphasizes the importance of fully evaluating the potential for SHEP dredging to impact the habitat of endangered species (Shortnose sturgeon) and other anadromous fishes such as the popular Striped bass, and also the indirect wetland impacts of converting tidal freshwater marsh habitat into brackish wetlands or saltmarsh at the Savannah National Wildlife Refuge (SNWR) and other freshwater marshes by exacerbating saltwater intrusion.[11] We recommend continued coordination with FWS and NOAA regarding opportunities for developing appropriate mitigation for these impacts.

Beyond EPA's primary DO water quality concern, other substantive project concerns include wetland mitigation, general air quality, air toxics, sediment issues, and environmental justice (EJ)/children's health. EPA believes these remaining issues need additional analysis in the FEIS to complement the DEIS. As a NEPA Cooperating Agency, EPA recommends further COE coordination on these issues with EPA, including our review of draft documentation prior to the FEIS. Our remaining issues are summarized below:

+ *Wetland Mitigation*: Overall, EPA believes that the COE Wetland Mitigation Plan proposed in the DEIS should be further refined. The proposed Plan, which presently appears to emphasize the preservation of freshwater wetlands, should be modified to be consistent with Section 404(b)(1)Guidelines/2008 Mitigation Rule to replace in-type and function of both the freshwater and saltwater wetlands being project impacted. It is important to recognize, if technically supported, the wetlands preservation approach can be an element of this functional replacement mitigation approach such that these two approaches need not be mutually exclusive. A refined Plan should replace the functional impacts to all wetland types; be adequate given the proposed mitigation actions, the timeframe and the risk factors; and comply with all requirements of the 2008 Mitigation Rule. EPA recommends that the FEIS include a draft Plan prepared by the COE in cooperation with an interagency wetland mitigation "working group" including EPA, FWS and others. Given the additional requirement within WRDA 1999 that the mitigation plan shall be implemented before or concurrent with the project, it is important that this Plan be finalized in the ROD.

+ *General Air Quality*: The FEIS should demonstrate that project emissions do not interfere with area attainment and maintenance of the NAAQS for either the No Action Alternative or the Tentatively Recommended Plan. Accordingly, the FEIS (App. K) should provide a future condition analysis through the end of the project (2065). As part of this

[11] For the -47 ft deepening alternative, 1,177 acres of freshwater marsh would be converted and 1,212 acres for the -48 ft alternative (pg. 5-13).

evaluation, EPA requests that dispersion modeling be conducted to determine how landside emissions will impact local area air quality, with emphasis on port traffic effects in potential EJ areas and any possible NAAQS violations. The current emissions inventory of the DEIS (App. K) does not provide a future condition emissions analysis for comparison against the current conditions data provided for the selected criteria pollutants and other parameters measured, or a dispersion analysis. Furthermore, to verify the DEIS assumption that future larger vessels (Panamax and post-Panamax) calling on the port produce less emissions than the existing smaller fleet, the FEIS should compare the fuel efficiency/emissions of larger versus smaller vessels using an "emissions per TEU" metric as the basis of comparison.

+ *Air Toxics*: A significant number and volume of air toxics are associated with operating the port, with significant emission increases being expected over time (38 tons in 2008 to a range of 117-123 tons in 2032 per Appendix K of the DEIS). These emissions are a source of concerns to residents living in communities surrounding the Port. Accordingly, EPA requests the preparation of a screening level risk assessment to evaluate the potential impacts associated with emissions of air toxics related to the harbor deepening and its operation. Moreover, although the Appendix K emissions inventory for air toxics provides both current and future emissions data as noted earlier, future conditions data were considered the same after 2032 based on the assumption that the number of calling vessels will be constrained by 2032 (due to one-way vessel traffic) such that there will be no increase in freight thereafter. EPA believes that the future condition analysis for air toxics (and NAAQS) should extend beyond 2032 to encompass the entire 50-year life of the project (2065). The tonnage and number of TEUs could continue to increase after 2032 (along with associated additional truck/locomotive landside emissions impacts). Since not all calling vessels currently offload 100 percent of their containers at Savannah, the number of TEUs offloaded at Savannah could conceivably increase after 2032. Also, the requested dispersion modeling for criteria pollutants should include air toxics emissions. Modeling results should be used in the requested screening level risk assessment to help determine effects on landside sensitive receptors such as potential EJ areas located along road/rail corridors noted in the DEIS (pg. 5-147) and determine any areas of localized higher concentrations.

+ *Sediment Issues*: Dredged material disposal should be conducted in accordance with Section 404 of the Clean Water Act or Section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) consistent with EPA and COE policies provided in the joint guidance document, *Evaluating Environmental Effects of Dredged Material Management Alternatives – A Technical Framework*. In accordance with this Technical Framework, offshore disposal outside of three miles should be conducted pursuant to MPRSA and within an EPA-designated Ocean Dredged Material Disposal Site (ODMDS), in this case the Savannah ODMDS. The DEIS proposes that a portion of the project's dredged material from the ocean entrance channel be disposal at sites 11 and 12 near the channel as experimental fish habitat mounds. Although EPA generally supports fisheries enhancements and acknowledges that there is a fisheries exemption under MPRSA, we believe that this proposed reuse may not be consistent with MPRSA and would likely offer minimal fisheries habitat value. Therefore, EPA does not currently support the proposed disposal at sites 11 and 12, and recommends the evaluation of other alternatives, such as use of the Savannah ODMDS for the disposal of this material. EPA recommends further

coordination with EPA, U.S. Coast Guard, and NOAA and their state fisheries counterparts regarding these issues, and the results of such coordination should be documented in the FEIS.

In addition, the DEIS documents the COE's intent to use dredging to extend the current channel offshore for over seven miles since ocean water depths in these areas will not accommodate post-Panamax vessels under all tide and cargo conditions. This channel extension would constitute an estimated 17- to -18 percent increase in the project channel length, and an additional 4.6 mcy of new dredged material. This project component should be fully analyzed and discussed in the FEIS. Specifically, the FEIS should address the multiple factors outlined in the Enclosure, including full characterization of the dredged material, identification and analysis of disposal options, potential evaluation of the Savannah ODMDS capacity in relation to any material that would be disposed in the ODMDS, precise identification of the proposed channel route and alternative routes, and discuss findings. EPA's full understanding of the ocean channel extension component is essential to the overall NEPA analysis and Agency approval of the SHEP. Therefore, EPA requests the opportunity to review and comment on the new channel dredging sections prior to the issuance of the FEIS. EPA also notes that based on the incomplete information on this issue in the DEIS, the public may not have a full understanding of this issue for purposes of public review and comment.

+ *Environmental Justice & Children's Health*: Because most of the communities surrounding the project have elevated levels of minority and low-income populations (45 percent of the population of Chatham County, Georgia, is comprised of minorities), it is appropriate that project effects on potential EJ communities and children's health were considered in the DEIS consistent with NEPA and relevant Executive Orders (EO 12898 and EO 13045). These analyses should be expanded in the FEIS to include potential landside emission effects on nearby populations (as previously requested above: *General Air Quality*), public concerns offered at the SEG and other meetings and their follow-up outcomes, and disclosure of the demographics of children under age 18 within the project area. As one offset to project impacts, we understand that members of the local community may economically benefit from the project by securing some of the 175 additional positions expected by 2020 due to port cargo growth.

Summary

While the proposed SHEP Action Alternatives have the potential to lower DO water quality, directly and indirectly impact tidal freshwater wetlands, and reduce fishery habitat, EPA finds that project DO depletions can be reasonably restored to pre-project conditions and evenly distributed within the affected river reaches using Speece Cones for direct oxygen injection into the river. Such artificial injection is expected to elevate DO concentrations by +0.42 mg/l on average, which would raise these river reaches to levels approaching 3.5 mg/l. To achieve project success, EPA expects assurances from the COE and/or GPA for post-construction field monitoring of DO levels to ensure this level of DO restoration, a financial guarantee to ensure continuation of the proposed mechanical mitigation throughout the life of the project, and Speece Cone installation and operation before dredging begins to minimize the potential impacts on the aquatic community.

EPA's conclusion concerning the sufficiency of the proposed DO mitigation focuses on a water quality perspective to ensure pre-project DO levels are maintained. We defer to NOAA and FWS for their ecological interpretation of these concentrations relative to DO effects on their fishery and refuge mandates. The proposed alternatives should continue to be closely evaluated to ensure that the construction and subsequent operation of any harbor deepening would not further cause or contribute to the ongoing DO impairment in the harbor.

In addition to EPA's DO water quality concern, our other substantive project concerns include wetland mitigation, general air quality, air toxics, sediment issues, and EJ/children's health. As a Cooperating Agency, EPA recommends further COE coordination with EPA on these remaining issues, including our review of draft documentation prior to the FEIS.

Additional findings and detail of our DEIS review are provided in the Enclosure to this cover letter.

EPA DEIS Rating

EPA rates this DEIS as an "EC-2" (Environmental Concerns, additional information requested). EPA bases this rating on the overall project impacts and the additional information requested for the FEIS. If this harbor deepening project is further pursued by the sponsor, EPA expects our additional information requests will be incorporated in the FEIS and that the impacts of the proposed project will be fully mitigated consistent with the policies and regulations of the COE and its Cooperating Agencies and guaranteed throughout the life of the project. Although the COE has not yet identified a Recommended Plan, EPA believes the proposed DO mitigation would be sufficient to reasonably restore DO levels to pre-project conditions for any of the considered incremental harbor deepening alternatives (-44 ft to -48 ft).

EPA appreciates the opportunity to review the Tier II DEIS and the significant coordination the COE has provided over the project years. Should you have questions regarding our comments, you may wish to contact A. Stanley Meiburg, Deputy Regional Administrator, or Heinz Mueller, Chief of the NEPA Program Office coordinating the NEPA review, at 404-562-9611 or mueller.heinz@epa.gov.

Sincerely,

Gwendolyn Keyes Fleming
Regional Administrator

Enclosure

ENCLOSURE

EPA RECOMMENDATIONS & ADDITIONAL COMMENTS

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Based on our review of the SHEP DEIS, EPA offers the following project conclusions and recommendations on DO water quality, wetland mitigation, general air quality, air toxics, sediment quality and disposal, and EJ/children's health, as well as additional comments on various project topics.

> RECOMMENDATIONS

>> *DO Water Quality*

+ Dissolved Oxygen Impacts: Without mitigation, the proposed Savannah Harbor deepening project would result in a reduction in the dissolved oxygen (DO) in the Savannah River and Harbor area. The DEIS proposes to inject oxygen at three locations to mitigate the decrease in DO due to the physical dredging of the Harbor. The depressed dissolved oxygen levels are greater in the bottom portion of the River system. The proposed mitigation plan would result in an average increase of dissolved oxygen in the lower half of the River system of +0.42 mg/l DO above existing DO conditions or an 8.8% net increase in dissolved oxygen in the River system. This net improvement in DO is based on the August 1997 river flows representative of the average summer flows under critical temperature conditions. Based on this analysis, the overall impact of the proposed deepening and mitigation is a net improvement in the available DO under average summer flow conditions. To ensure that the DO mitigation is sufficient under drought conditions, EPA requests the COE assess and document in the FEIS the August 1999 low-flow conditions similar to the August 1997 normal-flow data analysis provided in the DEIS.

As discussed more fully below, the data in the DEIS based on the water quality model results indicate there are only four locations where the proposed mitigation does not fully mitigate for project impacts on DO. In three of those locations, EPA concludes that the lack of complete mitigation would not result in a failure to attain water quality standards that were previously attained, nor would it adversely affect habitat. In one location, involving a portion of Segment FR11, the lack of complete mitigation in this portion did not prevent the entire Segment FR11 from attaining a net increase in DO with mitigation. EPA defers to NOAA and the FWS to determine whether potential loss of habitat is significant. However, the data overall support the conclusion, as described above, that the proposed mitigation plan will produce a net increase in DO throughout the River system impacted by the proposed dredging project.

The determination that there are only four locations where the proposed mitigation does not fully mitigate for the project impacts on DO was based on a full analysis of the modeling of expected localized impacts throughout the Savannah River and Harbor system. The following discussion contains EPA's analysis of each of these localized instances in relation to compliance with applicable water quality standards (WQS) and anticipated impact on habitat.

The WQS for DO for this portion of the River are a daily average of 5.0 mg/l DO and 4.0 mg/l minimum for both Georgia and South Carolina. The Georgia WQS specify a compliance point for the dissolved oxygen standards as one meter below the surface for rivers with a depth exceeding two meters. South Carolina WQS are silent on the compliance depth, but their approved Section 303(d) assessment methodology references a 0.3 meter depth for grab samples for DO to determine compliance with the WQS. The DEIS focused the DO analyses on the lower portions of the river system to assess impacts on aquatic organisms sensitive to depressed DO at the lower depths.

The WASP-EFDC water quality model, described in Section 5 of the DEIS, was used in order to assess any isolated areas negatively impacted by the lowering of DO due to dredging. The River system is divided into 27 segments, each with several cells defined by depth, length and width. There are six depth layers and the River channel geometry determines how many cells are needed to adequately cover the length and width of each segment. There were two analyses performed. The first considers the distribution of the DO values for August 1997 calculated by averaging the DO values in all cells in the bottom three layers of each segment. The second evaluated the impacts of the mitigation plan on the most impacted cell in each segment (the "critical cell"). The results of these two analyses are assessed below.

The first analysis concluded that 26 of the 27 segments experience a net increase in DO from existing conditions to post-deepening, mitigated conditions. One segment, MR6, was not fully mitigated as compared to existing DO conditions. As can be seen in the table below, the lowest dissolved oxygen values found at the first and fifth percentiles of the samples would be slightly improved from existing conditions. The most significant percent net reductions in dissolved oxygen occur at the 50th percentile and above when the DO values are maintained at or above the 5.0 mg/l daily average water quality standard. The percentage of time the water quality standards are not attained under existing conditions, less than the 50th percentile, is not changed with the DO mitigation. However, there is a net loss of DO of 0.11 mg/l at the 25th percentile and a net loss of 0.22 mg/l at the 25th percentile.

DO Concentration Percentiles (mg/l) for Existing and Mitigated Conditions in MR6									
Percentile	1%	5%	10%	25%	50%	75%	90%	95%	99%
Existing	2.15	2.53	3.05	3.58	5.69	6.33	6.80	6.94	7.27
Mitigated	2.23	2.51	2.93	3.36	4.99	5.39	5.55	5.66	5.91

Although the MR6 segment is not fully mitigated with respect to DO, an evaluation of the fishery habitat maps in Appendix P, indicate that MR6 does not contain any segments which adversely impact the sensitive fish species assessed in the DEIS.

The second analysis concluded that four segments had critical bottom cells that were not fully mitigated by the proposed oxygen injection system. These segments are FR2, FR11, MR6, and LBR3. Each critical cell is evaluated below.

The critical cell in FR2 was fully mitigated except at the 99th percentile DO concentration which changed from 5.09 mg/l for the existing condition to 4.87 mg/l under the mitigation plan. All other percentiles indicated the DO was increased with the mitigation plan. Segment FR2 is

located below the portions of the River system evaluated for habitat impact. Therefore, this critical cell is not a concern regarding impacts to the aquatic community.

The critical cell in FR11, located in the SNWR above the dredged zone, exhibited significant impairment under the proposed mitigation plan. This impairment is due to the geometry of the River, sediment oxygen demand, and long hydraulic retention time caused by the localized conditions. A table comparing the changes in the DO profile is presented below.

DO Concentration Percentiles (mg/l) for Existing and Mitigated Conditions in FR11									
Percentile	1%	5%	10%	25%	50%	75%	90%	95%	99%
Existing	4.17	4.7	4.93	5.24	5.67	6.14	6.5	6.64	7.13
Mitigated	2.71	2.69	2.72	2.74	2.78	2.89	3.03	3.11	3.18

Even though this one cell is significantly impaired the average DO for the entire bottom three layers of Segment FR11 increased by 6.2% under the mitigation plan. This decrease in DO in the critical cell is likely contributing to habitat loss in a portion of the FR11 segment. This critical bottom cell covers less than one fifth of the length of FR11 and only the right half of the river channel. EPA defers to NOAA and the FWS to determine if this isolated loss of habitat is significant.

The critical cell in MR6 (the only Segment not fully mitigated) is located in the SNWR and is significantly impacted by the proposed dredging project as shown in the table below.

DO Concentration Percentiles (mg/l) for Existing and Mitigated Conditions in MR6									
Percentile	1%	5%	10%	25%	50%	75%	90%	95%	99%
Existing	2.11	2.49	3.01	3.51	5.61	6.36	6.80	7.06	7.32
Mitigated	2.64	2.65	2.66	2.7	2.81	3.02	3.26	3.39	3.49

The segment MR6 and its critical cell will experience lower water quality under the mitigation plan. However, this lower water quality is not expected to adversely impact fish habitat.

The critical cell in LBR3 which is located in the SNWR is not fully mitigated by the injection of oxygen. The proposed project impact on DO in the critical cell is shown below.

DO Concentration Percentiles (mg/l) for Existing and Mitigated Conditions in LBR3									
Percentile	1%	5%	10%	25%	50%	75%	90%	95%	99%
Existing	2.89	3.28	3.47	3.68	3.95	4.34	4.73	4.99	5.24
Mitigated	3.14	3.23	3.36	3.56	3.87	4.20	4.39	4.51	4.68

The lowest DO value is mitigated but the higher percentile values are not fully restored. However, for the whole bottom half of the LBR3 segment, there is a net DO addition of 15.3% calculated by averaging the DO increases for each percentile. An evaluation of the habitat maps in Appendix P indicates that the critical segment in LBR3 is associated with habitat gains for the Shortnose sturgeon juveniles and Stripped bass spawning and no impact on the other species. Therefore, the lower water quality in the critical cell was not deemed significant.

+ Monitoring & Adaptation: Because of uncertainties associated with modeling, EPA recommends that DO levels be monitored and adaptively managed to ensure adequate oxygen injection. As was discussed at the September 2010 Executive Steering Committee meeting, this mitigation function must also be guaranteed by the COE and/or sponsor throughout the life of the project, and be implemented prior to construction to avoid DO impacts during dredging. Moreover, financial guarantees for Speece Cone operation must be provided in the FEIS and ROD by the COE and/or sponsor for the life of the project.

+ Cumulative DO Benefits: EPA proposed a draft DO TMDL for Savannah Harbor was re-proposed in May 2010 based on Georgia's revised water quality standards, which would require an approximate 85% aggregate reduction in point source loads. Successful implementation of the loadings required by a TMDL for DO, and any additional DO mitigation provided by the Speece Cones beyond the impact of this deepening project, would together ecologically benefit the Savannah River system.

>> *Wetland Mitigation*

+ No Mitigation Credit for Sea Level Rise: Wetland marshes will be lost due to sea level rise effects over the long life of the project. Regardless of the value used in the COE analysis (e.g., +3 mm per year) to represent sea level rise, EPA believes that the proposed project should mitigate for actual wetland impacts that occur once construction is complete (the base year) and not take credit for any wetland losses due to sea level rise over the life of the project. Further, the COE should also ensure that the project fully mitigates for all impacts that would occur over the entire 50-year period of analysis.

+ Project Wetland Impact Summary: For the 48-ft deepening alternative supported by the sponsor, the project will excavate 14.08 acres of primarily saltwater tidal wetlands (saltmarsh). The project will also convert approximately 1,212 acres of freshwater wetlands to brackish wetlands or saltmarsh. As compensatory mitigation, the COE proposes to implement Plan 6A, which consists of a set of hydrological modifications in the Savannah Harbor which is predicted to restore freshwater flow to some areas and convert brackish wetlands to freshwater wetlands. Plan 6A reduces the net freshwater wetland loss to 337 acres. However, 730 acres of saltmarsh will also be converted to brackish wetlands.

+ DEIS-Proposed COE Wetland Mitigation Plan for SHEP: As mitigation for the wetland excavation impacts, the COE proposes to excavate an old confined disposal area (CDF 1S on the SNWR) down to tidal level. This would re-create approximately 45 acres of what is predicted to be saltmarsh. EPA notes that 29 acres would be dedicated to the impacts of the project and the remaining 16 acres would be "reserved" for future projects in the harbor. As mitigation for the 337 acres of freshwater wetland conversion impacts remaining after implementation of Plan 6A and the 730 acres of saltwater wetland conversion impacts, the COE proposes to preserve 2,683 acres of freshwater wetlands at a site or sites listed in a 1998 acquisition list for the SNWR. The COE used an application of the Savannah District Standard Operating Procedure (SOP) to justify these quantities of compensatory mitigation.

+ EPA's Recommended FEIS Wetland Mitigation Plan for SHEP: EPA recommends that the Wetland Mitigation Plan for SHEP include the following components:

1. Use a mutually acceptable technical approach to determine the loss (and gain, if any) of all wetland functions due to the project;
2. Apply the same approach to any proposed wetland mitigation action or site to determine wetland in-kind functional replacement;
3. Use an appropriate methodology (like an SOP) to ensure temporal and risk factors are taken into account in determining the quantity of any proposed mitigation;
4. If preservation is a component of the mitigation plan, develop site selection criteria and then identify candidate sites using the criteria;
5. Develop mitigation plans for any action/site that meet the criteria of the Mitigation Rule;
6. Ensure that all mitigation sites are protected in perpetuity in the target condition of the final Mitigation Plan, i.e., managed to sustain the in-kind wetland type;
7. Address cumulative wetland loss/conversion in the project portion of the Savannah River system;
8. As outlined in the 2008 Mitigation Rule, financial assurances for the complete implementation for the mitigation and monitoring plan should be included.

+ EPA's Concerns with Present DEIS Wetland Mitigation Plan: EPA offers the following comments and conclusions on the COE's proposed mitigation plan presented in the DEIS. Following the submission of all comments on the DEIS, we recommend the COE convene an interagency wetland mitigation "working group" consisting of agencies that commented on the mitigation plan, including EPA and FWS. The mitigation working group could then seek solutions to the issues we raise below and those raised by others. The goal of the group would be to develop an overall approach to compensatory mitigation that replaces the functions lost due to the project and to assist the COE in developing a refined draft Wetland Mitigation Plan for SHEP. The FEIS should incorporate the findings of this group and the draft Plan, while the final Wetland Mitigation Plan should be incorporated in the COE ROD.

* *Overview:* EPA recommends that the proposed compensatory mitigation plan be improved, as discussed below, to ensure that it fully complies with the Section 404(b)(1) Guidelines and the 2008 Mitigation Rule, and to ensure that it will not result in the net loss of wetland functions and types in the Savannah Harbor.

* *Mitigation Using Wetland Preservation*: The proposed preservation of 2,683 acres of some type of wetlands at an undetermined location in the Harbor represents a mitigation-to-impacts ratio of 2.5:1 for the remaining freshwater wetland impacts and the saltmarsh impacts. This is out-of-kind mitigation that is significantly below the ratios recommended in the 2001 EPA Region 4 Mitigation Policy for wetland preservation. EPA recommends development of screening criteria for wetland preservation consistent with the Mitigation Rule, focusing on wetlands that are of the highest function and which are under the most immediate threat by the project.

* *Functional Assessment*: The DEIS and its supporting studies did not employ a functional assessment to objectively and quantitatively evaluate the functional losses due to excavation of wetlands and conversion of wetland types from the SHEP. A functional approach is key to the assessment of wetland impacts and the analysis of adequate compensatory mitigation actions. We recommend that the interagency working group identify tools to determine the functional losses due to the project. This same tool should then be applied to any proposed wetland mitigation action. The comparison of the results should indicate whether or not the no-net-loss-of-function criterion is met.

* *Monitoring Plan*: There should be a detailed plan to monitor wetland functional changes throughout the harbor due to the deepening in the FEIS. This could involve the application of remote sensing methods. EPA recommends the Monitoring Plan be based on the parameters used in the functional assessment cited above. The duration of monitoring should be based on the expected time for full functional replacement. The plan should extend at least seven years after construction, which is the minimum monitoring period required by the Savannah District for any mitigation project of this magnitude.

* *Data Collection & Monitoring*: EPA recommends including a comprehensive baseline data collection and monitoring plan for the mitigation acreage, specifically, predicted acres of "restoration" of freshwater wetlands through conversion from saltmarsh/brackish marsh as identified in the implementation of Plan 6A.

* *Preservation Site Selection*: The proposed preservation action of selecting one or more properties from a 1998 list of 25 properties is vague (three of the properties are already government owned, two appear to have significant development and one was rejected as a restoration site). Alternatively, EPA recommends that an updated list of specific sites be identified, and that the five preservation criteria in the 2008 Mitigation Rule be applied to these sites as well as the other site selection criteria noted above.

* *Standard Operating Procedure Application*: Based on Savannah District Guidance, the SOP is not applicable for impacts over 10 acres, though with modification, it may be able to serve as an initial evaluation tool. The 48-ft project deepening alternative would excavate 14.08 acres and hydrologically impact/convert at least 1,212 acres of wetlands. The application of the SOP to this project affects the quantity of the proposed compensatory mitigation. This is partially due to the fact that the calculations lack a scaling factor. EPA recommends that the mitigation working group assess modification of the current SOP or use of another method to ensure an adequate quantity of compensatory mitigation is provided that will replace the wetland functions lost due to the project.

* *SOP Factors*: SOP factor selections appear to be inconsistent and clarification on the technical basis for the factors used is needed. Again, EPA recommends that the mitigation working group assess modification of the current SOP and the application of the impact factors or use of another method to ensure an adequate quantity of compensatory mitigation is provided that will replace the wetland functions lost due to the project.

* *Threats to Preserved Tidally-Influenced Wetlands*: The COE characterized the threat to any potentially preserved tidally-influenced wetlands as "moderate" due to potential development on nearby uplands, even though no specific site or sites were identified. EPA generally rates the threat to these types of wetlands as "low" or "none", especially since the State of Georgia has been exerting ownership claims on all tidally-influenced wetlands that have a valid King's grant. A significant degree of threat is one factor required for any preservation area under the Mitigation Rule and a lower degree of threat would result in significantly more preservation acreage being needed in the SOP calculations. EPA recommends the mitigation working group assess the project "threat" and incorporate it into the criteria for site selection.

* *Differing Resource Agency Mitigation Approaches*: Project mitigation for SHEP is somewhat confounded by different resource agency philosophies for mitigating the same wetland impacts. In general, EPA emphasizes a functional assessment of wetlands that is based on physical, chemical and biological metrics to restore or enhance wetlands to offset the functional losses due to a project. For this project, it appears that FWS has emphasized wetland preservation, with the preserved land added to the SNWR, as the preferred approach. Preservation clearly has a role in wetland mitigation but it should be consistent with the 2008 Mitigation Rule and should include a thorough functional assessment of the proposed preservation sites. EPA believes the mitigation working group could help resolve the differing approaches to wetland mitigation.

EPA in its review of wetland mitigation proposals applies the Section 404(b)(1) Guidelines and the 2008 Mitigation Rule (which amended the Guidelines). We understand that FWS has a strong preference for preservation and has placed a high value on freshwater tidally-influenced wetlands. This preference is also reflected in the COE's wetland mitigation plan proposed in the DEIS. For example, while Mitigation Plan 6A may increase the acreage of freshwater wetlands, it will also decrease the acreage of saltmarsh and brackish wetlands. In contrast, EPA does not categorize and rank wetland types but instead looks for functional replacement for losses of any wetland type (i.e., all jurisdictional wetlands). Both mitigation approaches should be reasonably satisfied in the wetland mitigation plan of the FEIS, so that wetland function and habitat values will both be mitigated for project impacts. An ideal plan would seek to maintain or increase the functions of all wetlands in the Savannah Harbor area.

Reflecting the lack of a functional approach noted above, the DEIS places a higher "value" on freshwater wetlands, followed by brackish wetlands and finally saltmarsh. This was observed throughout the impact and mitigation evaluations. EPA believes that each wetland type has a unique suite of functions and alteration of these functions is a loss, regardless of the wetland type. While we agree that the Savannah Harbor is a highly managed and altered estuarine system, we recommend an objective analysis for assessing functional loss that is based on in-kind functional replacement.

>> *General Air Quality*

+ Vessel Efficiency – Appendix K of the DEIS states that "Since the total number of containerized vessels calling at the port would decrease with a deeper harbor, the total volume of air emissions would decrease." To verify the DEIS assumption that future (post-project) larger

vessels (Panamax and post-Panamax) calling on the port produce less emissions than the existing smaller fleet, the FEIS should compare the fuel efficiency/emissions of larger versus smaller vessels using an "emissions per TEU" metric as the basis of comparison, and compare the emission levels per TEU for the smaller versus larger containerized vessels calling on the port.

+ NAAQS Attainment – The FEIS should demonstrate that project emissions should not interfere with area attainment and maintenance of the NAAQS under Section 110 of the Clean Air Act and NAAQS maintenance plan requirements. The FEIS should demonstrate this over the life of the project (2065) given the expected growth of the port. Such an analysis would require a project future condition analysis.

+ Future Condition Analysis: The Appendix K emissions inventory provides current and future emissions data (to 2032) for air toxics, but limits emissions data for several NAAQS and other parameters to current conditions. Therefore, EPA requests that the future condition for selected criteria and other measured pollutants also be included in the FEIS for either the No Action Alternative or the Tentatively Recommended Plan (since the COE believes them to be the same in terms of port growth and air quality).

+ Dispersion Modeling: There is no dispersion modeling in the DEIS to indicate how these emission increases will impact local area air quality monitors and communities, with emphasis on potential EJ communities. There is one target monitor of concern located in Garden City Terminal and another in downtown Savannah to determine how these emission increases will impact local area air quality. Since much of the truck traffic from the port travels through these areas, it is important to characterize the impacts along those routes to ensure that the increases will not adversely affect the models. EPA requests that the dispersion modeling evaluates potential impacts on both criteria pollutants (NAAQS) and air toxics relative to sensitive port landside receptors, with emphasis on potential EJ communities along road/rail corridors associated with the port.

+ Air Analysis Conclusions: The conclusions for the air emissions analysis section in Appendix K were somewhat general. The COE states that the emissions would occur with or without the project, but the COE has not supported the reasoning behind this statement. It is recommended that the COE provided documentation to support the analysis that the total cargo moving though the port would not increase or decrease as a result of the harbor deepening.

+ Recommended Additional Port Mitigation: EPA recommends the following additional streamlining and mitigation methods to further offset port diesel emissions and enhance the sponsor's environmental management system for the port:

* *Shore Power* – Since the port is electrifying its cargo cranes, EPA recommends the port evaluate the possibility of including shore power during that upgrade. Installing shore power at the same time as electrifying the gantry cranes should save costs. Since the vessels are significantly larger, EPA expects the call time in port to extend beyond the current average turn time. While short turn times may not justify shore power, longer turn times make shore power a potentially viable option to reduce air emission impacts.

* *Dray Truck Upgrades* – EPA recommends that the port consider programs that incentivize upgrading of dray (on-port) equipment to 2007 standards.

* *Distribution Center* – EPA recommends that the port coordinate with the distribution center to establish no-idle-zones at distribution centers. There is no need for a vehicle to idle while it is being loaded or unloaded.

* *Eliminate or Reduce Creep Idle* – Creep idle is a significant source of pollution at many ports. The port should determine if creep idle is a problem and address it accordingly. The current gating process should be effective, but an evaluation will support this.

* *Alternative Fuels* – Use of biodiesel in port diesel equipment will reduce emissions of polycyclic aromatic hydrocarbons (PAH) significantly. The port should consider this as a future fuel choice. In addition, since there is a reliable source of liquefied petroleum gas (LPG) nearby, the port could consider switching all on-property diesel vehicles to LPG to reduce impacts. The port should consider this as part of operating agreements with Stevedores and shipping lines if they do not have direct control of the jockey trucks.

>> *Air Toxics*

+ Air Toxics Emissions – Table 5-64 (pg. 46 of App. K) estimates the emissions of 28 air toxics (e.g., 1,3-butadiene, acrolein, acetaldehyde, etc.) from the Garden City Terminal in 2008 to be about 38 tons. The corresponding estimates for the year 2032 range from about 117 to 123 tons (Tables 5-74 and 5-76). This is a dramatic increase and reflects the possible emissions from only one terminal.

+ COE Level of Analysis & Project Position – Toxicity information and estimated concentrations of the air toxic pollutants around the port are not provided in the DEIS. The potential health impacts associated with these air toxics emissions are not addressed in the DEIS. The DEIS states (pg. 108 of App. K), "More detailed analyses – such as dispersion analyses to identify 'hot spots' of pollution – could be conducted. However, the Port is not a major contributor to the overall emissions in the County. When coupled with the dispersed nature of many of those 'Port' emissions along the 34-mile length of the navigation channel, the Corps concluded that such additional analyses are not warranted." Page 4 Section 2.0 (App. K) states, "This assessment does not include a detailed dispersion modeling assessment of these emissions or a risk-based assessment of the health effects associated with the proposed project."

+ Screening Level Risk Assessment – As noted above, a significant number and volume of air toxics are associated with operating the port and significant increases in such emissions are expected over time. Therefore, EPA believes that locally, port air toxics are a potential concern to surrounding communities. The dispersion of emissions and the location and magnitude of the emission sources are important to determining whether a particular source poses a significant risk to those nearby. EPA Region 4 has provided detailed guidance (including references to well-prepared air toxics analyses by the COE at other ports) numerous times over the last several years of coordination to assist the COE in such an evaluation. EPA continues to support for a screening level risk assessment to evaluate the potential impacts associated with emissions of air

toxics related to the harbor deepening and its operation, both overall and potential any areas of localized higher concentrations, particularly in light of the projected increase in emissions of air toxics associated with the port over the next several years.

+ Vessel Cargo (App. K): While the Appendix K emissions inventory for air toxics provides both current and future emissions data, future conditions data were considered the same after 2032 since the COE maintains that the number of calling vessels will be constrained by 2032 (due to one-way vessel traffic) such that there will be no increase in freight thereafter. While the number of ships calling on the Garden City Terminal is at capacity in 2032, it is unclear how the COE made a determination that there would not be an increase in cargo offloaded or an increase in overall freight received. The FEIS should clarify if the capacity at the port to store and handle additional cargo is reached at the same time. Currently, every ship that calls on the Garden City Terminal does not offload 100% of its containers. If this is the case in 2032, then the capacity of the terminal itself is the key stabilizing factor and not the number of vessels calling on the port. If the capacity of the terminal has not been reached at 2032, then that same number of vessels could still offload more containers and increase the air emissions throughout the 50-year life of the project (to 2065).

>> Sediment Issues

+ Elevated Cadmium: The cadmium background is elevated in some Savannah River reaches, but its re-suspension in the water column during dredging is not expected to be a significant issue with application of appropriate Best Management Practices (BMPs), including the potential use of dredging methods that minimize potential cadmium re-suspension, as appropriate.

+ Upland Disposal: EPA finds that the upland disposal management plan for the project's cadmium-laden dredged material is acceptable, with the exception of a few minor inconsistencies. Overall, EPA concurs with the use of eight (8) upland confined disposal facilities (CDF's) provided by the GPA/GDOT non-federal sponsor for use as part of SHEP. These CDF's are known as 2A, 12A, 12B, 13A, 13B, 14A, 14B, and Jones/Oysterbed Islands. However, dikes at the CDFs will have to be raised in height over the next 50 years to provide the needed sediment storage capacity. EPA recommends that the FEIS provide additional information on long-term maintenance issues for Savannah Harbor, and commit to specific future review dates to consider advances in dredging technologies, changes in shoaling rates or environmental conditions, as well as changes in environmental laws.

+ Proposed Extension of Ocean Channel – The proposals in the DEIS include dredging to extend the current channel offshore for over seven miles since ocean water depths in these areas will not accommodate post-Panamax vessels under all tide and cargo conditions. This channel extension would constitute an estimated 17-18% increase in the project channel length, while the additional 4.6 mcy of new work dredged material is a 13-15% increase in the dredged material volume.[1]

[1] The cited length and volume percentages are expressed as ranges due to some inconsistencies in the DEIS (e.g., the total dredged material volume for the -48 ft deepening is 28.3 mcy on page 3-18, but 38.8 mcy on page 5-97).

This project component should be fully analyzed and discussed in the FEIS. Specifically, the FEIS should address the following:

* *Characterize Dredged Material*: Were core samples taken, will hard/live bottom material be dredged, are sediments contaminated, are there any additional cadmium concerns associated with this project component, etc.? Should it be determined that hard/live bottom material will be dredged within the channel extension area, an analysis of fisheries mitigation would be necessary. EPA recommends that appropriately designed fisheries enhancement in-kind habitat mitigation be used to fulfill any identified mitigation requirements.

* *Offer Disposal Options*: What disposal areas are available, particularly given that the use of proposed sites 11 and 12 may not be appropriate (see *Dredged Material Reuse* below)?

* *Savannah ODMDS Capacity Evaluation*: Any plans requiring use of the Savannah ODMDS should include an ODMDS capacity evaluation to ensure the ability to accommodate the related volumes of dredged materials.

* *Provide Route Variations*: The DEIS does not identify the specific alignment of the proposed new channel extension. EPA understands that hard bottom habitat has been identified in the general vicinity of the new channel extension. Are there slight alignment shifts possible within the channel corridor to avoid any potential hard bottom habitat? What mitigation measures will be taken for impacts?

* *Discuss Funding*: Did the WRDA 1999 authorization include the funding and cover the scope of this proposed extension?

So that EPA can have a full understanding of the ocean channel extension component, EPA requests the opportunity to review and comment on the new channel dredging sections prior to the issuance of the FEIS. EPA also notes that based on the lack of information on this issue in the DEIS, the public may not have a full understanding of this issue for purposes of public review and comment.

+ Dredged Material Reuse: EPA recommends that the COE consider re-entering suitable sediments dredged at the entrance channel into the sand-sharing system (longshore drift) by placement at feeder berms located south of the entrance channel in areas free from seagrasses, hard/live bottoms, and/or cultural resources. Use of suitable dredged material for beach renourishment projects can also be a reasonable reuse if locally requested; seagrasses, hard/live bottoms and/or cultural resources are not covered; and grain size is compatible with the existing beach to reduce erosion potential. Feeder berms utilized for this purpose must be located within the territorial sea (i.e., shoreward of the 3 nautical mile line) in accordance with the Clean Water Act (CWA). Placement of dredged material outside the territorial sea is regulated under the MPRSA and must be placed in an EPA- designated ODMDS after proper characterization and evaluation, and in compliance with the Ocean Dumping Regulations (40 CFR 220-228).

In regard to the proposed project disposal of dredged material at sites 11 and 12 near the entrance channel as fish habitat mounds, such reuse may not be consistent with MPRSA and

should be further coordinated with EPA. Pursuant to Section 103 of MPRSA, ocean disposal of dredged material can only occur in an EPA-designated ODMDS. Alternatively, material can be placed as fill pursuant to Section 404 of the CWA within three miles of the baseline, such as the above feeder berms within the sand-sharing system. Although EPA supports fisheries enhancements and acknowledges that there is a fisheries exemption under MPRSA, the DEIS does not provide sufficient information to demonstrate that placement of dredged material at these sites would necessarily "develop, maintain or harvest fisheries" and exclude it from the Ocean Dumping Regulations (40 CFR 220.1(c)(2)). We are concerned that the fishery habitat value for these mounds would be minimal since they could easily erode, potentially be a navigational concern, be proximal to the turbidity and other effects of recurring maintenance dredging of the entrance channel, and would not provide any hard structure as is typical of fisheries enhancement projects.

Therefore, EPA recommends the evaluation of other alternatives, such as use of the Savannah ODMDS for the disposal of this material. If entrance channel dredged material cannot be properly reused in accordance with the CWA, the material, if shown to be suitable and in compliance with the Ocean Dumping Regulations, could potentially be disposed of at the Savannah ODMDS which is formally designated by EPA, consistent with MPRSA. EPA emphasizes that such project disposal at the ODMDS is a separate process from the current harbor deepening project NEPA process and will therefore need additional coordination.

>> *Environmental Justice / Children's Health*

+ Air Emissions – According to page 5-150, the COE expects the volume of containers handled at the Garden City Terminal to increase from 2.6 million TEU until the terminal reaches its capacity of 6.5 million TEU around 2032. According to the DEIS, this is predicted to significantly increase the number of truck movements per day from 4,900 to approximately 13,000. In addition, while the number of containerized ships that may use the channel would eventually be constrained by the one-way traffic limitation for calling vessels, the port capacity and amount/percentage of cargo that can be unloaded in Savannah does not appear to be restricted. As suggested in our *General Air Quality* section above, EPA expects that this project has the potential to result in additional truck and locomotive traffic within the project areas, even after 2032. In turn, these additional landside emissions could affect potential nearby communities and should be evaluated.

+ Public Involvement – The DEIS indicates that representatives of the potential EJ communities have not expressed *substantial* concerns about the project. It is unclear what concerns have been expressed by EJ representatives, how they were resolved and what denotes *substantial* concerns (pg. 5-145). The FEIS should incorporate this information within the EJ section for public review. EPA notes that many meetings have been held related to the project, including two public workshops at the beginning of the project. We recommend that the FEIS describe how or whether specific efforts were made to engage EJ communities in the surrounding areas during that period or subsequently. EPA commends the COE for the use of an external Stakeholders Evaluation Group (SEG), which held approximately 65 full meetings. The outcomes of SEG's extensive involvement should also be summarized in the FEIS as well as the degree to which representatives from potential EJ communities were involved or EJ concerns were discussed and

addressed in this forum. The FEIS should also indicate whether the port has a mechanism or long-term program designed to update surrounding communities on port expansion/changes and for receiving regular feedback or concerns from areas residents.

+ Property Acquisition – The DEIS indicates that properties will be acquired for the project, but the precise properties have not been determined. According to the DEIS, the properties will be selected from a list identified by the FWS for acquisition and could contain a small number of residences. The COE believes these impacts will be minimal because less than five properties are expected to be acquired. The FEIS should include information regarding the property type (i.e., residential, commercial), location/number, and the percentage that are owned or occupied by minority and low-income populations and describe in the FEIS how any identified issues are resolved.

+ Noise & Lighting – EPA appreciates the efforts that have been made to minimize noise and lighting impacts. However, in the EJ section, there does not appear to be a discussion/overlay of existing noise levels on the communities that surround the port and its transportation corridors. This baseline information should be summarized in the FEIS EJ section, or cross-referenced. We note that the GPA sponsor has programs designed to reduce air, noise and lighting impacts on the surrounding communities. For example, GPA built noise berms to offset significant noise impacts and have reduced their facility lighting to conserve energy and offset impacts.

+ EJ Project Benefits – Although it does not mitigate for project impacts, job creation is the primary benefit (offset) derived from the proposed SHEP to both EJ and other populations living in the project area. Overall, the DEIS does a good job discussing the percentage of minority residents that are currently employed by GPA and one of three unions. Based on these percentages, it is likely that EJ populations will also economically benefit from the project by securing some of the 175 additional positions expected by 2020 due to future cargo growth.

+ Children's Health Documentation – Unlike the EJ section, demographics related to the population of children under age 18 within the project area relative to the reference population (i.e., county and state) are not fully incorporated. This information should be provided in the FEIS under Section 5.20 on children's health. Nevertheless, EPA appreciates the inclusion of a map depicting the location of schools, hospitals and child care facilities along the navigation channel. In terms of the impacts assessment, EPA notes that the DEIS indicates that the facilities are dispersed throughout the communities and are not located disproportionately near the navigation channel of the Garden City Terminal. While these facilities may be dispersed, it is unclear whether some areas along the navigation channel, terminal or transportation corridor (trucks/locomotives), currently experience (or potentially would in the future) substantive impacts from noise, traffic, air toxics, etc., relative to more removed and unaffected (baseline) areas. In this regard, we are pleased to note that the DEIS provides information related to several measures that are being made to reduce air emissions and to improve traffic in area neighborhoods in the future.

> ADDITIONAL COMMENTS

+ SHEP Modeling Results Presentation – As part of the NEPA process over the last decade, the COE has invested considerable amounts of money (over $10 million) on at least 15 major models that address a wide range of issues. Numerous engineering and scientific models were developed to quantify impacts in water quality, DO, chlorides, salinity, fisheries and conversion of freshwater to brackish wetlands. Groundwater studies and surface water modeling efforts were conducted regarding saltwater intrusion and decreased DO levels within the project area, and modeling was also conducted to study the effects of hurricane storm surges within the deepened harbor channel.

Although the conclusions from technical meetings about these diverse models (including numerous comments) are incorporated into this DEIS, EPA recommends that a separate appendix or section in the main document be added to the FEIS to provide a synopsis of the modeling with emphasis on results. Similarly, we note that Section 1.03 (*Major Conclusions and Findings*) primarily only references other sections within the DEIS where topics are discussed such as water quality and fisheries (as opposed to providing an actual summary of conclusions for the reader). We therefore recommend that the FEIS summarize the COE's findings for those sections in an appendix or separate section in the main document. We believe such summary sections for modeling and other findings would improve the readability of the FEIS and consolidate results for public and agency review.

+ Cumulative Impacts – Appendix L is dedicated to addressing cumulative effects. We acknowledge that considerable analysis was provided, including identification of the affected resources as well as past, ongoing and reasonably foreseeable conditions.

Despite this substantive effort, we recommend that the 22 National Pollutant Discharge Elimination System dischargers identified in the TMDL located along the Savannah River be discussed and preferably listed with their main impact identified. This is particularly relevant in this case since project and discharger impacts (oxygen-demanding effluent) both deplete river DO levels and thereby causing a local cumulative effect. The COE may wish to coordinate with the respective states and EPA to document these dischargers.

+ Alternatives – We offer the following comments and clarification for alternatives:

* *Action Alternatives Description*: Given that the DEIS indicates that approximately 70% of the vessels calling on the port are not at their maximum load and design draft, we suggest that the FEIS provide the relative capability (percentage greater than the existing 70%: pg. 3: App. K) of each deepening alternative to accommodate large post-Panamax vessels. Such an evaluation would show if any alternatives other than the -47 and -48 ft options (both being considered the Tentatively Recommended Plan by the COE in the DEIS) could also reasonably accommodate post-Panamax vessels without waiting on high tide or limiting cargo.

* *Jasper County Marine Terminal*: We note that the Jasper County Marine Terminal was conceptually considered for Savannah River Mile (RM) 5 in Jasper County, South Carolina during the SHEP study timeframe. This terminal was referenced in the main document (pg. 5-

119) and in Appendix L discussing cumulative effects (pg. 46). EPA understands that no detailed studies have been conducted for the facility and that this alternative may or may not be presently considered as an alternative to the proposed deepening of the harbor. Nevertheless, we suggest that this alternate port terminal and its status (i.e., potential as a near-term alternative) be disclosed and discussed in the main document of the FEIS under *Alternatives* (Section 3.00).

The advantage of the discussed Jasper Terminal alternative is that it would be much closer to the coast than the Port of Savannah (5 RM versus 21 RM upstream the Savannah River) and therefore require significantly less channel dredging than the proposed expansion and thereby minimize additional fish habitat losses and increases in saltwater intrusion. Such a Jasper Terminal could one day also act as a reliever port to the existing Port of Savannah due to the Port of Savannah's one-way vessel traffic constraint, which would remain even after proposed project dredging. However, a terminal near the mouth of the Savannah River would result in significant wetland losses to construct its roadways/rail spurs and other infrastructure which currently do not exist there, as well as probable secondary developmental impacts in the surrounding area.

* *Details of COE's Maximum Authorized Plan*: This -48 ft deepening plan includes dredging (6 feet deeper) most of the harbor and existing turning basin (Kings Island Turning Basin at Stations 98+500 to 100+500), the eight berths at Garden City Terminal (Berths 2, 3, 4, 5, 6, 7, 8, and 9), widening the three bend wideners (Stations -23+000B to -14+000B, 27+700 to 31+500, and 52+250 to 55+000,), constructing two meeting areas (Stations 14+000 to 22+000 and 55+000 to 59+000), and constructing an approximately 25,000 foot long extension to the existing 600 foot wide ocean bar channel from Station -60+000B to -98+600B. Dredging will remove about 15 million cubic yards of sediment from the Inner Harbor (Garden City Terminal from Station 103+000 to Station 4+000) with disposal in the existing upand CDF. Dredging will also remove about 13 mcy of sediment for the Entrance Channel (Stations +4+000 to -98+600B) with placement in nearshore feeder berms off of Tybee Island, in the submerged berms (2,000 feet from the ocean bar entrance channel), and possibly in EPA's approved Savannah ODMDS.

+ Speece Cones – The Speece Cone systems would be land-based, with water being withdrawn from the river through pipes, then super-saturated with oxygen and returned to the river to locally augment DO levels. We offer the following:

* *Locations*: The Speece Cone systems may be located in three locations (near Georgia Pacific, Hutchinson Island – west side, Hutchinson Island – east side). Table 5-24 projects 8-10 cones are proposed, depending on the alternative selected. The FEIS should include a detailed plan and commitment to specific Speece Cone locations, and include information about easements, rights-of-way, etc. where relevant.

* *Operation*: The energy consumption of Speece Cones could be an expensive operational cost from an electricity use perspective. In addition, depending on their final location, transmission line infrastructure to some of the cones may need to be constructed. The FEIS should consider these construction and operation costs in the overall project budget. EPA also understands that generators may be used to power isolated Speece Cones in lieu of constructing such transmission lines. If so, would these generators be operated by gasoline, diesel or electricity? If emissions are generated, have estimates been documented and

minimized? Although outages of a few hours should not significantly affect river DO levels, the FEIS should discuss the likelihood of brownouts or generator malfunctions and any contingency plans for power losses for a longer term.

* *Noise*: While the DEIS concludes that the proposed harbor deepening "is not expected to result in more than minimal adverse impacts as a result of noise," and the Speece Cone systems may be located in locations that are not particularly noise-sensitive areas, no noise information from the operation of the Speece Cone systems was found in the main document of the DEIS (e.g., Section 5.21 under "A. Noise" on page 5-154 or in Section 5.2.2 under "Mitigation Impacts to Dissolved Oxygen" on page 5-48 were reviewed). The FEIS should disclose such information.

EPA is requesting such noise information since we understand that operational noise levels during the Speece Cone project demonstration (pilot study) were substantial. Therefore, we request that noise levels during operation be modeled and the anticipated seasonal schedule for operation be documented. Moreover, we suggest that noise attenuation methods be considered in terms of shielding around the cones and insulation within the cones, or perhaps upgrades in technology to collectively generate less noise at the source (source reduction). Moreover, the cumulative noise impacts of the 8-10 Speece Cones proposed should also be considered if two or more are located proximally.

+ General Air Quality – We offer the following additional comments on the emissions inventory for the current conditions for those measured criteria pollutants and other parameters provided in the DEIS (App. K):

* *Truck Model Years*: The model years of the Jockey trucks, for which the COE calculated emission rates, is unclear. Without model years, emissions estimates cannot be made.

* *MOBILE Modeling*: The COE used the certification levels for incoming engines instead of the in-use emission factors. These factors can be calculated using MOBILE 6 or the new MOVES model. If the COE uses MOVES, there is an air toxics model which will provide a breakout of key air toxics from this fleet.

* *Locomotive Calculations*: The hours of use from a daily average to a weekly average do not add up. Additional information is needed on how the weekly average was calculated. The 21 hours/day and only 69 hours/week for switching implies that the locomotives are being used a little over three days. Further, idling emissions can be significant. This should be calculated in the FEIS.

* *Emission Analysis*: The DEIS is limited in the supporting data for the emission estimates provided. The COE should provide model inputs and outputs for calculation of the on-highway and non-road emissions. This information will provide a sound support for the data listed in the DEIS. Without such support, the validity of the estimates cannot be assessed.

+ Air Toxics – The following are additional comments on air toxics (all page and table references are to Appendix K).

* *Port Growth & Efficiency*: Page 6 Section 4.0 notes that "At 2032, the capacity of the port would be reached. This means that between 2032 and 2065, no additional growth occurs in commodities or annual vessel numbers. No additional vessels could load/off-load at the port each year between 2032 and 2065." Page 80 notes that: "The reduced emissions reflect the lower number of container ships that would call in a given year with a deeper harbor." However, page 62 notes that: "Growth in such (cargo handling) efficiency has been commonly observed in the past, and is expected to continue to occur at Savannah, but the ability to predict its amount and timing are quite difficult." If increased cargo handling efficiencies occur, then the port might accommodate additional visits by large ships. EPA recommends that the COE make estimates concerning the likely efficiency increases that might occur, how this might allow additional cargo to pass through the port, and the associated increase in air pollution emissions. It should be noted that page 94 states: "The volume of air toxics emitted as a result of port operations is expected to increase as the volume of cargo passing through the port rises." This scenario should be evaluated in the FEIS.

* *Port Vessel Calls*: Pages 7-8 Table 4-3 summarizes the anticipated vessel calls at the Garden City Terminal over the next several decades for the No Action Alternative and a number of channel deepening alternatives. For the No Action Alternative or "42 feet Baseline", the total number of calls increases from 2,172 in the year 2015, to 4,148 (nearly twice as many) in the year 2032 when the capacity of the port should be reached. This increase is largely due to an increasing number of post-Panamax ships calling at the port. Post-Panamax calls rise from 308 in the year 2015 to 2,226 in 2032, an increase of 1,918 post-Panamax calls per year, nearly the entire increase that is projected to occur in calls to the port by 2032.

It is unclear how this projected increase in post-Panamax visits would be possible if, as the DEIS states in the Abstract (pg. 1): "In excess of 70% of the vessels do not call on Savannah Harbor at their maximum capacity or design draft. The "light loading" of vessels increase costs to the shipper, which are eventually passed on to the consumer. Less efficient vessels also generally result in higher shipping costs." Page 3 of Appendix K supports this concern, stating: "The GPA indicates that 70% of the container vessels that called on the port in 2006 were operationally constrained by the channel depth. As the newer, larger container vessels increase their calls at the port, that percentage will increase." Post-Panamax ships are among the ships that will be operationally constrained. Given that they comprise nearly the entire increase in calls to the port over the next two decades, the number of ships that would be operationally constrained by the current channel depth could increase dramatically – to nearly all ships calling at the port.

EPA assumes that the resulting delays from congestion and the need to schedule visits to the terminals according to the tides would be economic disincentives to the use of the Port of Savannah, and result in a redirection of trade to other ports if the channel were not deepened. If redirection of trade to other ports did not occur, the EPA further assumes that the base case would result in greater waiting times for the ships to be able to navigate to and from the terminals and corresponding additional air pollution emissions.

* *Port Truck Calls*: Page 39 Section 5.14 refers to trucks calling at the Garden City Terminal. The FEIS should include any data on the number of trucks calling at the Ocean City

Terminal and private terminals along the river. Also, Table 5-50 cites the number of trucks calling at Garden City in 2008. These values are identical to those in an earlier version of this document from 2006. The values should be updated or the date on the table corrected.

* *Locomotive Emissions*: The last sentence on page 44 indicates the COE obtained information from the NMIM "SCC Toxics" database provided by EPA Region 5. For the FEIS, the COE should identify the source of emission information used for locomotives and commercial marine sources.

* *Table 5-63 Values*: The values in this table (pg. 45) should be checked since they differ significantly from values in the draft version of the table provided by the COE some time ago. This table compares air toxics emissions from the port with those from the entire county. This is an inappropriate comparison in that air toxics pose a threat primarily to those who are near the source. A comparison between emissions at the port and those countywide could be misleading because the emissions from port activities are more localized than those from the county as a whole. The comparison of air toxics emissions between the county and port presented in this table should be accompanied with an acknowledgement that localized impacts at the port could be significant. We suggest the COE include an emissions density map, population density map, and map identifying locations of sensitive populations which would be informative for the reader in evaluating this information.

The first sentence on page 45 refers to Table 5-61. Should this refer to Table 5-63? The first sentence says that the table lists the relationship of 28 toxics to other calculated pollutants. Is there a column missing that would indicate percentages or ratios between the toxics and other pollutants? How did the COE develop the values listed in Table 5-63? If ratios were used to estimate emissions based on other parameters, how those ratios were developed should be detailed in the FEIS (i.e., what specifically are the numerator and denominator for each and where were those data were obtained?). The quantity of air toxics emissions should be identified by source type. This would help determine the areas that would benefit most from emission reduction efforts.

* *2006 Air Quality Analysis*: The first sentence on the last paragraph of page 3 refers the reader to the "Air Quality Analysis, Savannah Harbor Expansion Project" which was prepared in 2006. The text says that this report is available from the Savannah District. However, we suggest it be included as an appendix to the FEIS, or alternatively, be made available online.

* *Editorial Comment*: The first sentence on the last paragraph of page 5 states that the 2006 Air Emissions Analysis is Attachment A. However, Attachment A is the container fleet forecast.

+ EJ & Children's Health – EPA offers these additional comments:

* *EO 12898*: The DEIS (pg. 5-144) states that "Executive Order 12898 deals with Environmental Justice." This statement should be amended in the FEIS to reflect that the EO deals with EJ "in minority and low-income populations". The DEIS also indicates that the EO states that "...the Federal government would review the effects of its proposed actions on low

income communities." We believe this statement should be removed in the FEIS because it is not found in the EO. We offer that it is more accurate to retain the following statement: "Federal agencies are 'to the greatest extent practicable and permitted by law' identify and address 'as appropriate', disproportionately high and adverse human health and environmental effects of its programs, policies and activities on minority populations and low-income populations in the United States."

* *EO 13045*: EPA appreciates the inclusion of a children's health section related to Executive Order (EO) 13045, which deals with the protection of children from environmental health and safety risks. As part of the background information, the DEIS indicates that the EO states that "...the Federal government would review the effects of its proposed actions on children because they may suffer disproportionately from the environmental health risks and safety risk." This statement should be removed in the FEIS since we do not believe it is accurate. However, the subsequent DEIS statement accurately reflects the EO and should be retained: "Federal agencies are to 'identify and assess environmental health risks and safety risks that may disproportionately affect children;' and 'ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.'"

+ Sea Level Rise – EPA and the COE concur that as sea level increases at Savannah, the amount of tidal freshwater wetlands will decrease. Since there have been continual records of sea level at Savannah for over 200 years, EPA understands that the COE decided that it would rely heavily on that site-specific historical data in its prediction of future trends in sea level rise at this site. Examination of the historic information revealed that sea level has been rising relatively constantly at Savannah at an average of +3 mm per year. Therefore, the COE decided to use a continuation of this historic rate of sea level rise at Savannah in its predictions of future wetland distributions in the estuary. EPA notes that the +3 mm per year value is within the bounds of sea level rise predicted for the next century in the 2007 report from the International Panel on Climate Change (+0.18 to +0.59 meters).

+ Fisheries – EPA gives deference to the fishery experts of FWS, NOAA and their state counterparts regarding project impacts and mitigation. However, we wish to offer that EPA conceptually supports a fish passage at the New Savannah Bluff Lock and Dam since it would open up 20 river miles of former (pre-dam) habitat above the dam that is not affected by the SHEP dredging. We also agree with the COE that the original 2002 proposal for such passage should be updated; however, we will defer to NOAA, FWS and their state counterparts regarding any new or preferred designs as to the engineering of the passage structure.

Conceptually, however, we believe that whatever design is selected should be easily available to, and usable by, all anadromous/catadromous species of SHEP concern (in terms of their varying size and behavior) and perhaps optimal for the Shortnose sturgeon due to the reduction of its habitat by past and proposed dredging below the dam and its federally endangered species status.

+ Maintenance Related to Savannah NWR – The federal government is responsible for maintenance of the Diversion Canal, the channels in Little Back River and Middle River, and the canals and control works for the SNWR. In May 2010, the COE entered into a contract to

rehabilitate a major portion of the project, with work beginning in July 2010. The COE has requested the additional funds that are required to complete the rehabilitation work. The FEIS should include additional details on the progress of this important work.

+ Bank Erosion at Old Fort Jackson – The concerns that had been expressed during public review of the Tier 1 EIS about bank erosion at Old Fort Jackson have been addressed. In 2003, the COE partnered with the GDNR (which owns the site) to stabilize the shoreline. Similarly, the Manager of the Fort Pulaski National Monument has expressed concerns about the ongoing erosion that is occurring along portions of their river shoreline. The COE determined that the erosion is the result of several factors, but an increase in vessel size is not expected to "substantially" increase the rate of the ongoing erosion, but may have some effect. EPA recommends that the COE partner with the National Park Service to address river shoreline erosion at the Fort Pulaski National Monument.

+ COE-SHPO Programmatic Agreement – We suggest that a signed and dated Programmatic Agreement between the COE and the State Historic Preservation Office (SHPO) from Georgia and South Carolina be included in Appendix G.

United States Environmental Protection Agency, Region 4

Page 3

1109-BB-101-EV01

Comment: *EPA commends the COE for its significant efforts to inform the public, the Stakeholders Evaluation Group (SEG), local communities, and numerous State and federal resource agencies regarding the many issues associated with the proposed harbor deepening. EPA understands that since its inception in January 1999, the COE has met with the SEG approximately 65 times to discuss the proposed deepening. In addition to the scoping meetings of2002, a number of meetings with the public and agencies have been held to discuss project issues such as salinity changes, lowered DO, conversion of freshwater to brackish wetlands, benthic organisms, contaminated sediments, economics, and cumulative impacts related to the proposed harbor deepening.*

Response: The District has maintained open and transparent communication with all interested parties throughout the entire NEPA process.

Page 4

1109-BB-101-EV02

Comment: *The -47 ft alternative is the COE's tentatively-identified NED Plan because the COE found it to be the alternative with the maximum net economic benefit. According to the DEIS, the NED Plan would be recommended for implementation (Recommended Plan) unless there are "overriding conditions" to favor another plan (pg. 3-19). However, such conditions may exist in this case as GPA supports the -48 ft alternative and it could become the non-federal, cost-share sponsor of that deeper alternative (pg. 2) and fund the additional cost difference between its -6 ft deepening and the NED Plan's -5 ft deepening (the FEIS should verify if this will be the case). For the purposes of the DEIS, however, the COE did not identify a single Tentatively Recommended Plan, so that both the -47 ft and the -48 ft alternative are the COE's Tentatively Recommended Plan at this time (pg. 3-22). A final COE Recommended Plan should be identified in the FEIS and selected in the COE's Record of Decision (ROD).*

Response: The FEIS identifies the NED plan and its associated environmental impacts. As a result of the comments that were received on the Draft GRR and Draft EIS, and after coordination with the project's non-Federal sponsor, the Corps decided to select the NED Plan for implementation.

Page 5

1109-BB-101-EV03

Comment: *The DEIS states that the COE believes that the proposed action (Recommended Plan) would not increase the number of containers (TEUs) that would be processed at the port when compared to the No Action Alternative - even though the fleet mix would change to fewer vessels (larger posi-Panamax) compared to the current greater volume of smaller vessels. The COE agrees that there would be port growth over time, but maintains that growth would be the same with or without the proposed action. Accordingly, the number of TEUs would stay constant (or the growth rate would stay the same) with or without the project so that port vessel, truck and train emissions would be the same (or would grow the same). A consequence of this assumption is the belief that the port air quality would not change due to the project and would improve with the replacement of multiple smaller vessels with fewer larger ones (as well as the required use of lower sulfur fuels by calling vessels in 2015). The DEIS provides insufficient*

information for EPA to agree with these statements, and we request additional modeling to evaluate these statements and other general conclusions regarding air emissions.

Response: Under both the without- and with-project conditions, the District expects the Garden City Terminal to reach its build-out capacity around 2030 when the total number of TEUs processed reaches 6.5 million. This annual capacity will be constrained by the following factors: size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the container cranes, the number of jockey trucks that move the containers within the terminal, how the containers are stacked within the terminal, and the number of railroads that service the terminal and the frequency of their trains. It is anticipated that without deepening, more vessels will be required to transport this volume of cargo whereas with channel deepening, the total number of vessels decreases as they will be able to load more completely.

No increase in cargo is expected to occur as a result of the proposed harbor deepening. As a result, the number of containers that transit the areas that surround the port remains a zero sum when compared to the without-project condition. Further, overall landside impacts outside the Garden City Terminal, e.g., noise, air emissions [including air toxics], and traffic, would not increase as a result of the proposed deepening. The project's economic benefits accrue from the use of larger, more cost-effective container ships, not an increase in the number of containers.

The Corps' multiport analysis indicates that while there would be substantial economic benefits garnered through the increased efficiency of a deeper Savannah Harbor, those efficiencies would not decrease the total transportation costs of goods through Savannah Harbor to the extent that it would alter the relative advantages of other east coast ports. This is based upon an analysis of the total transportation costs of moving goods through other ports with the cost of moving goods through a deepened Savannah Harbor. The Corps evaluated the total transportation cost of goods moving through the east coast ports and did not identify any change in the comparative costs between ports. Therefore, the Corps has no basis for believing that Savannah Harbor would have increased throughput due to deepening the harbor. See also other responses to comments on air emissions issues.

1109-BB-101-EV04

Comment: *EPA acknowledges that the ability to fully accommodate larger (and presumably efficient) vessels could result in operational efficiencies that could - at least initially - reduce the number of vessel trips. Fewer vessel trips for the same amount of projected cargo weight (e.g ..TEUs) along with introduction of cleaner diesel fuels by 2015 could result in a net reduction in ship emissions. However, in contrast to the COE's perspective, EPA believes that over the life of the project, the projected growth in port commerce could cause a commensurate increase in the overall vessel trips and in the number of TEUs, thereby resulting in possible increases in vessel, truck and train emissions. That is, compared to the No Action Alternative, EPA believes that the number of vessels, cargo and emissions would likely increase more over time with the operational efficiencies of the harbor deepening project, despite the use of larger vessels and cleaner fuels.*

Response: According to the commodity forecast found in Section 5 of the GRR, the port's landside cargo handling is maximized at 6.5 TEUs around the year 2030, i.e., there are practical, finite limits for expansion. The basis for this determination was cited in a previous response.

This landside capacity is the port's limiting factor, rather than a constraint on the number of vessels that could be processed. Therefore, when landside cargo handling capacity is reached [2030], vessel calls

would not increase through the remainder of the project's economic life [2067]. The Corps Fleet Forecast [developed by the USACE, Mobile District in consultation with the Georgia Ports Authority] verified this projection.

Page 6

1109-BB-101-EV05, 1109-BB-101-EV06

Comment: *Our major concern during the Tier I and II NEPA process has been the ability to mitigate project DO impacts attributable to dredging. After extensive interpretation of DO hydrodynamic modeling data, EPA finds that project DO depletions can be reasonably restored to pre-project conditions and evenly distributed within the affected river reaches using Speece Cones for direct oxygen injection into the River. The modeling concluded that such oxygen injection would be sufficient to not only serve as DO mitigation for project losses but also for underestimated DO deficiencies associated with the last harbor deepening to -42 ft. Such artificial injection is expected to elevate DO concentrations by +0.42 mg/L on average, which would raise these river reaches to levels approaching 3.5 mg/1. To ensure that the DO mitigation is sufficient under drought conditions, EPA requests the COE assess and document in the FEIS the August 1999 low-flow conditions similar to the August 1997 normal-flow data analysis provided in the DEIS.*

Response: Concur. DO depletions caused by channel deepening will be restored to pre-project conditions through use of the oxygen injection systems.

The Water Quality Interagency Coordination Team requested the District evaluate the project's impacts on dissolved oxygen using the August 1999 low river flow conditions. The request was partially based on the States' identification of those conditions as being the critical ones for dissolved oxygen levels in the estuary. The first DO system design report also identified low river flow conditions as requiring more oxygen to mitigate project impacts than would drought flows. The Interagency Coordination Team requested the District analyze potential impacts under the August 1997 average river flows as a sensitivity analysis. The results of that evaluation were included as Supplemental Materials to the Engineering Appendix of the GRR. The District also performed two other sensitivity analyses requested by the Water Quality ICT – (A) low river flows and 1999 point source loads, and (B) low river flows and maximum permitted point source loads.

1109-BB-101-EV07

Comment: *To achieve success in project DO mitigation, EPA expects three assurances from the COE and/or OPA sponsor. These are: I) post-construction field monitoring of DO levels to ensure the above-described level of DO restoration, 2) guaranteed mitigation throughout the life of the project, and 3) installation and operation of the Speece Cones before dredging begins to ensure that the project's predicted impacts to DO are minimized and mitigated from the outset in order to avoid any potential temporary impacts on the aquatic community while dredging occurs.*

Response: The District agrees (1) to conduct post-construction monitoring of DO levels to ensure the project compensates for its DO impacts, (2) to operate and maintain the mitigation features as described in the FEIS throughout the life of the project, and (3) to install the Speece Cones at the beginning of the project and begin their operation on Hutchinson Island before dredging occurs upriver of Station 0. The second DO system would become operational within one year of the start of dredging upriver of Station 0, well within the four-year construction period.

1109-BB-101-EV08

Comment: *Project DO mitigation would primarily only restore DO levels to pre-project conditions, and there remains a continuing need to improve the overall DO water quality of the Savannah River system. In this regard, EPA is currently working to revise the DO Total Maximum Daily Load (TMDL) for Savannah Harbor. Consistent with 40 CFR §122.44(d)(l)(vii)(S), EPA expects that the wasteload allocations for the oxygen-demanding substances contained in the TMDl, along with any relevant assumptions and requirements, will be implemented through the state National Pollutant Discharge Elimination System permit program. EPA proposed a draft DO TMDL for Savannah Harbor in May 2010 based on Georgia's revised water quality standard, which would require an approximate 85 percent aggregate reduction in point source loads. Successful implementation of the loadings required by a TMDL for DO, and any additional DO mitigation provided by the Speece Cones beyond the impact of this deepening project, would together ecologically benefit the Savannah River system.*

Response: Concur. Operation of the proposed Speece Cone system is expected to have a net positive effect on the harbor's DO. The Speece cones would restore DO concentrations to pre-construction conditions and result in a slight improvement in most of the estuary.

Page 7

1109-BB-101-EV09

Comment: *In addition to these EPA-related issues, EPA emphasizes the importance of fully evaluating the potential for SHEP dredging to impact the habitat of endangered species (Shortnose sturgeon) and other anadromous fishes such as the popular Striped bass, and also the indirect wetland impacts of converting tidal freshwater marsh habitat into brackish wetlands or saltmarsh at the Savannah National Wildlife Refuge (SNWR) and other freshwater marshes by exacerbating saltwater intrusion. We recommend continued coordination with FWS and NOAA regarding opportunities for developing appropriate mitigation for these impacts.*

Response: The District has continued its coordination with USFWS and NOAA, and the FEIS contains more specific information on the proposed mitigation features. The Corps would continue to coordinate with the natural resource agencies if the project is approved and implemented.

1109-BB-101-EV10

Comment: *Beyond EPA's primary DO water quality concern, other substantive project concerns include wetland mitigation, general air quality, air toxics, sediment issues, and environmental justice (EI)/children's health. EPA believes these remaining issues need additional analysis in the FEIS to complement the DEIS. As a NEPA Cooperating Agency, EPA recommends further COE coordination on these issues with EPA, including our review of draft documentation prior to the FEIS. Our remaining issues are summarized below:*

Response: The District met with EPA after the review period for the DEIS was complete. As a result, the Corps performed additional analyses requested by EPA (noise impacts from DO systems and alternate future conditions in air quality assessment). Those analyses have been provided to EPA and are included in the FEIS. The FEIS also contains additional demographic information on the communities adjacent to the port. That additional information (including information on minority and low-income populations) was used to refine the impact assessment regarding environmental justice and children's health. EPA will also be provided a copy of the FEIS prior to its release to the public.

1109-BB-101-EV11

Comment: *Wetland Mitigation: Overall, EPA believes that the COE Wetland Mitigation Plan proposed in the DEIS should be further refined. The proposed Plan, which presently appears to emphasize the preservation of freshwater wetlands, should be modified to be consistent with Section 404(b)(1)Guidelines/2008 Mitigation Rule to replace in-type and function of both the freshwater and saltwater wetlands being project impacted. It is important to recognize, if technically supported, the wetlands preservation approach can be an element of this functional replacement mitigation approach such that these two approaches need not be mutually exclusive. A refined Plan should replace the functional impacts to all wetland types; be adequate given the proposed mitigation actions, the timeframe and the risk factors; and comply with all requirements of the 2008 Mitigation Rule. EPA recommends that the DEIS include a draft Plan prepared by the COE in cooperation with an interagency wetland mitigation "working group" including EPA, FWS and others. Given the additional requirement within WRDA 1999 that the mitigation plan shall be implemented before or concurrent with the project, it is important that this Plan be finalized in the ROD.*

Response: EPA has provided specific comments concerning the proposed wetland mitigation plan in the Appendix section of its letter. The District will address each of the Agency's specific comments in a later section of this response to comments.

1109-BB-101-EV12, 1109-BB-101-EV13, 1109-BB-101-EV14

Comment: *General Air Quality: The FEIS should demonstrate that project emissions do not interfere with area attainment and maintenance of the NAAQS for either the No Action Alternative or the Tentatively Recommended Plan. Accordingly_ the FEIS (App. K) should provide a future condition analysis through the end of the project (2065). As part of this evaluation, EPA requests that dispersion modeling be conducted to determine how landside emissions will impact local area air quality, with emphasis on port traffic effects in potential EJ areas and any possible NAAQS violations. The current emissions inventory of the DEIS (App. K) does not provide a future condition emissions analysis for comparison against the current conditions data provided for the selected criteria pollutants and other parameters measured, or a dispersion analysis. Furthermore, to verify the DEIS assumption that future larger vessels (Panamax and post-Panamax) calling on the port produce less emissions than the existing smaller fleet, the FEIS should compare the fuel efficiency/emissions of larger versus smaller vessels using an "emissions per TEU" metric as the basis of comparison.*

Response: Air emissions studies [2002 USEPA NEI data for Chatham County compared to the calculated emissions for the Port in 2008 -shown in Table 6-3 of Appendix K of the EIS] show that the port is a small subset of the County's total emissions. Moreover, the air emission inventory [Appendix K of the FEIS] demonstrates that the proposed project emissions do not interfere with the project area's present attainment classification under the Clean Air Act. As noted, the port's capacity is reached around 2030 at 6.5 million TEUs. Its emissions were calculated for both 2030 and 2067 [end of the 50-year project's economic life] for both the No Action Alternative (-42 foot depth) and the proposed action (-47 foot depth).

Under both the without- and with- project conditions, the District expects the Garden City Terminal to reach its maximum annual capacity around 2030 [6.5 TEUs]. The bases of this determination have been detailed in previous responses. Also previously cited is the anticipation that without deepening, more vessels will be required to transport the cargo expected to move through the port. With deepening, the total number of vessels decreases (compared to the Without Project condition) as they will be able to load more deeply.

No increases in cargo are expected to occur as a result of the proposed harbor deepening. As a result, the project would not affect the number of containers that move through the areas that surround the port. The economic benefits of the project would result from the use of larger, more cost-effective container ships, not an increase in the number of containers. Noise, air emissions [including air toxics], and traffic would not be increased as a result of the proposed deepening.

As a result, the proposed harbor deepening will have no adverse landside impacts outside the Garden City Terminal or within the adjacent EJ communities, nor will it cause any NAAQS violations in either Chatham or Jasper Counties.

Separate from the SHEP project, the Georgia Ports Authority is conducting dispersion modeling of the air emissions at the Garden City Terminal. This analysis will provide insight into how air emissions originating from its facility disperse under without- project conditions. These analyses will not be completed until after circulation of the FEIS for review. However, since overall emissions have already been determined to remain -- at most unchanged by the proposed harbor deepening -- the results of the dispersion analysis are not needed to evaluate the proposed action.

The DEIS [Appendix K] contained a future conditions analysis, i.e., an emission inventory and comparison to current conditions for the selected criteria pollutants, as well as air toxics and greenhouse gases. The evaluation was calculated using data when the port reaches capacity at 2032 with 6.5 million TEUs. This analysis shows that air emissions [including air toxics and greenhouse gases] would be greater with the No- Action Alternative of -42 foot depth than with all the proposed harbor deepening alternatives. As noted, Garden City Terminal reaches its maximum capacity in 2030 and thereafter could not accept any additional container traffic. Therefore, its air emissions in 2065 would be comparable to those in 2030. Further, dispersion modeling is not required since no cargo increases are expected to occur as a result of the proposed harbor deepening. As a result, the project would not affect air quality in or around the port.

In developing the air emission inventory for the harbor, the District used EPA's **"Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories, Final Report, dated April 2009"**. This guidance document provided the framework used to calculate all air emission estimates for OGV and land based equipment. The District has not indicated that future larger vessels produce less air emissions than the existing smaller fleet. Instead, the District has repeatedly stated that **fewer** larger vessels [more heavily loaded] could transport the same amount of cargo as a larger number of smaller vessels. Hence, a fleet comprised of **more** larger vessels would result in lower air emissions than would a fleet of smaller vessels.

The above 2009 EPA Report does not require, recommend, or provide an approved methodology to compare the emissions of the larger Post-Panamax and Panamax Ocean-Going Vessels with smaller container vessels. Similarly, it does not include a requirement for or provide an approved methodology to determine an "emission per TEU" for each vessel size, i.e., Post-Panamax, Panamax, Sub-Panamax, and Handy size, calling at a port. The procedure described in the guidance document is based on the average size of main and auxiliary engines for a vessel, not the size of the ship itself. Therefore, since the document does not recommend this analysis or provide an approved methodology, the District has concluded that this information would not be required in assessing project's potential air impacts.

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1109-BB-101-EV15, 1109-BB-101-EV16

Comments: *Air Toxics: A significant number and volume of air toxics are associated with operating the port, with significant emission increases being expected over time (38 tons in 2008 to a range of 117-123 tons in 2032 per Appendix K of the DEIS). These emissions are a source of concern to residents living in communities surrounding the Port. Accordingly, EPA requests the preparation of a screening level risk assessment to evaluate the potential impacts associated with emissions of air taxies related to the harbor deepening and its operation. Moreover, although the Appendix K emissions inventory for air taxies provides both current and future emissions data as noted earlier, future conditions data were considered the same after 2032 based on the assumption that the number of calling vessels will be constrained by 2032 (due to one-way vessel traffic) such that there will be no increase in freight thereafter. EPA believes that the future condition analysis for air toxics (and NAAQS) should extend beyond 2032 to encompass the entire 50-year life of the project (2065). The tonnage and number of TEUs could continue to increase after 2032 (along with associated additional truck/locomotive landside emissions impacts). Since not all calling vessels currently offload 100 percent of their containers at Savannah, the number of TEUs offloaded at Savannah could conceivably increase after 2032. Also, the requested dispersion modeling for criteria pollutants should include air toxics emissions. Modeling results should be used in the requested screening level risk assessment to help determine effects on landside sensitive receptors such as potential EJ areas located along road/rail corridors noted in the DEIS (pg. 5-147) and determine any areas of localized higher concentrations.*

Response: An increase in air emissions will occur at and in the vicinity of the port over time, but these additional emissions would not be the result of the proposed harbor deepening. It is important to note that the expected increase in the port's overall air toxics emissions is greatly subsumed by Chatham County's total air toxic emissions.

The air toxics found in the 2002 USEPA NEI data for the entire County compared to the calculated Port air toxic emissions in 2008 reveal that the port emissions are just a small subset of the County's total releases [Table 6-3 of Appendix K]. Table 5-64 of Appendix K [2008] indicates that ocean going vessels, land based operations, and tugs at the Garden City Terminal [GCT] would be discharging about 38 tons of air toxics. The GCT is one of 22 terminals [see Table 1-1, page 1 of Appendix K] in the port of Savannah.

Table 5-63 of Appendix K indicates that for the same emissions/timeframe in 2008 all 22 terminals discharged about 83 tons of air toxics. Table 5-63 compares the same air toxics emitted from all 22 terminals in the port [2008] to the US EPA's NEI data for Chatham County in 2002 of about 4,340 tons of air toxics. Hence, the entire Port accounts for only a very small percentage [about 1.9% - 83 tons/4,340 tons] of the total air toxics emitted in the air shed and by extension its environmental significance is equally limited. Therefore, a screening level risk assessment for air toxics is not warranted.

Further, Table 5-78 [Appendix K] reveals that overall emissions for all vessels and associated land based equipment for the existing -42 foot depth are greater than either the -47 or -48 foot deepened project. It is important to remember in this regard that the 28 air toxics are ratios of either VOC or PM10; therefore, if there are more VOC and PM10 emissions there are more air toxics.

In comparison, Table 6-7 in Appendix K shows EPA data from 2002 and 2007 that indicate the coal-fired Kraft Steam Electric Plant which operates in Port Wentworth [Chatham County GA], discharged 7,189.4

tons and 7,704.7 tons of SO2. For these same years EPA stated that this plant discharged 1,367,644 tons and 1,653,099 ton of CO2. Hence, the air emissions from this one coal-fired facility located just upstream of the Garden City Terminal are significantly higher than all the estimated emissions for the entire Port [existing or deepened condition, see Table 5-78 in Appendix K].

The air emission inventory conducted by the District [described in Appendix K of the EIS] was a comprehensive analysis of port-dependent emissions. All air emissions including criteria pollutants, air toxics, and greenhouse gas emissions were calculated for the No-Action Alternative [-42 foot depth], all depth alternatives [42, 44, 45, 46, 47, and 48 feet], and all years [2015, 2020, 2025, 2030, 2032, and 2065]. It included emissions from the following sources:

- Dredges used during the new work dredging
- Dredges used during maintenance dredging
- Ocean-Going Vessels
- LNG Vessels
- Tug Boats
- Intra-Harbor Shifts
- Tour Boats
- Landside equipment at GPA terminals
- Landside equipment at non-GPA terminals
- Trucks calling at the Garden City Terminal
- Locomotives serving the Garden City Terminal
- GPA fleet vehicles
- Air Toxics
- Greenhouse gases

The District followed the procedures outlined in EPA's 2009 Final Report titled "Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories". The District's analysis disclosed that harbor deepening would result in fewer air emissions than the No-Action Alternative [baseline existing depth of -42 foot].

1109-BB-101-EV17

Comments: *Sediment Issues: Dredged material disposal should be conducted in accordance with Section 404 of the Clean Water Act or Section 103 of the Marine Protection, Research and Sanctuaries Act (MPRSA) consistent with EPA and COE policies provided in the joint guidance document, Evaluating Environmental Effects of Dredged Material Management Alternatives – A Technical Framework. In accordance with this Technical Framework, offshore disposal outside of three miles should be conducted pursuant to MPRSA and within an EPA-designated Ocean Dredged Material Disposal Site (ODMDS), in this case the Savannah ODMDS. The DEIS proposes that a portion of the project's dredged material from the ocean entrance channel be disposal at sites 11 and 12 near the channel as experimental fish habitat mounds. Although EPA generally supports fisheries enhancements and acknowledges that there is a fisheries exemption under MPRSA, we believe that this proposed reuse may not be consistent with MPRSA and would likely offer minimal fisheries habitat value. Therefore, EPA does not currently support the proposed disposal at sites II and 12, and recommends the evaluation of other alternatives, such as use of the Savannah ODMDS for the disposal of this material. EPA recommends further coordination with EPA, U.S. Coast Guard, and NOAA and their state fisheries counterparts regarding these issues, and the results of such coordination should be documented in the FEIS.*

Response: Concur. As a result of information obtained during the public comment period, the District has revised the nearshore placement plan, i.e., deleting Sites 11 and 12. Now, these sediments will be placed in the ODMDS, and testing protocols for offshore disposal will be used to evaluate those sediments.

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1109-EB-101-EV18, 1109-EB-101-EV19

Comment: *In addition, the DEIS documents the COE's intent to use dredging to extend the current channel offshore for over seven miles since ocean water depths in these areas will not accommodate post-Panamax vessels under all tide and cargo conditions. This channel extension would constitute an estimated 17- to -18 percent increase in the project channel length, and an additional 4.6 mcy of new dredged material. This project component should be fully analyzed and discussed in the FEIS. Specifically, the FEIS should address the multiple factors outlined in the Enclosure, including full characterization of the dredged material, identification and analysis of disposal options, potential evaluation of the Savannah ODMDS capacity in relation to any material that would be disposed in the ODMDS, precise identification of the proposed channel route and alternative routes, and discuss findings. EPA's full understanding of the ocean channel extension component is essential to the overall NEPA analysis and Agency approval of the SHEP. Therefore, EPA requests the opportunity to review and comment on the new channel dredging sections prior to the issuance of the FEIS. EPA also notes that based on the incomplete information on this issue in the DEIS, the public may not have a full understanding of this issue for purposes of public re view and comment.*

Response: Information on these issues was included in the GRR [Appendix D]; the FEIS includes a detailed summary. The District will also provide EPA with a full sediment characterization after the ongoing sampling and analysis is complete.

The EPA provides these same comments in greater detail within the Appendix of its letter. As such, the District will address each of the specific comments in a later section of this response to comments.

1109-EB-101-EV20

Comment: *Environmental Justice & Children's Health: Because most of the communities surrounding the project have elevated levels of minority and low-income populations (45 percent of the population [Chatham County, Georgia, is comprised of minorities), it is appropriate that project effects on potential EJ communities and children's health were considered in the DEIS consistent with NEPA and relevant Executive Orders (EO 12898 and EO 13045). These analyses should be expanded in the FEIS to include potential landside emission effects on nearby populations (as previously requested above: General Air Quality), public concerns offered at the SEG and other meetings and their follow-up outcomes, and disclosure of the demographics of children under age 18 within the project area. As one offset to project impacts, we understand that members of the local community may economically benefit from the project by securing some of the 175 additional positions expected by 2020 due to port cargo growth.*

Response: Concur. The District developed additional demographics [FEIS-Section 5.19] for the communities adjacent to the port. This additional information on minority and low-income populations was used to assess project impacts regarding environmental justice and children's health (EO 12898 and EO 13045).

1109-BB-101-EV21

Comment: *While the proposed SHEP Action Alternatives have the potential to lower DO water quality, directly and indirectly impact tidal freshwater wetlands, and reduce fishery habitat, EPA finds that project DO depletions can be reasonably restored to pre-project conditions and evenly distributed within the affected river reaches using Speece Cones for direct oxygen injection into the river. Such artificial injection is expected to elevate DO concentrations by +0.42 mg/L on average, which would raise these river reaches to levels approaching 3.5 mg/1. To achieve project success, EPA expects assurances from the COE and/or GPA for post-construction field monitoring of DO levels to ensure this level of DO restoration, a financial guarantee to ensure continuation of the proposed mechanical mitigation throughout the life of the project, and Speece Cone installation and operation before dredging begins to minimize the potential impacts on the aquatic community.*

Response: The District agrees (1) to conduct post-construction monitoring of DO levels to ensure the project compensates for its adverse DO impacts, (2) to operate and maintain the mitigation features as described in the FEIS throughout the project's life, and (3) to install the Speece Cones at the beginning of the project and commence their operation on Hutchinson Island before dredging occurs upriver of Station 0. The second DO system would become operational within one year of the start of dredging upriver of Station 0 which is well within the four-year construction period.

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1109-BB-101-EV22

Comment: *EPA's conclusion concerning the sufficiency of the proposed DO mitigation focuses on a water quality perspective to ensure pre-project DO levels are maintained. We defer to NOAA and FWS for their ecological interpretation of these concentrations relative to DO effects on their fishery and refuge mandates. The proposed alternatives should continue to be closely evaluated to ensure that the construction and subsequent operation of any harbor deepening would not further cause or contribute to the ongoing DO impairment in the harbor.*

Response: Each of the proposed harbor deepening alternatives includes a dissolved oxygen improvement system to mitigate its adverse DO effects. While the Speece Cones would produce a minor net positive effect on DO from pre-project conditions, they would not address the harbor's existing water quality impairment. To ensure the DO systems function as intended, monitoring and adaptive management is a component of the post-construction and long-term commitments.

1109-BB-101-EV23

Comment: *In addition to EPA's DO water quality concern, our other substantive project concerns include wetland mitigation, general air quality, air toxics, sediment issues, and EJ/children's health. As a Cooperating Agency, EPA recommends further COE coordination with EPA on these remaining issues, including our review of draft documentation prior to the DEIS.*

Response: The District met with EPA after the review period for the DEIS was complete. As a result, the Corps performed additional analyses requested by EPA (noise impacts from D.O. systems and alternate future conditions in air quality assessment). Those analyses have been provided to EPA and are included in the FEIS. The FEIS also contains additional demographic information on the communities adjacent to the port. That additional information (including information on minority and low-income populations) was used to refine the impact assessment regarding environmental justice and children's health. EPA will also be provided a copy of the FEIS prior to its release to the public.

1109-BB-101-EV24, 1109-BB-101-EV25

Comment: *EPA rates this DEIS as an "EC-2" (Environmental Concerns, additional information requested). EPA bases this rating on the overall project impacts and the additional information requested for the FEIS. If this harbor deepening project is further pursued by the sponsor, EPA expects our additional information requests will be incorporated in the FEIS and that the impacts of the proposed project will be fully mitigated consistent with the policies and regulations of the COE and its Cooperating Agencies and guaranteed throughout the life of the project. Although the COE has not yet identified a Recommended Plan, EPA believes the proposed DO mitigation would be sufficient to reasonably restore DO levels to pre-project conditions for any of the considered incremental harbor deepening alternatives (-44 ft to -48 ft).*

Response: The District will respond to all comments provided by the EPA, and those responses will become part of the FEIS. The District will also review any of the Agency's additional information requests. Each request would be assessed to determine if the information is essential to reasoned decision-making and, therefore, for inclusion into the FEIS. The District will ensure that SHEP-derived impacts are fully mitigated as specified in the policies and regulations governing Corps Civil Works projects. The District agrees to operate and maintain the mitigation features as described in the FEIS throughout the project's economic life.

Operation of the proposed DO systems is expected to have a net positive effect on DO in the post-construction harbor, i.e., the Speece cones are capable of maintaining DO concentrations [at least] at levels which would have occurred without deepening.

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1109-BB-101-EV26, 1109-BB-101-EV27

Comment: *Dissolved Oxygen Impacts: Without mitigation, the proposed Savannah Harbor deepening project would result in a reduction in the dissolved oxygen (DO) in the Savannah River and Harbor area. The DEIS proposes to inject oxygen at three locations to mitigate the decrease in DO due to the physical dredging of the Harbor. The depressed dissolved oxygen levels are greater in the bottom portion of the River system. The proposed mitigation plan would result in an average increase of dissolved oxygen in the lower half of the River system of +0.42 mg/L DO above existing DO conditions or an 8.8% net increase in dissolved oxygen in the River system. This net improvement in DO is based on the August 1997 river flows representative of the average summer flows under critical temperature conditions. Based on this analysis, the overall impact of the proposed deepening and mitigation is a net improvement in the available DO under average summer flow conditions. To ensure that the DO mitigation is sufficient under drought conditions, EPA requests the COE assess and document in the FEIS the August 1999 low-flow conditions similar to the August 1997 normal-flow data analysis provided in the DEIS.*

Response: Concur. Operation of the proposed DO systems is expected to have a net positive effect on DO in the post-construction harbor, i.e., the Speece cones are capable of maintaining DO concentrations [at least] at levels which would have occurred without deepening.

The Water Quality Interagency Coordination Team requested the District evaluate project impacts on dissolved oxygen using the August 1999 low river flow conditions. That request was based partially on the States' identification of these conditions as being most critical to the estuary's dissolved oxygen levels. As verification, the first DO system design report also recognized low river flow conditions as requiring more oxygen to mitigate project impacts than would drought flows. The Interagency Coordination Team also requested that the District analyze potential impacts under the August 1997

average river flows as a sensitivity analysis. The results of the sensitivity evaluation were included as Supplemental Materials to the Engineering Appendix of the GRR. The District also performed two other sensitivity analyses requested by the Water Quality ICT – (A) low river flows and 1999 point source loads, and (B) low river flows and maximum permitted point source loads.

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1109-BB-101-EV28

Comment: *Monitoring & Adaptation: Because of uncertainties associated with modeling, EPA recommends that DO levels be monitored and adaptively managed to ensure adequate oxygen injection. As was discussed at the September 2010 Executive Steering Committee meeting, this mitigation function must also be guaranteed by the COE and/or sponsor throughout the life of the project, and be implemented prior to construction to avoid DO impacts during dredging. Moreover, financial guarantees for Speece Cone operation must be provided in the FEIS and ROD by the COE and/or sponsor for the life of the project.*

Response: The lower oxygen injection system (near Hutchinson Island) would be installed and made operational prior to commencement of dredging in the inner harbor. The upper oxygen injection system would become operational within one year of that. The SHEP Mitigation Plan and Adaptive Management Plan provide for monitoring of dissolved oxygen levels in the harbor and an evaluation of the oxygen injection system. A Transfer Efficiency Study would be conducted to determine the efficiency at which the systems add oxygen to the estuarine waters. The Corps would use the efficiency rate to determine how it needs to operate the systems to add the amount of oxygen determined by the modeling to be needed to compensate for the impacts of the project. The results of this study could cause modifications to the systems such as the amount of oxygen that is injected, the number and location of Speece cones, etc.

Installation and operation of the oxygen injection system is a mitigation feature which is an integral part of the project. This mitigation feature is required for the project to be constructed and perform as planned. Consequently, the inclusion of the oxygen injection system in the project is fully described in the EIS, and a commitment to install and operate the system will be included in the Record of Decision.

1109-BB-101-EV29

Comment: *Cumulative DO Benefits: EPA proposed a draft DO TMDL for Savannah Harbor was reproposed in May 2010 based on Georgia's revised water quality standards, which would require an approximate 85% aggregate reduction in point source loads. Successful implementation of the loadings required by a TMDL for DO, and any additional DO mitigation provided by the Speece Cones beyond the impact of this deepening project, would together ecologically benefit the Savannah River system.*

Response: Concur. The proposed DO mitigation system [Speece Cones] is expected to result in a net positive effect on DO in the harbor. They will not only restore DO to concentrations comparable to pre-construction conditions, but also result in higher DO levels in over 90 percent of the estuarine water volume.

1109-BB-101-EV30

Comment: *No Mitigation Credit for Sea Level Rise: Wetland marshes will be lost due to sea level rise effects over the long life of the project. Regardless of the value used in the COE analysis (e.g., +3 nun per year) to represent sea level rise, EPA believes that the proposed project should mitigate for actual wetland impacts that occur once construction is complete (the base year) and not take credit for any wetland losses due to sea level rise over the life of the project. Further, the COE should also ensure that the project fully mitigates for all impacts that would occur over the entire 50-year period of analysis.*

Response: The Assistant Secretary of the Army (Civil Works) has granted the District's request to waiver from Section 5, paragraph E-36.c.(1) of ER 1105-2-100 regarding how environmental impacts are computed. This waiver request stresses the need to mitigate for the environmental impacts occurring when a project is implemented, rather than over an annual basis and takes into account that impacts are more certain early rather than toward the end of the 50-year project life.

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1109-BB-101-EV31

Comment: *EPA's Recommended FEIS Wetland Mitigation Plan for SHEP: EPA recommends that the Wetland Mitigation Plan for SHEP include the following components:*
1. Use a mutually acceptable technical approach to determine the loss (and gain, if any) of all wetland functions due to the project;
2. Apply the same approach to any proposed wetland mitigation action or site to determine wetland in-kind functional replacement;
3. Use an appropriate methodology (like an SOP) to ensure temporal and risk factors are taken into account in determining the quantity of any proposed mitigation;
4. If preservation is a component of the mitigation plan, develop site selection criteria and then identify candidate sites using the criteria;
5. Develop mitigation plans for any action/site that meet the criteria of the Mitigation Rule;
6. Ensure that all mitigation sites are protected in perpetuity in the target condition of the final Mitigation Plan, i.e., managed to sustain the in-kind wetland type;
7. Address cumulative wetland loss/conversion in the project portion of the Savannah River system;
8. As outlined in the 2008 Mitigation Rule, financial assurances for the complete implementation for the mitigation and monitoring plan should be included.

Response:

1. The District assembled a Wetland Interagency Coordination Team (ICT) to develop an acceptable technical approach to determine wetland impacts and followed its guidance as to impact evaluation and development of mitigation plans. [see additional responses to EPA comments concerning wetland impacts];
2. The Savannah District's Regulatory Standard Operating Procedures (SOP) was used to assess the functional value of impacted wetlands and sites proposed for preservation;
3. The SOP was used to determine the quantity of proposed mitigation. [see additional responses to EPA comments concerning wetland impacts];
4. Preservation is a component of the mitigation plan. The District worked with USFWS and the Wetland Interagency Coordination Team (ICT) to identify sites that would provide acceptable mitigation. [see additional responses to EPA comments concerning wetland impacts];

5. The District complied with the 2008 Mitigation Rule when developing the mitigation plan. [see EIS Appendix C, Section VII Consideration of the USEPA/USACE Mitigation Rule, and additional responses to EPA comments concerning wetland impacts];
6. The District will provide the preservation mitigation sites to the USFWS for incorporation into the Savannah National Wildlife Refuge, where they will be protected in perpetuity;
7. The District has addressed cumulative wetland loss/conversion in the project area [Savannah River system]. [see additional responses to EPA comments concerning wetland impacts]; and
8. Financial assurances are not required when a government agency would construct the project. The SHEP is a civil works project that will receive funding from the Federal government. The SHEP Record of Decision (ROD) will constitute a formal, binding commitment to implement the project mitigation, subject to Congressional appropriation of funds for the project. Mitigation features are required to be implemented before or concurrent with construction, so the project could not proceed if there were not sufficient funds to implement mitigation. After construction, mitigation operation and maintenance would be the Corps' highest budget priority. The Georgia Department of Transportation (a government agency within the State of Georgia) would be committed to providing a cost-share for the project. There is little risk that mitigation features will not be implemented as planned and maintained for the life of the project.

   The District will obtain funds for SHEP construction [including monitoring and adaptive management] through its annual Construction Program budget process. The Corps will develop a construction funding plan as well as a mitigation and adaptive management funding plan. The Corps will seek funding each year as identified in the funding plans. If the total costs exceed the estimates, the Corps would seek to obtain Corps approvals for any additional amounts needed through the normal budget process. Funds for un-programmed adaptive management needs would be considered should excess construction funds become available during the year. Adaptive management funds currently estimated at $2 million per year will be sought for the entire duration of the monitoring period and for any action needed based on the monitoring results. Any project funds that are not used during the year due to unforeseen circumstances would be carried forward as needed and justified. Further, the non-Federal sponsor, acting through the Georgia Ports Authority, has agreed to set aside in advance their cost-shared portion of the monitoring and adaptive management funds in an escrow account upon approval of the project.

1109-BB-101-EV32

Comment: *EPA's Concerns with Present DEIS Wetland Mitigation Plan: EPA offers the following comments and conclusions on the COE's proposed mitigation plan presented in the DEIS. Following the submission of all comments on the DEIS, we recommend the COE convene an interagency wetland mitigation "working group" consisting of agencies that commented on the mitigation plan, including EPA and FWS. The mitigation working group could then seek solutions to the issues we raise below and those raised by others. The goal of the group would be to develop an overall approach to compensatory mitigation that replaces the functions lost due to the project and to assist the COE in developing a refined draft Wetland Mitigation Plan for SHEP. The FEIS should incorporate the findings of this group and the draft Plan, while the final Wetland Mitigation Plan should be incorporated in the COE ROD.*

Response: In summer 2003, the District assembled a Wetland Interagency Coordination Team (ICT) to assist in its analysis of potential wetland impacts from the SHEP. The team consisted of agency wetland experts from USEPA, USFWS, NMFS, GA DNR, SC DNR, and SC DHEC. After deliberation, the agencies identified an acceptable technical approach to determine wetland impacts. They also identified the information needed to review the DEIS. Since creation of the team, the District has hosted at least

seven meetings of the ICT, including one in June 2011 after EPA submitted this comment. During those meetings, methods for evaluating functional losses and mitigation alternatives for wetland impacts were proposed and discussed at length. After every meeting, the District prepared a Memorandum for Record (MFR), which was provided to all members of the ICT, including EPA. Of the seven meetings that were hosted by the District, five were attended by a representative of EPA. The ICT, or "working group", will continue to coordinate throughout the construction and post-construction phases as outlined in Appendix D.

1109-B8-1D1-EV33

Comment: *Overview: EPA recommends that the proposed compensatory mitigation plan be improved, as discussed below, to ensure that it fully complies with the Section 404(b)(1) Guidelines and the 2008 Mitigation Rule, and to ensure that it will not result in the net loss of wetland functions and types in the Savannah Harbor.*

Response: In subsequent comments below, the EPA provides specific recommendations to ensure the compensatory mitigation plan complies with Section 404(b)(1) Guidelines and the 2008 Mitigation Rule. The District has addressed each of the Agency's specific comments. Responses to those comments are provided below.

1109-B8-1D1-EV34

Comment: *Mitigation Using Wetland Preservation: The proposed preservation of 2,683 acres of some type of wetlands at an undetermined location in the Harbor represents a mitigation-to-impacts ratio of 2.5: 1 for the remaining freshwater wetland impacts and the saltmarsh impacts. This is out-of-kind mitigation that is significantly below the ratios recommended in the 2001 EPA Region 4 Mitigation Policy for wetland preservation. EPA recommends development of screening criteria for wetland preservation consistent with the Mitigation Rule, focusing on wetlands that are of the highest function and which are under the most immediate threat by the project.*

Response: The District has provided a functional assessment for wetlands that would be impacted as a result of the SHEP [characterization below]. The results of this functional assessment conclude that the differentiation between salt marsh and brackish marsh recommended by the Wetland Interagency Coordination Team and used in the DEIS was overly constrained. The salinity range used in the SHEP model to differentiate between brackish marsh [0.6-4 ppt] and salt marsh [> 4ppt] was quite restrictive given that brackish marsh salinities have been reported with a range from 0.5-10 ppt [NOAA, 2010] and in other estuarine systems from 0.5-17 ppt [Judd and Lonard, 2004]. An earlier assessment of wetland vegetation coinciding with the salinity range reported for brackish marsh systems [i.e., 5-10 ppt], both of which occur within the area of potential effect, also supports those findings. Thus, the salinity range used to quantify salt marsh in the area of potential effect [i.e., > 4 ppt] over estimated the amount of saltmarsh in the system and under estimated the amount of brackish marsh. As such, the described conversion of salt marsh to brackish marsh, which would occur as a result of harbor deepening, would be negligible. This would be especially true when taking into account the salinity tolerance range of individual species comprising the brackish marsh community [i.e., between 5 and 10 ppt].

Given the wide range of salinity reported in literature for brackish marsh systems, the inherent variability in salinity that exists for all estuarine systems, and the modeling results that report post-deepening salinity concentrations consistent with the aforementioned range, the District concluded the 740-acre calculated conversion of saltmarsh to brackish marsh if the harbor is deepened to 47-feet, may be an exaggerated value. Similar logic applies for the other project depths. In fact, in most instances

actual vegetative shifts would not be identifiable *in situ* in Savannah. That said, the District chose to be inclusive in its assessment of the potential for project-related effects and elected to include the saltmarsh and brackish marsh conversion in its calculation of minor impacts.

The conversion of 223 acres of freshwater wetland to brackish marsh represents the only significant wetland conversion that is likely to be noticeable if the harbor is deepened to 47-feet. Again, it is important to reiterate that the ecological values of the impacted freshwater wetlands would not be completely lost. Instead, those acres would be converted to brackish marsh. The District's calculation of the freshwater wetlands with the potential for conversion to brackish marsh is based on a shift in 0.5 ppt salinity, a traditional rule-of-thumb for differentiating between freshwater and brackish marsh. However, data reported in the literature for Savannah Harbor suggest that a shift in vegetation [from freshwater marsh to brackish marsh] in this estuary does not occur until salinity concentrations approach 2.5 ppt [Latham et al., 1994]. Even at oligohaline marsh sites [average salinity concentration of 2.1 ppt]], a discriminate function [DF] analysis revealed that only 47% of cases resulted in the correct pairing of environmental variables with vegetative species composition and dominance. At those same oligohaline sites, 37% of the vegetative species composition and dominance were more closely aligned with a freshwater classification [Latham et al., 1994].

The District's salinity value that denotes a defined shift from freshwater to brackish marsh [i.e., 0.5 ppt] is approximately five times lower than traditional observations of 100% vegetative shifts *in situ* within the Lower Savannah Watershed [Latham et al., 1994] and other coastal marsh systems in the southeastern United States [NOAA, 2010]. Thus, many of the existing freshwater emergent plant species, and associated ecological parameters, will likely be sustained in areas predicted to experience salinity concentrations in the range of <2.5 ppt. For those areas that do transition to more brackish characteristics, they would still continue to provide the traditional ecological functions associated with all emergent wetland systems [see functional assessment response]. Thus, the preservation of 2,245 acres [consisting of bottom land hardwoods and upland buffer] is more than sufficient to offset any conversion in freshwater wetland vegetation that might occur. Using the higher salinity value observed in the Savannah basin for conversion to brackish marsh [2.5 ppt], less conversion would be expected, resulting in a mitigation-to-impacts ratio of roughly 10:1, which is more consistent with ratios recommended in the 2001 EPA Region 4 Compensatory Mitigation Policy concerning wetland preservation. Using the DF analysis reported by Latham et al [1994] which aligned 37% of freshwater species with oligohaline sites, the 223 acres of freshwater to brackish marsh conversion is reduced further such that the mitigation-to-impacts ratio is increased to 16:1.

EPA's 2001 Region 4 Compensatory Mitigation Policy provides examples of preservation projects that were used to offset impacts to aquatic resources. USEPA describes these examples as, *"preservation projects that have accomplished the goals of the Clean Water Act while meeting the specific goal of the management agencies that accepted or will accept the preserved wetlands."* A project known as Walker Ranch in Osceola and Polk Counties, Florida, is included as an example project. In brief, Walker Ranch [8,500 acres] was purchased and preserved by the Disney Development Company as mitigation for filling approximately 600 acres of wetlands [Stutzman, 1992]. The Orlando Sentinel newspaper reported this action as the "one of the largest wetlands losses ever requested in Florida at one time" (Regan, 1991). Although the mitigation-to-impacts ratio is 14:1, the preservation mitigation was provided in exchange for the irretrievable *and complete loss* of 600 acres of swamp and pristine wetland. All elements of wetland function were lost as a result of filling and/or draining of those 600 acres.

In contrast, the wetland impacts derived from SHEP would result in conversion of 223 acres of freshwater marsh to brackish marsh and 740 acres of saltmarsh to brackish marsh. This would result in a minor shift in vegetation and all wetland functions associated with these areas of conversion would be retained [see response for functional assessment]. These SHEP impacts would be mitigated by preserving 2,245 acres of bottomland hardwood wetlands and adjacent upland buffer [an area highly sought by USFWS for the purpose of protecting lands within the SNWR]. Considering the previous information, the District has concluded that the proposed preservation mitigation for SHEP is more than sufficient. This is especially true, in comparison to the SHEP-derived, wetland conversion to the magnitude of wetland loss afforded the Disney Development Company, which was mitigated with the preservation of the Walker Ranch Property [a project highly regarded in 2001 Compensatory Mitigation Policy developed by EPA- Region 4].

33 CFR 332.3 (h)(2) of the Final Mitigation Rule states, *"Where preservation is used to provide compensatory mitigation, to the extent appropriate and practicable, the preservation shall be done in conjunction with aquatic resource, restoration, establishment and/or enhancement activities. This requirement may be waived by the district engineer where preservation has been identified as a high priority using a watershed approached described in paragraph (c) of this section, but compensation ratios will be higher."* A watershed assessment was conducted within the Lower Savannah River Harbor and has been updated in the FEIS. The District has again reviewed the listing of approved mitigation banks in the Lower Savannah River Watershed and evaluated the Regional Internet Banking Information and Tracking System (RIBITS) for potential mitigation banks that possess tidal freshwater credits within the Lower Savannah River Watershed. As of March 2011, Bath Branch, Brushy Creek, Margin Bay, Millhaven, Old Thorn Pond, and Phinizy Swamp banks have primary service areas that overlap the harbor area and some remaining credits. However, these banks do not contain tidal, freshwater systems and/or their associated credits. A review of secondary service areas overlapping the project area revealed Black Creek and Wilhelmina Morgan banks have some remaining credits. But likewise, these banks do not contain tidal, freshwater systems and/or their associated credits. Thus, at this time mitigation banks with "in kind" mitigation do not exist within the Lower Savannah Watershed. As of March 2011, the In-Lieu Fee Program in the State of Georgia has not been updated or approved by the District and Interagency Review Team (IRT) to provide compensatory mitigation credits that would offset impacts to aquatic resources.

As of this response date, there are no mitigation banks established with tidal, freshwater wetland characteristics. Thus, the most appropriate/practicable means of mitigating the minor shift in vegetation that would occur is the preservation of approximately 2,245 acres of bottomland hardwoods and upland buffer. USFWS and the Savannah National Wildlife Refuge (SNWR) have identified specific properties within the estuary having a high priority for acquisition. The Service believes these particular holdings are ecologically valuable and provide positive contributions to the goals of the Refuge to enhance the area's fish and wildlife resources.

The latest version of the Refuge's Acquisition Plan is dated July 2007 and is included in the document titled, "Final Environmental Assessment and Land Protection Plan; Proposed Expansion of Savannah National Wildlife Refuge". The document identified the subject lands proposed for preservation as Mill Creek and Abercorn Island. The properties comprising the Mill Creek, Abercorn Island, and Eastern Boundary areas are vegetatively characterized as wetlands and interspersed uplands. The wetlands are classified as bottomland hardwood forest, dominated by old-growth oaks, cypress, sycamore, and sweetgum. The sites are both temporarily and seasonally flooded and/or forested wetland. Thus, the proposed preservation of 2,245 acres of wetlands and upland buffer adjacent to the SNWR constitutes

"in basin" mitigation. USFWS previously identified the ecological value of those properties and believes they would be valuable additions to, and advance the goals of, the Savannah Refuge.

The Final Mitigation Rule provides for use of "out-of-kind" mitigation in certain circumstances where the mitigation is determined to be ecologically important. 33 CFR 332.3 (e)(2) of the Final Mitigation Rule states, *"In general, in-kind mitigation is preferable to out-of-kind mitigation because it is most likely to compensate for functions and services lost at the impact site. If the district engineer determines, using the watershed approach in accordance with paragraph (c) of this section that out-of-kind compensatory mitigation will serve the aquatic resource needs of the watershed, the district engineer may authorize the use of such out-of-kind compensatory mitigation. The basis for authorization of such out-of-kind mitigation must be documented in the administrative record for the [permit] action."*

It should also be noted that the District assembled and used a Wetland Interagency Coordination Team (ICT) consisting of technical expert representatives from USACE, Federal natural resource agencies, and State natural resource agencies representatives to identify acceptable mitigation for the proposed project. At that time, USFWS stated that mitigation actions must be performed within the basin for impacts to wetlands residing within the SNWR. The USFWS also confirmed that restoration, enhancement, and creation of saltmarsh would not mitigate for expected losses to freshwater marshes. Further, the Service stated that it did not support a proposal to create a freshwater marsh on a proposed site. This decision was made because of uncertainties in the District's ability to successfully create freshwater marsh at that location. The Service recommended preservation of lands as a possible solution and recommended sites that are part of its long- term land acquisition strategy to compliment the SNWR. The District also consulted with the Stakeholder Evaluation Group, including its Non-Governmental Organization [NGO] members, to identify any other suitable mitigation alternatives. Over the 10-year study period, no agency or organization could identify another feasible alternative as mitigation for impacts that would occur as a result of wetland conversion. Therefore, the District proceeded with the identification of preservation sites.

Given the justification and rationale for the preservation the acreage that was provided in the previous paragraphs, the District does not concur with EPA's recommendation that screening criteria for wetland preservation would be useful at this time. However, a functional assessment is provided which demonstrates that the only wetland function that would be affected by the marsh conversion would be fish and wildlife habitat [see response to functional assessment]. Hence, the preservation of freshwater habitat adjacent to the SNWR is deemed sufficient to replace the impact to that element of wetland function.

The District has considered use of the proposed properties for preservation relative to 33 CFR 332 (h) (1) (i-v) which states, *"Preservation may be used to provide compensatory mitigation for activities authorized by DA [permits] when all the following criteria are met: (i) The resources to be preserved provide important physical, chemical or biological functions for the watershed; (ii) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available; (iii) Preservation is determined by the district engineer to be appropriate and practicable; (iv) The resources are under threat of destruction or adverse modifications; and (v) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust)."*

Based on its analysis and coordination with the natural resource agencies that participated in the Wetland ICT, the District has:

(i) concluded that the preserved lands provide important physical, chemical and biological functions for the SNWR , the Savannah Harbor, and the Lower Savannah Watershed [see response to request for Functional Assessment]; and

(ii) the preserved lands will contribute to the sustainability of the watershed by ensuring the functions of bottomland hardwood wetlands on these properties are sustained in perpetuity, and the SNWR will be protected with a significant area of land that will function as a buffer in perpetuity. The preservation tracts will also enhance lands already within the SNWR ; and

(iii) for the reasons identified in (i) and (ii), the District Engineer has determined that preservation of these 2,245 acres is appropriate and practicable; and

(iv) the District and other entities anticipate that the Savannah Harbor, and areas surrounding the SNWR, will continue to experience population growth, industrial/commercial development, and changes in land use. In addition to the industrial developments that have been permitted by the District in recent years, the US Geological Survey, Water Science Center (GaWSC) commented on the large number of industrial facilities and associated impacts that are anticipated on lands in close proximity to the Georgia Ports Authority and the SNWR. Preservation of the 2,245 acres ensures aquatic resources on the associated properties will be protected in perpetuity. The preserved land will provide additional buffer so that any future development in the vicinity will not result in a secondary and/or indirect impact to existing Refuge lands. There is also a threat that subtle changes in adjacent land use will also have a detrimental impact on the SNWR. For example, a Public Notice published by the Charleston District, Corps of Engineers on September 28, 2009 requests comment on a proposal from a private landowner to divert tidal water flow onto an approximately 693-acre parcel to increase the hydrology on 485 acres of previously-existing rice impoundment. The 693-acre property, which would be used as a mitigation bank, presently provides benefits to migratory waterfowl during migratory stops similar to those provided by Refuge lands. Conversion of such acreage to saltmarsh could shorten their stay in the area and result in the birds that the Refuge serves resuming their migration with less rest. The expected effects of the proposed Regulatory action on the SNWR have not been quantified at this time, but the proposed project is an example of the continued threat that manipulation of adjacent lands pose to the SNWR and the resources it protects. Acquisition and preservation of the proposed 2,683 acres as mitigation for the SHEP project would provide additional buffer and protection from these type of activities as well; and

(v) preservation of the 2,245 acres will include a restrictive covenant and the recording of a conservation easement with conveyance of the property to the USFWS. Collectively, the information provided in this response justifies the preservation of 2,245 acres adjacent to the SNWR as satisfying the mitigation requirements for the conversion of freshwater and saltmarsh wetlands.

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1109-BB-101-EV35

Comment: *Functional Assessment: The DEIS and its supporting studies did not employ a functional assessment to objectively and quantitatively evaluate the functional losses due to excavation of wetlands and conversion of wetland types from the SHEP. A functional approach is key to the assessment of wetland impacts and the analysis of adequate compensatory mitigation actions. We recommend that the interagency working group identify tools to determine the functional losses due to the project. This same tool should then be applied to any proposed wetland mitigation action. The comparison of the results should indicate whether or not the no-net-loss-of-function criterion is met.*

Response: The District has provided a functional assessment in the FEIS (Appendix C, Section VII Consideration of the USEPA/USACE Mitigation Rule) that objectively and quantitatively evaluates the functional losses due to excavation of wetlands and conversion of wetland types. In addition, Savannah District's Regulatory Standard Operating Procedure [SOP] was used to objectively and quantitatively evaluate functional losses due to excavation of wetlands as well as the conversion of wetland types that would occur as a result of the SHEP. The Wetland ICT concurred with use of the SOP to quantify impacts and the associated mitigation.

In summer 2003, the Corps assembled a Wetland Interagency Coordination Team (ICT) to assist in its analysis of potential wetland impacts from the SHEP. The team consisted of agency wetland experts from USEPA, USFWS, NMFS, GA DNR, SC DNR, and SC DHEC. The agencies identified an acceptable technical approach to determine wetland impacts. They also identified their information needs to review the DEIS. Since creation of the team, the District hosted seven meetings of the ICT, one of which was held in June 2011 in response to Agency comments on this issue. During those meetings, methods for evaluating functional losses and mitigation alternatives for wetland impacts were proposed and discussed at length. After every meeting, the District prepared a Memorandum for Record (MFR), which was provided to all members of the ICT, including EPA. Of the seven meetings that were hosted by the USACE, five were attended by a representative of EPA.

The District conducted an Agency Technical Review (ATR) to assess the use of Savannah District's SOP as a tool in the development of a mitigation plan for SHEP. The ATR was lead by the National Deep-Draft Navigation Planning Center of Expertise. The actual review was performed by experts at the Corps' Engineering Research and Development Center in Vicksburg, MS. The ATR sought to determine if the SOP was an appropriate method to ascertain the preservation acreage needed to compensate for impacts resulting from the SHEP. The ATR also evaluated the assumptions and calculations that the Savannah District used in applying the SOP for the SHEP. The SOP was used to determine the amount of preservation acreage necessary to offset the remaining impacts ONLY after avoidance, minimization, and restoration measures had been applied. After these deliberations, the ATR concurred with using the SOP to determine the amount of preservation acreage needed. Moreover, it considered the Savannah District's application of the SOP to be reasonable in quantifying impacts together with the associated mitigation that would be required.

The USFWS provided a Fish and Wildlife Coordination Act Report, dated August 2010. In that report, the USFWS concurred with use of the SOP, which calculated a need to preserve 2,245 acres adjacent to the SNWR. The Service provided updates to the SOP calculations in Appendix A of the report. The District concurred with use of the updated SOP worksheets and adopted the results of those calculations for use in the DEIS. In its Adaptive Management Program, the District also proposed funding to acquire additional wetlands [up to five percent] if monitoring demonstrates that wetland impacts are under-predicted.

Indirect Impacts Resulting in Conversion of Wetland

As detailed in other response sections and the FEIS, deepening the harbor to a 47-foot depth would result in a conversion of the dominant vegetative species typically observed in approximately 223 acres of freshwater marsh [freshwater to brackish marsh scenario]. It is important to note that many of the emergent plant species associated with freshwater marsh systems would still be readily observed in environments that have been defined as brackish marsh [Latham et. al., 1994]. Likewise, the 47-foot depth would result in a conversion of the dominant vegetative species typically observed in 740 acres of

saltmarsh [saltmarsh to brackish marsh scenario]. Nonetheless, dominant saltmarsh species like *Spartina alterniflora* would still be observed in areas which have salinities that define a brackish marsh. However, the basic wetland functions typically associated with these systems would not be materially changed. The same logic applies for other depth alternatives considered. A comparison of potential changes in elements of wetland function for both conversion scenarios is provided in Table 1.

Table 1. Changes in Wetland Function as a Result of Wetland Conversion

Elements of Wetland Function	Freshwater to Brackish Marsh (Approximately 223 acres)	Saltmarsh to Brackish Marsh (Approximately 740 acres)
Water Purification	Negligible	Negligible
Flood Protection	Negligible	Negligible
Shoreline Stabilization	Negligible	Negligible
Groundwater Recharge	Negligible	Negligible
Streamflow Maintenance	Negligible	Negligible
Retention of Particles	Negligible	Negligible
Surface Water Storage	Negligible	Negligible
Subsurface Storage	Negligible	Negligible
Nutrient Cycling	Negligible	Negligible
Values to Society	Negligible	Negligible
Fish and Wildlife Habitat	Minor Adverse	Negligible

As illustrated in Table 1, the only indirect effect the 47-foot project would have on the function of these wetlands systems would be associated with fish and wildlife habitat. All other elements of wetland function associated with predicted shifts in wetlands classification would be negligible as a result of the anticipated increase in salinity. It should be noted that areas of the Savannah Harbor identified as saltmarsh or brackish marsh support similar fish and wildlife species. Any anticipated conversion of saltmarsh to a brackish marsh system would have a negligible impact on the overall function of the wetland system. Alternatively, the District recognizes that a comparison of fish and wildlife habitat between freshwater and brackish marsh systems yields fewer similarities. However, the conversion in fish and wildlife habitat will still be minor when considering total wetland function. Post-project, there would also be some freshwater vegetation in areas now categorized as brackish marsh.

The proposed preservation of 2,245 acres consists of bottomland hardwoods, maritime forest, and uplands dominated by deciduous forest and regrowth. The bottomland hardwoods are classified as palustrine, forested, broad-leaved deciduous systems that are both temporarily and seasonally flooded. Preserving these areas would ensure their wildlife habitat is protected in perpetuity. Moreover, the additional lands would buffer the SNWR from future threats of development, i.e., changes in land use would not occur immediately adjacent to existing areas of the Refuge containing emergent wetlands. Thus, the acquisition and preservation of 2,245 acres of wetland and upland buffer provides a functional replacement for the minor conversion of the only wetland function [i.e., fish and wildlife habitat] that would be expected as a result of the 223 acre freshwater to brackish marsh conversion [See Table 1]. In conclusion, the District has determined that the functional assessment conducted for all wetland areas proposed for impact and mitigation satisfies the no-net-loss of function criterion.

Direct Impacts to Brackish Marsh

The harbor deepening project will require the excavation of 15.68 acres of brackish marsh [after implementation of all possible avoidance and minimization measures]. In brief, these marsh areas are subject to periodic flooding as a result of daily tides. Their vegetative communities are a monoculture of smooth cordgrass [Spartina alterniflora]. Approximately 7.3 acres (47%) of the total acreage to be excavated is subject to the wave action of passing ships. As a result of this perturbation, these areas exhibit vegetation densities which are significantly less than typically observed in this community type. Patches of bare, course-grain sand and mudflat are integrated throughout the patches of *Spartina alterniflora* in these locations. Given the sparse presence of vegetation, it would appear that these areas are challenged, somewhat degraded, and do not possess the same degree of primary productivity as observed in robust, densely-vegetated, systems located elsewhere in coastal Georgia.
Mitigation of the 15.68 acres would be accomplished by restoring approximately 40.3 acres of brackish marsh (approximately 28.8 acres would provide adequate mitigation for the SHEP excavation requirements while the remaining 11.5 acres could be used for other wetland mitigation needs associated with the SHEP or the operation and maintenance of Savannah Harbor). The District used its Regulatory SOP to determine the exact number of acres that would be required for restoration [See Appendix A at the end of the Mitigation Appendix].

Historically, the District's Regulatory Division and members of the Interagency Review Team (IRT), which includes USEPA, USFWS, NMFS, and GADNR representatives, have authorized the creation of saltmarsh as mitigation to offset permitted projects located in this coastal habitat type. The table below identifies five projects in Chatham County where saltmarsh creation was used as mitigation. Typically, a ratio of 2 acres created to 1 acre impacted has been used.

Projects impacting Saltmarsh and the Associated Saltmarsh Mitigation

Project Name	USACE File Number	Saltmarsh Impacts (Acres)	Saltmarsh Creation (Acres)
Slip One- Hutchinson Island	200501453	0.28	0.56
Hardin Canal Drainage	200600393	0.27	0.54
Skidaway Narrows Emergency Access	200600909	0.56	0.56
Skidaway Road Drainage Improvements	200601249	0.52	0.75
SLNG-Slip Construction	200200640	3.24	7.5

The proposed restoration of 28.75 acres of brackish marsh as mitigation for SHEP impacts to 15.68 acres would be a ratio of 1.8:1 [acres restored to acres impacted]. The ratio is roughly the same as for other similar authorized projects that impact saltmarsh. The District's SOP confirmed this value given the area of impact and the subject marsh's current function/integrity.

In support of this site-specific mitigation, it is important to note that the 42 acres (a 1.7 acre site previously graded down by Georgia Ports Authority would be included in the restoration site) of contiguous, restored brackish marsh will include construction of tidal creeks creating edge effect which will have more ecological value than the marsh proposed for excavation. Furthermore, the proposed mitigation site is non-segmented, located "in basin" [north of the Federal Navigation Channel], and incorporates a strip of trees to separate it from the harbor; all factors which makes it an ideal mitigation option for replacing the impacted marsh acreage.

Finally, this mitigation alternative was selected after consideration of the 2008 Final Mitigation Rule. Presently, there are no mitigation banks in coastal Georgia that are approved to sell saltmarsh or brackish marsh credits. Additionally, the In-Lieu Fee program has not been updated or approved by the District and Regulatory Interagency Review Team (IRT) to provide compensation for impacts to saltmarsh or brackish marsh. Thus, site-specific mitigation represents the only course of action for mitigating impacts to the subject 15.68 acres of brackish marsh. Adaptive management would require planting *Spartina alterniflora* if the site does not naturally re-vegetate at colonization rates indicated in Table 5-2 of the FEIS. Annual monitoring reports would be prepared for seven years and provided to a Wetland Interagency Coordination Team (ICT). If the restoration site does not meet the success criteria illustrated in Table 5-2, the ICT would recommend corrective actions [e.g., new planting requirements, increased sprig densities, etc.] to achieve compliance with the reported values in Table 5-2. The need for corrective action(s) would be determined annually with agency involvement. If at the end of seven years the plant density at the restored marsh is not within 10% of the reference site, the District would implement further actions to achieve successful marsh regeneration on this site [see updated Appendix C - Mitigation Planning and Appendix D – Monitoring and Adaptive Management].

The District has determined that the functional assessment [conducted for all brackish marsh areas proposed for direct impact and mitigation] satisfies the no functional net loss criterion.

1109-BB-101-EV36, 1109-BB-101-EV37

Comment: *Monitoring Plan: There should be a detailed plan to monitor wetland functional changes throughout the harbor due to the deepening in the FEIS. This could involve the application of remote sensing methods. EPA recommends the Monitoring Plan be based on the parameters used in the functional assessment cited above. The duration of monitoring should be based on the expected time for full functional replacement. The plan should extend at least seven years after construction, which is the minimum monitoring period required by the Savannah District for any mitigation project of this magnitude.*

Response: The District would install/operate 12 continuous recording stations to monitor selected environmental parameters within the surrounding marsh habitat. The selected locations include sites that have previously been evaluated, so the principals could take advantage of a longer vegetative record. The sites were also chosen to cover the range of salinity conditions in the harbor and model predictions about areas that are most susceptible to salinity changes. The recording stations will monitor water surface elevation, specific conductance of surface waters that flood the marsh, specific conductance of waters in the root zone, and water depth every 30 minutes. Recorded data would be downloaded on a monthly basis. Twice a year characterization of marsh vegetation at each of these sites is also part of the monitoring plan. The preliminary sites are depicted in Figure 4 of Appendix D in the FEIS [see Appendix D for more detail on the monitoring plan].

The District has designed a Monitoring Plan based on the functional assessment provided in the response to comments. The plan's stipulations would remain operational for at least ten years after construction.

Monitoring Plan for Wetlands Subject to Indirect Impacts

The District has prepared a monitoring plan that would assess the wetland changes occurring as a result of the SHEP. As indicated in the District's response to the functional assessment request, only minor shifts in vegetation [species frequencies] are anticipated with the 223-acre conversion of freshwater to brackish marsh. Likewise, minor shifts in vegetation are the only anticipated effect that would occur with the 740-acre conversion of saltmarsh to brackish marsh. In both cases, it is important to note that some areas are not expected to experience any measureable/observable shifts in vegetation given the variability and fluctuations in salinity that the harbor currently experiences and the range of salinities that the marsh vegetation tolerate. The functional assessment revealed that the only element of wetland roles that would be impacted as a result of this conversion is the potential change in fish and wildlife habitat. Monitoring shifts in vegetation and salinity in these wetlands would indirectly assess the degree to which fish and wildlife habitat factors are being affected by the deepening. To that end, the proposed monitoring plan includes vegetative and salinity monitoring [one year] at 12 locations during the pre-construction phase of the project. Other water quality parameters would be simultaneously recorded at these sampling locations. Presently, the USGS Florida Fish and Wildlife Cooperative Research Unit is expected to be asked to conduct this work [see Appendix D of the FEIS] since they have performed it at these sites in the past. Site monitoring would continue during the construction period [estimated to be four years]. Finally, monitoring of the marsh sites, which are subject to vegetative conversion, would continue for ten years following completion of the project. Annual monitoring reports would be prepared following construction. A comprehensive report would be prepared in year six that includes data from the previous years. A final report would also include comparisons to the pre-construction monitoring results.

Monitoring Plan for Restored Wetland

Prior to the start of restoration activities at the Disposal Area 1S site, the District will survey the approximately 42-acre site to determine if any areas are already vegetated with saltmarsh species. Those fringe areas would not be subject to grading. Early investigations of the site suggest the practical acreage [approximately 42 acres] available for mitigation purposes is more than sufficient to provide the minimum area necessary to grade and ultimately restore 28.75 acres of brackish marsh, satisfying the compensatory mitigation needs for direct impacts to 15.68 acres.

The development of the restored marsh also includes a stipulation [adaptive management] requiring planting of juvenile *Spartina alterniflora* plants if the site does not begin to naturally revegetate with the rate of colonization indicated in Table 5-2 of the FEIS. Annual monitoring reports would be generated over a period of seven years and provided to a Wetland Interagency Coordination Team (ICT). If the restored marsh does not meet the success criteria illustrated in Table 5-2, then the ICT would identify and/or recommend corrective actions. This would include altering planting requirements and associated sprig densities to achieve compliance with the reported percentages in Table 5-2. The need for corrective action(s) would be determined and/or implemented annually with agency involvement and concurrence. If at the end of seven years the plant density at the restored marsh is not within 10% of the reference site, then the District would implement further actions to achieve successful marsh regeneration on this site [see updated Appendix C-Mitigation Planning].

1109-BB-101-EV38

Comment: *Data Collection & Monitoring: EPA recommends including a comprehensive baseline data collection and monitoring plan for the mitigation acreage, specifically, predicted acres of "restoration" of freshwater wetlands through conversion from saltmarsh/brackish marsh as identified in the implementation of Plan 6A.*

Response: The marsh monitoring plan includes six sites previously examined by the USGS Florida Fish and Wildlife Cooperative Unit as well as the addition of six new ones. Continuous recording stations at these 12 sites would measure water surface elevation, specific conductance of surface waters that flood the marsh and in the root zone, as well as water depth every 30 minutes. Quantitative sampling [distribution and density] of wetland vegetation would be determined via transects taken twice annually. Marsh monitoring would be conducted prior to construction, during construction, and for ten years after construction.

1109-BB-101-EV39

Comment: *Preservation Site Selection: The proposed preservation action of selecting one or more properties from a 1998 list of 25 properties is vague (three of the properties are already government owned, two appear to have significant development and one was rejected as a restoration site). Alternatively, EPA recommends that an updated list of specific sites be identified, and that the five preservation criteria in the 2008 Mitigation Rule be applied to these sites as well as the other site selection criteria noted above.*

Response: The District consulted with the USFWS to obtain the latest information on properties that the Refuge seeks to acquire/preserve to expand the SNWR's boundaries. Priority would be given to acquisition of large bottomland hardwood tracts located at upriver locations in the estuary that would not be affected by the proposed harbor deepening. Sites that are presently Government-owned or which possess a conservation easement would not be considered. The District will evaluate the proposed preservation mitigation [sites] using the five criteria identified in the 2008 Mitigation Rule. Specifically, 33 CFR 332.3 (h) (1) (i-v) states, *"Preservation may be used to provide compensatory mitigation for activities authorized by DA [permits] when all the following criteria are met: (i) The resources to be preserved provide important physical, chemical or biological functions for the watershed; (ii) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available; (iii) Preservation is determined by the district engineer to be appropriate and practicable; (iv) The resources are under threat of destruction or adverse modifications; and (v) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust)."*

Based on our analysis and coordination with the resource agencies that participated in the IRT, the District has:

(i) concluded that the preserved lands must provide important physical, chemical and biological functions for the SNWR , the Savannah Harbor, and the Lower Savannah Watershed [see response to request for Functional Assessment];

(ii) the preserved lands must contribute to the sustainability of the watershed by ensuring the functions of bottomland hardwood wetlands on these properties are sustained in perpetuity, and the SNWR will be protected with a significant area of land that will function as a buffer in perpetuity. The preservation tracts will also enhance lands already within the SNWR by functioning as a buffer;

(iii) for the reasons identified in (i) and (ii), the District Engineer has determined that preservation of these 2,245 acres is appropriate and practicable;

(iv) the District and other entities anticipate that the Savannah Harbor and areas surrounding the SNWR will continue to experience population growth, industrial/commercial development, and changes in land use. In addition to the industrial developments that have been permitted by the USACE in recent years, the US Geological Survey, Water Science Center (GaWSC) commented on the large number of industrial facilities and associated impacts that are anticipated on lands in close proximity to the Georgia Ports Authority and the SNWR. Preservation of up to 2,245 acres ensures aquatic resources on the associated properties will be protected in perpetuity. The preserved land will provide additional buffer so that any future development in the vicinity will not result in a secondary and/or indirect impact to existing Refuge lands. There is also a threat that subtle changes in adjacent land use will also have a detrimental impact on the SNWR. For example, a Public Notice published by the Charleston District, Corps of Engineers on September 28, 2009 requested comment on a proposal from a private landowner to divert tidal water flow onto an approximately 693-acre property to increase the hydrology on 485 acres of previously-existing rice impoundment. The 693-acre property, which would be used as a mitigation bank, presently provides benefits to migratory waterfowl during migratory stops similar to those provided by Refuge lands. Conversion of such acreage to saltmarsh could shorten their stay in the area and result in the birds that the Refuge serves resuming their migration with less rest. The expected effects of the proposed Regulatory action on the SNWR have not been quantified at this time, but the proposed project is an example of the continued threat that manipulation of adjacent lands pose to the SNWR and the resources it protects. Acquisition and preservation of the proposed 2,683 acres as mitigation for the SHEP project would provide additional buffer and protection from these type of activities as well; and

(v) preservation of the 2,245 acres will include a restrictive covenant and the recording of a conservation easement with conveyance of the property to the USFWS. Collectively, the information provided in this response justifies the preservation of 2,245 acres adjacent to the SNWR as satisfying the mitigation requirements for the conversion of freshwater and saltmarsh wetlands.

1109-SB-101-EV40, 1109-SB-101-EV41

Comment: *Standard Operating Procedure Application: Based on Savannah District Guidance, the SOP is not applicable for impacts over 10 acres, though with modification, it may be able to serve as an initial evaluation tool. The 48-ft project deepening alternative would excavate 14.08 acres and hydrologically impact/convert at least 1,212 acres of wetlands. The application of the SOP to this project affects the quantity of the proposed compensatory mitigation. This is partially due to the fact that the calculations lack a scaling factor. EPA recommends that the mitigation working group assess modification of the current SOP or use of another method to ensure an adequate quantity of compensatory mitigation is provided that will replace the wetland functions lost due to the project.*

Response: The USACE does not concur with this assessment. The Savannah District SOP has been used, and will continue to be used to evaluate Regulatory Division permit applications with wetland impacts greater than 10 acres. The District can document 15 permitted projects in the last 5 years that the Federal and State natural resource agencies – including EPA – authorized based on the Savannah District SOP having wetland impacts greater than 10 acres [Table 3].

Table 3. Projects with Impacts Greater than 10 acres that Used SOP Calculations to Determine Mitigation Requirements

Project Name	USACE File Number	Wetland Impacts (Acres)
Northport/Oak Grove Plantation	200414950	33.2
Broadhurst Landfill	200501435	96.55
GDOT US441 / SR 89	200600828	64.04
Houston American Cement	200700577	21.21
Newton Tract	200701309	31.86
Robins Air Force Base	200701096	19.5
Fort Benning 69741	200900567	15.94
Fort Benning 69668	200900568	12.33
The Carter Group	200801428	11.3
GDOT I-95 Widening	200502310	14.47
Grady County	200500967	129.0
Fort Stewart	200900886	26.7
Fort Stewart Machine Gun Range	200900786	103.34
Fort Stewart Multipurpose Range	200901852	202.9
Fort Stewart Digital Multipurpose Range	200900885	43.6

For these projects, the SOP was considered the best available tool to quantify credits required for mitigating wetland impacts, i.e., restoration, enhancement and preservation], if applicable. In every case where impacts were greater than 10 acres, the SOP was used as an assessment tool to ensure the credits required for mitigation were practicable, but also commensurate with the magnitude of impact associated with the authorized project environmental losses.

It is important to note that while the SOP is a tool for calculating mitigation, the District also uses sound, science-based judgment when evaluating an applicant's project that would impact Waters of the US. As defined in the USACE's General Regulatory Policies, 33 CFR 320.4 (r)(2) states, *"All compensatory mitigation will be for significant resource losses which are specifically identifiable, reasonably likely to occur, and of importance to the human or aquatic environment. Also, all mitigation will be directly related to the impacts of the proposal, appropriate to the scope and degree of those impacts, and reasonably enforceable."* To that end, the Savannah District Regulatory Division always ensures that calculated mitigation credits derived from the SOP pass the sensibility test and are consistent with actual, project-derived impacts.

The Regulatory Division is developing an updated Mitigation SOP using a functional assessment metric. However, this tool will not available for use in time for this project. In the interim, the Regulatory Division will use the current SOP for assessing mitigation requirements for all projects [including those having a real impacts greater than 10 acres] until the updated version is finished, tested, and validated.

In a previous response, the USACE discussed the past and current use of the SOP by Savannah District's Regulatory Division when evaluating projects that have greater than 10 acres of wetland impact. For several years, the EPA has advocated use of a scaling factor primarily when calculating a loss in stream

length that exceeds 5,000 linear feet. Integrating a scaling factor into the SOP is not appropriate when evaluating SHEP-derived impacts for the following reasons: (1) Over 10 years ago, the District assembled a Wetland Interagency Coordination Team (ICT) consisting of technical expert representatives from USACE, Federal natural resource agencies, and State natural resource agencies to identify procedures to identify wetland impacts and acceptable mitigation for a harbor deepening project. The results of that coordination and collaboration included agreement to use the existing Regulatory SOP to calculate the acreage needed for preservation [see previous District response regarding formation of mitigation working group]; (2) Presently, there is no scientific approach or mathematical justification that can document/validate an appropriate value for use as a scaling factor in the current application of the existing SOP. The Savannah District, Regulatory Division continues to use the existing SOP [without a scaling factor] as one tool to assess the validity of an applicant's proposed mitigation plan for projects that would impact greater than 5,000 linear feet of stream and/or 10 acres of wetland. Based on that initial assessment, the District can determine if more or less mitigation is needed as defined in 33 CFR 320.4 (r)(2); (3) The District has performed a functional assessment of the wetland areas that would be subject to changes in salinity as a result of the harbor deepening. The District has determined that the only element of wetland function that would be affected is fish and wildlife habitat [see Functional Assessment response]. To that end, a scaling factor integrated into the SOP would not provide any greater means of evaluating impact, or enhance the ability of the current tool to identify a more appropriate form of mitigation other than what has been proposed; (4) The existing SOP was used to calculate the mitigation that would be required to offset direct impacts associated with the excavation of 15.68 acres of brackish marsh. Use of the SOP demonstrated that the restoration of 40.3 acres of brackish marsh within the Savannah Harbor would provide more than sufficient mitigation to offset the impacts. The functional assessment also concluded that the restored brackish marsh would provide greater wetland function than those areas proposed for impact [see results of Functional Assessment for direct impacts to brackish marsh].

1109-08-101-EV42

Comment: *SOP Factors; SOP factor selections appear to be inconsistent and clarification on the technical basis for the factors used is needed. Again, EPA recommends that the mitigation working group assess modification of the current SOP and the application of the impact factors or use of another method to ensure an adequate quantity of compensatory mitigation is provided that will replace the wetland functions lost due to the project.*

Response: The District does not believe a mitigation working group is needed at this time to review the impact factors used in applying the SOP to this project. The Corps has conducted an independent review of the application of the SOP to this project. That Agency Technical Review (ATR) assessed the use of Savannah District's SOP as a tool in the development of a mitigation plan for SHEP. The ATR was led by the National Deep-Draft Navigation Planning Center of Expertise. The evaluation was performed by experts in the Engineering Research and Development Center in Vicksburg, MS. The ATR was to ascertain if the SOP was an appropriate method to determine the preservation acreage needed to compensate for impacts resulting from the SHEP. The ATR was also requested to comment on the reasonableness of the assumptions and calculations that Savannah District used in applying the SOP for the SHEP. The SOP was used only to determine the amount of preservation acreage necessary to offset the remaining acreage impacted after development of avoidance, minimization, and restoration features. The ATR concurred with use of the SOP to determine the amount of preservation acreage needed and considered Savannah District's application of the SOP to be reasonable in quantifying impacts and the associated mitigation that would be required.

The Fish and Wildlife Coordination Act Report (March 2011) was prepared by the USFWS and reviewed by SC DNR and GA DNR. In that report, the USFWS concurred with use of the SOP, which calculated a need to preserve 2,245 acres of land adjacent to the SNWR for the 47-foot alternative. The District had previously concurred with use of factors recommended by those agencies in the SOP worksheets and incorporated those factors in the SOP calculations used in the DEIS. Since the USFWS, SC DNR and GA DNR have concurred in the factors that the Corps used in this SOP application, hosting a review by an interagency team to review the SOP factors would duplicate what has already occurred.\

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1109-BB-101-EV43

Comment: *Threats to Preserved Tidally-Influenced Wetlands: The COE characterized the threat to any potentially preserved tidally-influenced wetlands as "moderate" due to potential development on nearby uplands, even though no specific site or sites were identified. EPA generally rates the threat to these types of wetlands as "low" or "none", especially since the State of Georgia has been exerting ownership chums on all tidally-influenced wetlands that have a valid King's grant. A significant degree of threat is one factor required for any preservation area under the Mitigation Rule and a lower degree of threat would result in significantly more preservation acreage being needed in the SOP calculations. EPA recommends the mitigation working group assess the project "threat" and incorporate it into the criteria for site selection.*

Response: This comment pertains to the SOP Preservation Worksheet that illustrates a "Degree of Threat" factor which gets integrated into the credit calculations. The 2,245 acres that would be preserved are immediately adjacent to the SNWR and include bottomland hardwood wetlands, as well as some uplands [see functional assessment response for description of areas to be preserved]. As described in other response sections, the lands proposed for preservation are imminently subject to development.

When reviewing the preservation worksheet and the "Degree of Threat" factor, it is important to note that the District did not use the highest value [i.e., 0.5] available for this calculation. Use of the "High" Degree of Threat value would have resulted in a greater "Sum of m Factors" calculation, which, in turn, would have ultimately reduced the required preservation acreage that was needed. Alternatively, the District chose to describe the Degree of Threat as "Moderate" which more accurately [but conservatively] reflects the current trends in the vicinity of the SNWR.

Although the "Degree of Threat" factor was defined as "Moderate", the District, USFWS, and other entities anticipate that the Savannah Harbor, and areas in the vicinity of the SNWR, will continue to experience population growth, industrial/commercial development, and changes in land use. The District evaluated development trends within five miles of the Savannah National Wildlife Refuge for the last 15 years. In those 15 years, authorization of approximately 170 regulatory permits has resulted in more than 230 acres of wetland impacts. In recent years, several industrial developments have been constructed in the vicinity of the SNWR, e.g., a Target distribution facility was constructed three years ago which converted approximately 42 acres of pristine, maritime forest and wetland. Land has been cleared in SC for an industrial park adjacent to the Refuge. The US Geological Survey, Water Science Center (GaWSC) commented to the District in its DEIS review on the large number of industrial facilities and associated impacts that are anticipated on lands in close proximity to the Georgia Ports Authority and the SNWR. Preservation of the 2,245 acres ensures aquatic resources on the associated properties will be protected in perpetuity. The preserved land will also provide additional buffer so that any future

development in the vicinity will not result in a secondary and/or indirect impact on the Refuge. There are also subtle threats in adjacent land use that could have a detrimental impact on the SNWR as evidenced by the proposal [2009 – noted previously] of a private landowner requesting a permit to divert tidal water onto an approximately 693-acre property in an effort to increase the hydrology on 485 acres of a previously existing rice impoundment. Acquisition and preservation of 2,245 acres as mitigation for the SHEP project would provide additional buffer and protection from these types of activities.

The other Federal and State natural resource agencies concurred in the District's assessment of the "Degree of Threat" factor together with the other use of SOP elements/assumption by their overall concurrence of the Fish and Wildlife Coordination Act Report.

1109-BB-101-EV44

Comment: *Differing Resource Agency Mitigation Approaches: Project mitigation for SHEP is somewhat confounded by different resource agency philosophies for mitigating the same wetland impacts. In general, EPA emphasizes a functional assessment of wetlands that is based on physical, chemical and biological metrics to restore or enhance wetlands to offset the functional losses due to a project. For this project, it appears that FWS has emphasized wetland preservation, with the preserved land added to the SNWR, as the preferred approach. Preservation clearly has a role in wetland mitigation but it should be consistent with the 2008 Mitigation Rule and should include a thorough functional assessment of the proposed preservation sites. EPA believes the mitigation working group could help resolve the differing approaches to wetland mitigation.*

Response: The District conducted a functional assessment that examined all of the potential direct and indirect impacts to wetlands. The magnitude of physical, chemical, and biological impact was also examined [Please see response to request for functional assessment].

The District's analysis of indirect effects concluded that the only element of wetland function that would be impacted as a result of the conversion in wetland vegetation is an impact to fish and wildlife habitat. The District then evaluated the proposed impacts using the 2008 Mitigation Rule to ascertain the appropriate mitigation that would compensate for the minor impact to fish and wildlife habitat. Fish and wildlife use of the marsh would still occur, even though the species and percent composition of vegetation would shift to some degree. Consequently, fish and wildlife species use of the marsh would shift somewhat with the shift in dominant marsh type. Ultimately, the District reaffirmed that the preservation of 2,245 acres of bottomland hardwoods and interspersed uplands adjacent to the SNWR would compensate for impacts to fish and wildlife function by protecting important freshwater wetland habitats and expanding the buffer around the SNWR. Thus, the District has satisfied EPA's request to complete a functional assessment and comply with the 2008 Mitigation Rule. In turn, the conclusion of the Corps' assessment (i.e., preservation of lands adjacent to the SNWR) agrees with an original ITR determination that preservation is an acceptable mitigation alternative for the minor conversion of wetland, which would occur as a result of harbor deepening.

Direct impacts for the proposed harbor deepening include the excavation of approximately 15.68 acres of saltmarsh. The District conducted a functional assessment of those brackish marsh systems and our findings are included in a previous response. The District also complied with the 2008 Mitigation Rule. Ultimately, our watershed assessment and iterative approach to mitigation concluded that the loss of 15.68 acres of brackish marsh could be mitigated using "in kind/in basin" mitigation that consists of restoring 40.3 acres of brackish marsh. A functional assessment of the impact and mitigation sites

concluded that restoration of the 40.3 acre marsh site would result in "no-net-loss of aquatic habitat." In fact, our assessment of the Lower Savannah Watershed and functional assessment of impact and restoration sites demonstrate that the area proposed for restoration will ultimately have greater function, integrity and productivity than those areas to be excavated (See response to functional assessment).

1109-B8-101-EV45

Comment: *EPA in its review of wetland mitigation proposals applies the Section 404(b)(1) Guidelines and the 2008 Mitigation Rule (which amended the Guidelines). We understand that FWS has a strong preference for preservation and has placed a high value on freshwater tidally-influenced wetlands. This preference is also reflected in the COE's wetland mitigation plan proposed in the DEIS. For example, while Mitigation Plan 6A may increase the acreage of freshwater wetlands, it will also decrease the acreage of saltmarsh and brackish wetlands. In contrast, EPA does not categorize and rank wetland types but instead looks for functional replacement for losses of any wetland type (i.e., all jurisdictional wetlands). Both mitigation approaches should be reasonably satisfied in the wetland mitigation plan of the FEIS, so that wetland function and habitat values will both be mitigated for project impacts. An ideal plan would seek to maintain or increase the functions of all wetlands in the Savannah Harbor area.*

Response: The District has concluded that the mitigation approaches proposed by EPA and USFWS have both been reasonably satisfied [please see previous/earlier responses].

1109-B8-101-EV46

Comment: *Reflecting the lack of a functional approach noted above, the DEIS places a higher "value" on freshwater wetlands, followed by brackish wetlands and finally saltmarsh. This was observed throughout the impact and mitigation evaluations. EPA believes that each wetland type has a unique suite of functions and alteration of these functions is a loss, regardless of the wetland type. While we agree that the Savannah Harbor is a highly managed and altered estuarine system, we recommend an objective analysis for assessing functional loss that is based on in-kind functional replacement.*

Response: The Wetland Interagency Coordination Team placed a higher "value" on freshwater wetlands, followed by brackish wetlands and finally saltmarsh. The District used that general ranking throughout its wetland impact and mitigation evaluations. However, in response to EPA's comments on the DEIS, the District developed and provided a functional approach that details the anticipated direct and indirect wetland impacts associated with the SHEP. The District agrees that each wetland type is important to the Lower Savannah Watershed. The conclusion from our functional assessment confirms that a minor shift [freshwater to brackish marsh] in the percent composition of vegetation could impact fish and wildlife habitat -one of several elements of wetland function. However, this change in fish and wildlife use should not be construed as constituting a loss in this wetland functional category. To verify that position, the magnitude of impact was considered when evaluating mitigation options to ensure compliance with the 2008 Mitigation Rule. Ultimately, the District concluded that preservation of 2,245 acres of bottomland hardwood wetlands and upland buffer around the SNWR would sufficiently compensate for the noted changes to fish and wildlife habitat - the single element of wetland function that would be affected as a result of the vegetation shift. See also EIS Appendix C, Section VII Consideration of the USEPA/USACE Mitigation Rule.

1109-BB-101-EV47

Comment: *Vessel Efficiency - Appendix K of the DEIS states that "Since the total number of containerized vessels calling at the port would decrease with a deeper harbor, the total volume of air emissions would decrease." To verify the DEIS assumption that future (post-project) larger vessels (Panamax and post-Panamax) calling on the port produce less emissions than the existing smaller fleet, the DEIS should compare the fuel efficiency/emissions of larger versus smaller vessels using an "emissions per TEU metric as the basis of comparison, and compare the emission levels per TEU for the smaller versus larger containerized vessels calling on the port.*

Response: In developing the air emission inventory for the Port of Savannah, the District used the US Environmental Protection Agency's (EPA's) "Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories, Final Report, dated April 2009". This EPA guidance document provided the framework used to calculate all air emissions at the port. Importantly, it does not require, recommend, or provide an approved methodology to compare the emissions of the larger Post-Panamax and Panamax Ocean-Going Vessels with smaller container vessels. It does not provide a methodology for comparing the emissions of vessels greater than 3000 kW in size. Similarly, it does not include a requirement for or provide an approved methodology to determine an "emission per TEU" for each vessel size, i.e., Post-Panamax, Panamax, Sub-Panamax, and Handy size. The procedure described in the guidance document is based on the average size of main and auxiliary engines for a vessel, not the size of the ship itself. Therefore, since the document does not recommend this analysis or provide an approved methodology, the District has concluded that this information would not be required in assessing project's potential air impacts.

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1109-BB-101-EV48

Comment: *NAAOS Attainment-The FEIS should demonstrate that project emissions should not interfere with area attainment and maintenance of the NAAQS under Section 110 of the Clean Air Act and NAAQS maintenance plan requirements. The FEIS should demonstrate this over the life of the project (2065) given the expected growth of the port. Such an analysis would require a project future condition analysis.*

Response: A comparison of the air emissions [2002 USEPA NEI data] for Chatham County and those calculated Port emissions [2008] revealed that the latter's emissions are a small subset of the County's totals. The District has already shown in the EIS - Appendix K that the proposed deepening of the harbor would have lesser air emissions than the No-Action Alternative [baseline condition of -42 feet]. Therefore, the proposed actions would not adversely interfere with area attainment of the NAAQS under Section 110 of the Clean Air Act; CAA maintenance plan requirements only apply to areas reclassified from non attainment to attainment status, which is not the case for Chatham/Jasper Counties (never classified as non attainment).

The District has already completed a future condition analysis, i.e., an air emission inventory calculated for the port when it reaches capacity [2030] with 6.5 million TEUs. This analysis also verified that the No Action Alternative of -42 foot depth has a greater air emission profile including air toxics and greenhouse gases than the proposed deepened harbor.

1109-BB-101-EV49

Comment: *Future Condition Analysis: The Appendix K emissions inventory provides current and future emissions data (to 2032) for air toxics, but limits emissions data for several NAAQS and other parameters to current conditions. Therefore, EPA requests that the future condition for selected criteria and other measured pollutants also be included in the FEIS for either the No Action Alternative or the Tentatively Recommended Plan (since the COE believes them to be the same in terms of port growth and air quality).*

Response: The District has already completed a future condition analysis, i.e., an air emission inventory calculated for the port when it reaches capacity [2030] with 6.5 million TEUs. This analysis also verified that the No Action Alternative of -42 foot depth has a greater air emission profile including air toxics and greenhouse gases than the proposed deepened harbor.

The air emission inventory that the District conducted [described in EIS - Appendix K] was a comprehensive analysis of port-dependent emissions. All air emissions [including criteria pollutants, air toxics, and greenhouse gas emissions] were calculated for both the No-Action Alternative [-42 foot depth] and the proposed action [-48 foot depth], for all depths [42, 44, 45, 46, 47, and 48 feet], and all years [2015, 2020, 2025, 2030, 2032, and 2065]. Additionally, the District compared air emissions from the existing No- Action Alternative to the proposed action. The baseline No Action Alternative for all years and depths had greater air emissions [criteria pollutants, air toxics, and greenhouse gas emissions] than the proposed action.

1109-BB-101-EV50

Comment: *Dispersion Modeling: There is no dispersion modeling in the DEIS to indicate how these emission increases will impact local area air quality monitors and communities, with emphasis on potential EJ communities. There is one target monitor of concern located in Garden City Terminal and another in downtown Savannah to determine how these emission increases will impact local area air quality. Since much of the truck traffic from the port travels through these areas, it is important to characterize the impacts along those routes to ensure that the increases will not adversely affect the models. EPA requests that the dispersion modeling evaluates potential impacts on both criteria pollutants (NAAQS) and air toxics relative to sensitive port landside receptors, with emphasis on potential EJ communities along road/rail corridors associated with the port.*

Response: Under both the without and with project conditions, the District expects the Garden City Terminal to reach its build-out [maximum] capacity in 2030 when the total annual number of TEU reaches 6.5 million. That determination is based on the following factors: size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the container cranes, the number of jockey trucks that move the containers within the terminal, how the containers are stacked within the terminal, and the number of railroads that service the terminal and the frequency of their trains. It is anticipated that without deepening, more vessels will be required to transport the port's annual cargo. However, with deepening, the total number of vessels decreases as vessels will be able to load more completely.

No increases in cargo are expected to occur as a result of the proposed harbor deepening. As a result, the project would not affect the number of containers that move through the areas that surround the port. The economic benefits of the project would result from the use of larger, more cost-effective container ships, not an increase in the number of containers. Noise, air emissions [including air toxics], and traffic would not be increased as a result of the proposed deepening.

Therefore, the proposed harbor deepening will have no adverse landside impacts outside the Garden City Terminal and in adjacent EJ communities. Dispersion modeling was not conducted since no cargo increases are expected to occur as a result of the proposed harbor deepening.

The Georgia Ports Authority has indicated that it is separately evaluating the dispersion of air emissions associated with their terminals, i.e., Garden City terminal and Ocean City Terminal, as well as those expected to occur in the future if the harbor is not deepened. Upon completion, GPA has indicated it would share the results with EPA.

1109-BB-101-EC01

Comment: *Air Analysis Conclusions: The conclusions for the air emissions analysis section in Appendix K were somewhat general. The COE states that the emissions would occur with or without the project, but the COE has not supported the reasoning behind this statement. It is recommended that the COE provided documentation to support the analysis that the total cargo moving though the port would not increase or decrease as a result of the harbor deepening.*

Response: It is in fact the terminal capacity that is the main controlling factor in how many TEUs can be loaded and off loaded at Garden City Terminal (GCT), not the number of vessels calling. The GCT capacity is estimated to be 6.5M TEUs, and the commodity forecast indicates that capacity will be reached by 2032. The primary constraints at the terminal are berthing space and the time required to move containers to and from the ships. The COE made the determination that overall freight shipped in and out of GCT would be the same in the without and with project conditions because the savings per TEU is not large enough to induce additional cargo to be shipped in and or out of Savannah.

1109-BB-101-EV51

Comment: *Recommended Additional Port Mitigation: EPA recommends the following additional streamlining and mitigation methods to further offset port diesel emissions and enhance the sponsor's environmental management system for the port.*

** Shore Power - Since the port is electrifying its cargo cranes, EPA recommends the port evaluate the possibility of including shore power during that upgrade. Installing shore power at the same time as electrifying the gantry cranes should save costs. Since the vessels are significantly larger, EPA expects the call time in port to extend beyond the current average turn time. While short turn times may not justify shore power, longer turn times make shore power a potentially viable option to reduce air emission impacts.*

** Dray Truck Upgrades - EPA recommends that the port consider programs that incentivize upgrading of dray (on-port) equipment to 2007 standards.*

** Distribution Center- EPA recommends that the port coordinate with the distribution center to establish no-idle-zones at distribution centers. There is no need for a vehicle to idle while it is being loaded or unloaded.*

** Eliminate or Reduce Creep Idle - Creep idle is a significant source of pollution at many ports. The port should determine if creep idle is a problem and address it accordingly. The current gating process should be effective, but an evaluation will support this.*

** Alternative Fuels - Use of biodiesel in port diesel equipment will reduce emissions of polycyclic aromatic hydrocarbons (PAH) significantly. The port should consider this as a future fuel choice. In addition, since there is a reliable source of liquefied petroleum gas (LPG) nearby, the port could consider switching all on-property diesel vehicles to LPG to reduce impacts. The port should consider this as part of operating agreements with Stevedores and shipping lines if they do not have direct control of the jockey trucks.*

Response: Appendix K [Table 5-78] indicates that all air emissions [vessels and land based operations] associated with the No-Action Alternative depth of -42 feet are lower than the comparable scenario with the proposed harbor deepening. Therefore, no mitigation is required to offset port diesel emissions.

Section 5.19 in the EIS states the following: *GPA continually evaluates methods to reduce diesel consumption and emissions and provides examples of actions taken or being taken by GPA to achieve that goal.*

The District will share EPA's suggestions with the Georgia Port Authority for further reducing ongoing air emissions from operations at its terminal facilities.

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1109-BB-101-EV52

Comment: *Air Toxics Emissions Table 5-64 (pg. 46 of App. K) estimates the emissions 'of 28 air toxics (e.g., 1.3-butadiene, acrolein, acetaldehyde, etc.) from the Garden City Terminal in 2008 to be about 38 tons. The corresponding estimates for the year 2032 range from about 117 to 123 tons (Tables 5-74 and 5-76). This is a dramatic increase and reflects the possible emissions from only one terminal.*

Response: The emissions identified in Table 5-64 through 5-67 are for the Without Project condition at the Garden City Terminal at various years in the future. Those emissions would occur independent of any harbor deepening. The increases would occur as a result of the growth in container traffic that is expected through Savannah in response to increasing population levels.

Table 5-64 -2008 indicates that for 28 air toxics the calculated air toxics emissions for ocean going vessels, land based operations, and tugs at the Garden City Terminal (GCT) would be about 38 tons. The GCT is one of 22 terminals [Appendix K -Table 1-1] in the Port of Savannah.

Table 5-63B indicates that in 2008 all 22 terminals in the Port of Savannah (including the GCT) discharged about 83 tons of the same 28 air toxics. In a previous response it was noted that these emissions were only about 1.9%, i.e., 83 tons/4340 tons, of the total air toxics emitted in Chatham County, GA.

Currently Chatham County, Georgia and Jasper County, South Carolina are attainment areas. The District's analyses indicate that the Port of Savannah does not have a significant impact on the total air toxics (or overall air quality) of Chatham County, Georgia. Although the calculations indicate a substantial increase in air emissions at the Port over time, those increases would occur as a result of a continuation in the Southeast's long-term growth in economic activity. They would not occur as the result of a harbor deepening.

Also see our response to comment 1109-BB-101-EV51, above. It follows that if the total air emissions for the deepened harbor are less than the total air emissions for the existing No Action depth of -42 feet, then air toxics (which are a subset of VOC and PM10 emissions) would be notably less for the deepened harbor than the baseline (Without Project) condition.

1109-BB-101-EV53

Comment: *COE Level of Analysis & Project Position - Toxicity information and estimated concentrations of the air toxic pollutants around the port are not provided in the DEIS. The potential health impacts associated with these air toxics emissions are not addressed in the DEIS. The DEIS states (pg. 108 of App. K), "More detailed analyses - such as dispersion analyses to identify 'hot spots' of pollution - could be conducted. However, the Port is not a major contributor to the overall emissions in the County. When coupled with the dispersed nature of many of those 'Port' emissions along the 34-mile length of the navigation channel, the Corps concluded that such additional analyses are not warranted." Page 4 Section 2.0 (App. K) states, "This assessment does not include a detailed dispersion modeling assessment of these emissions or a risk-based assessment of the health effects associated with the proposed project."*

Response: Since the proposed deepening project would result in a net decrease in air emissions [less VOC and PM10 emissions at the port] when compared to the No-Action Alternative , the proposed action would have less air toxics emissions than the baseline condition of -42 foot depth. Also, it should be noted that air emissions for the Port's sources, i.e., ocean going vessels, were calculated along the entire 32-mile length of the navigation channel, rather than just at the terminals.

The potential health impacts associated with the air toxics emitted by the 22 terminals in the port are minor when compared to the total air toxics emitted in Chatham County, GA [see response to 1109-BB-101-EV52]. 1109-BB-101-EV54

Comments: *Screening Level Risk Assessment - As noted above, a significant number and volume of air toxics are associated with operating the port and significant increases in such emissions are expected over time. Therefore, EPA believes that locally port air toxics are a potential concern to surrounding communities. The dispersion of emissions and the location and magnitude of the emission sources are important to determining whether a particular source poses a significant risk to those nearby. EPA Region 4 has provided detailed guidance (including references to well-prepared air toxics analyses by the COE at other ports) numerous times over the last several years of coordination to assist the COE in such an evaluation. EPA continues to support for a screening level risk assessment to evaluate the potential impacts associated with emissions of air toxics related to the harbor deepening and its operation, both overall and potential any areas of localized higher concentrations, particularly in light of the projected increase in emissions of air toxics associated with the port over the next several years.*

Response: For the same reasons stated previously, the overall increase in air toxics emissions at the port over the project's life is insignificant in comparison to the overall air toxic emissions for Chatham County, GA. Therefore, a screening level risk assessment will not be conducted for air toxics.

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1109-BB-101-EV55

Comments: *Vessel Cargo (App. K): While the Appendix K emissions inventory for air toxics provides both current and future emissions data, future conditions data were considered the same after 2032 since the COE maintains that the number of calling vessels will be constrained by 2032 (due to one-way vessel traffic) such that there will be no increase in freight thereafter. While the number of ships calling on the Garden City Terminal is at capacity in 2032, it is unclear how the COE made a determination that there would not be an increase in cargo offloaded or an increase in overall freight received. The FEIS should clarify if the capacity at the port to store and handle additional cargo is reached at the same time. Currently, every ship that calls on the Garden City Terminal does not offload 100% of its containers. If this is the case in 2032, then the capacity of the terminal itself is the key stabilizing factor and not the number of vessels calling on the port. If the capacity of the terminal has not been reached at 2032, then that same number of vessels could still offload more containers and increase the air emissions throughout the 50-year life of the project (to 2065).*

Response: According to the commodity forecast found in Section 5 of the GRR, the landside cargo handling of the port will reach its capacity of 6.5 TEUs in 2030. That annual capacity is the maximum number of containers that could reasonably be processed through the Garden City Terminal, i.e., its landside cargo handling capacity has practical, finite limits for expansion. The bases for this determination were cited in a previous response.

The landside capacity will limit the number of containers [TEUs] that can be processed through the terminal, rather than a limitation on the number of vessels that could be handled. Therefore, when landside cargo handling capacity is reached [2030], vessel calls would not increase through the remainder of the project's economic life [2067].

1109-BB-101-EV56

Comment: *Upland Disposal: EPA finds that the upland disposal management plan for the project's cadmium-laden dredged material is acceptable, with the exception of a few minor inconsistencies. Overall, EPA concurs with the use of eight (8) upland confined disposal facilities (CDF's') provided by the GPA/GDOT non-federal sponsor for use as part of SHEP. These COP's are known as 2A, 12A, 12B, 13A, 13B, 14A, 14B, and Jones/Oysterbed Islands. However, dikes at the CDFs will have to be raised in height over the next 50 years to provide the needed sediment storage capacity. EPA recommends that the FEIS provide additional information on long-tem maintenance issues for Savannah Harbor, and commit to specific future review dates to consider advances in dredging technologies, changes in shoaling rates or environmental conditions as well as changes in environmental laws.*

Response: Section 10.3.6 of the GRR contains a discussion of the incremental effects on operation and maintenance of the harbor from the proposed harbor deepening. USACE intends to remain current on technologies associated with long-term maintenance and will periodically meet with agency representatives to review changes in technology, shoaling rates, and/or environmental conditions and laws. Agency representatives will be made aware of any changes that are being proposed prior to the start of work.

1109-BB-101-EV57

Comment: *Proposed Extension of Ocean Channel- The proposals in the DEIS include dredging to extend the current channel offshore for over seven miles since ocean water depths in these areas will not accommodate post-Panamax vessels under all tide and cargo conditions. This channel extension would constitute an estimated 17-18% increase in the project channel length, while the additional 4.6 mcy of new work dredged material is a 13-15% increase in the dredged material volume.*

This project component should be fully analyzed and discussed in the FEIS. Specifically, the FEIS should address the following:
** Characterize Dredged Material: Were core samples taken, will hard/live bottom material be dredged, are sediments contaminated, are there any additional cadmium concerns associated with this project component, etc.? Should it be determined that hard/live bottom material will be dredged within the channel extension area, an analysis of fisheries mitigation would be necessary. EPA recommends that appropriately designed fisheries enhancement inkind habitat mitigation be used to fulfill any identified mitigation requirements.*
** Offer Disposal Options: What disposal areas are available, particularly given that the use of proposed sites 11 and 12 may not be appropriate (see Dredged Material Reuse below)?*
** Savannah ODMDS Capacity Evaluation: Any plans requiring use of the Savannah ODMDS should include an ODMDS capacity evaluation to ensure the ability to accommodate the related volumes of dredged materials.*
** Provide Route Variations: The DEIS does not identify the specific alignment of the proposed new channel extension. EPA understands that hard bottom habitat has been identified in the general vicinity of the new channel extension. Are there slight alignment shifts possible within the channel corridor to avoid any potential hard bottom habitat? What mitigation measures will be taken for impacts?*
** Discuss Funding: Did the WRDA 1999 authorization include the funding and cover the scope of this proposed extension?*

Response: All required surveys, sampling, etc. will be performed prior to construction of the proposed bar channel extension. The District has examined several channel alignments and determined the least cost alternative. If the sampling/surveys reveal the presence of hardbottom communities, mutually agreeable mitigation for such impacts will be coordinated with the Interagency Coordination Team. The District does not anticipate encountering any contaminated sediments offshore. The FEIS will include a revised placement plan in which all of the entrance channel extension sediments would be deposited in the previously-approved ODMDS or existing upland confined disposal area. The most recent capacity analysis of the Savannah Harbor ODMDS, included in Appendix R of the EIS, indicates that, for the 47 ft project, capacity would last up to 42 years. The District no longer proposes to place any of these sediments in Sites 11 and 12 as beneficial use features. The District has determined that proposed channel extension is within the WRDA 1999 authorization.

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1109-BB-101-EV58

Comment: *So that EPA can have a full understanding of the ocean channel extension component. EPA requests the opportunity to review and comment on the new channel dredging sections prior to the issuance of the FEIS. EPA also notes that based on the lack of information on this issue in the DEIS, the public may not have a full understanding of this issue for purposes of public review and comment.*

Response: The EIS and GRR include sufficient information on the entrance channel extension. The comprehensive information in the reports is more than sufficient for reasoned decision-making regarding the impacts expected from implementing the proposed alternative. The design for the proposed extension of the entrance channel is based on existing information and coordination with GA DNR-CRD. The District will conduct additional studies to confirm the initial determination that the proposed alignment is not likely to adversely impact significant environmental or cultural resources. Those studies will include side scan, magnetometer, and sediment testing. These confirmatory studies would be complete prior to the start of construction. The District will share the results of this sampling with the other natural resource agencies as they become available. If the presence of hard bottoms is detected within/adjacent to the alignment, all agencies will be consulted concerning necessary shifts and/or the need/kind/amount of mitigation. The Corps' ODMDS placement evaluation (included as Appendix R) concludes that the sediments are suitable for ocean disposal.

1109-BB-101-EV59

Comment: *Dredged Material Reuse: EPA recommends that the COE consider re-entering suitable sediments dredged at the entrance channel into the sand-sharing system (longshore drift) by placement at feeder berms located south of the entrance channel in areas free from seagrasses, hard/live bottoms, and/or cultural resources. Use of suitable dredged material for beach renourishment projects can also be a reasonable reuse if locally requested; seagrasses, hard/live bottoms and/or cultural resources are not covered; and grain size is compatible with the existing beach to reduce erosion potential. Feeder berms utilized for this purpose must be located within the territorial sea (i.e.-shoreward of the 3 nautical mile line) in accordance with the Clean Water Act (CW A). Placement of dredged material outside the territorial sea is regulated under the MPRSA and must be placed in an EPA- designated ODMDS after proper characterization and evaluation, and in compliance with the Ocean Dumping Regulations (40 CFR 220-228).*

Response: The District had proposed placing sediments dredged from the entrance channel into sand-sharing berms located south of the alignment. These sites were designated as Sites 2, 3, 4, 5, 6, 11, and 12. However, the City of Tybee Island and GA DNR-CRD believe that placement of the new work sediments in those areas is not acceptable. Based on the additional information provided by GA DNR-CRD, the District has revised the sediment placement plan. New work material dredged from the entrance channel will either be placed into the CDFs or in the ODMDS.

Sites 4, 5, 6, 11 and 12 are beyond the 3-mile line. Consequently, these sites will not be used for either new work or maintenance material from the entrance channel. Sites 2 and 3 are within the 3-mile line and will still be available for placement of maintenance material from the entrance channel as provided for in the LTMS.

1109-BB-101-EV60

Comment: *In regard to the proposed project disposal of dredged material at sites 11 and 12 near the entrance channel as fish habitat mounds, such reuse may not be consistent with MPRSA should be further coordinated with EPA. Pursuant to Section 103 of MPRSA, ocean disposal of dredged material can only occur in an EPA-designated ODMDS. Alternatively, material can be placed as fill pursuant to Section 404 of the CW A within three miles of the baseline, such as the above feeder berms within the sand-sharing system. Although EPA supports fisheries enhancements and acknowledges that there is a fisheries exemption under MPRSA, the DEIS does not provide sufficient information to demonstrate that placement of dredged material at these sites would necessarily "develop, maintain or harvest fisheries"*

and exclude it from the Ocean Dumping Regulations (40 CFR 220.1(c)(2». We are concerned that the fishery habitat value for these mounds would be minimal since they could easily erode, potentially be a navigational concern, be proximal to the turbidity and other effects of recurring maintenance dredging of the entrance channel, and would not provide any hard structure as is typical of fisheries enhancement projects.

Response: Based on input from NOAA-NMFS, GA DNR-CRD, and the City of Tybee Island, the Final EIS proposes to place sediments from the entrance channel in either the ODMDS or an upland confined disposal site. The District no longer proposes using Sites 11 and 12 in the SHEP.

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1109-BB-101-EV61, 1109-BB-101-EV62

Comment: *Therefore, EPA recommends the evaluation of other alternatives, such as use of the Savannah ODMDS for the disposal of this material. If entrance channel dredged material cannot be properly reused in accordance with the CWA, the material, if shown to be suitable and in compliance with the Ocean Dumping Regulations, could potentially be disposed of at the Savannah ODMDS which is formally designated by EPA, consistent with MPRSA. EPA emphasizes that such project disposal at the ODMDS is a separate process from the current harbor deepening project NEPA process and will therefore need additional coordination.*

Response: Concur. The Final EIS indicates that sediments from the entrance channel extension will be placed at the ODMDS or an existing CDF.

The District has provided an ODMDS PlacementEvaluation (Appendix R) to address compliance with the ocean disposal laws. The District will also provide the results of additional testing to support Savannah District's determination that the exclusionary criteria of 40 CFR § 227.13(b)(3) apply. That information will be coordinated with EPA prior to the start of project construction.

1109-BB-101-EV63, 1109-BB-101-EV64

Comment: *Air Emissions - According to page 5-150, the COE expects the volume of containers handled at the Garden City Terminal to increase from 2.6 million TEU until the terminal reaches its capacity of 6.5 million TEU around 2032. According to the DEIS, this is predicted to significantly increase the number of truck movements per day from 4,900 to approximately 13,000. In addition, while the number of containerized ships that may use the channel would eventua1ly be constrained by the one-way traffic limitation for calling vessels, the port capacity and amount/percentage of cargo that can be unloaded in Savannah does not appear to be restricted. As suggested in our General Air Quality section above, EPA expects that this project has the potential to result in additional truck and locomotive traffic within the project areas, even after 2032. In turn, these additional landside emissions could affect potential nearby communities and should be evaluated.*

Response: According to the commodity forecast found in Section 5 of the GRR, the landside cargo handling of the port will reach its capacity of 6.5 TEUs in approximately 2030. That annual capacity is the maximum number of containers that could reasonably be processed through the Garden City Terminal, i.e., its landside cargo handling capacity has practical, finite limits for expansion. The bases for this determination were cited in a previous response.

The landside capacity will limit the number of containers [TEUs] that can be processed through the terminal, rather than a limitation on the number of vessels that could be handled. Therefore, when landside cargo handling capacity is reached [2030], vessel calls would not increase through the remainder of the project's economic life [2067]. The Corps Fleet Forecast [developed by the USACE, Mobile District in consultation with the Georgia Ports Authority] verified this projection.

Truck and locomotive traffic at the GCT will increase with or without the proposed deepening project. The trucks arriving at the port will all be using ULSD (15 ppm Sulfur) and these truck emissions would be the same whether or not the port is deepened.

The proposed deepened port will have less air emissions [criteria pollutants, air toxics, and greenhouse gases] than the No-Action Alternative.

1109-B8-101-EV65

Comment: *Public Involvement - The DEIS indicates that representatives of the potential EJ communities have not expressed substantial concerns about the project. It is unclear what concerns have been expressed by EJ representatives, how they were resolved and what denotes substantial concerns (pg.5-145). The FEIS should incorporate this information within the EJ section for public review. EPA notes that many meetings have been held related to the project, including two public workshops at the beginning of the project. We recommend that the FEIS describe how or whether specific efforts were made to engage EJ communities in the surrounding areas during that period or subsequently. EPA commends the COE for the use of an external Stakeholders Evaluation Group (SEG), which held approximately 65 full meetings. The outcomes of SEG's extensive involvement should also be summarized in the FEIS as well as the degree to which representatives from potential EJ communities were involved or EJ concerns were discussed and addressed in this forum. The FEIS should also indicate whether the port has a mechanism or long-term program designed to update surrounding communities on port expansion/changes and for receiving regular feedback or concerns from areas residents.*

Response: Extensive public involvement for the SHEP began in 1999. Prior to the publication of the DEIS and the public comment period, representatives of the EJ community had not expressed any substantive concerns regarding the proposed harbor deepening. During review of the DEIS, the District issued a public notice, placed notices in local newspapers, and held a workshop where staff were available to discuss the studies that had been conducted and the proposed project. During the public comment period, the District received seven different comment letters on E J issues, plus the comments from EPA on the subject. Several respondents including the Keck School of Medicine and Citizens for Environmental Justice, alleged the project would disproportionately impact environmental justice communities near Savannah Harbor. Responses to those comments explaining why the project will not disproportionately impact environmental justice communities are included in the FEIS.

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1109-B8-101-EV66

Comment: *Property Acquisition - The DEIS indicates that properties will be acquired for the project, but the precise properties have not been determined. According to the DEIS, the properties will be selected from a list identified by the FWS for acquisition and could contain a small number of residences. The COE believes these impacts will be minimal because less than five properties are expected to be acquired. The FEIS should include information regarding the property type (i.e., residential, commercial),*

location/number, and the percentage that are owned or occupied by minority and low-income populations and describe in the FEIS how any identified issues are resolved.

Response: The District has revised the EIS to explain that the sites to be acquired are undeveloped properties which are not presently occupied. Therefore, no disproportionate impacts to minority and low-income populations are expected.

The properties of interest are described in the latest version of the Refuge's Acquisition Plan dated July 2007 and are included in the document titled "Final Environmental Assessment and Land Protection Plan; Proposed Expansion of Savannah National Wildlife Refuge". Land Acquisition would be concentrated in areas identified as or near the "Mill Creek Acquisition Lands" and "Abercorn Island Acquisition Lands". The project would acquire properties from the Refuge's Acquisition Plan that best meet the needs of the Refuge, viz., freshwater wetlands. The District has consulted with the Refuge and intends to focus on parcels in freshwater areas that the USFWS identified as Refuge priorities. The District always attempts to acquire property from willing sellers.

1109-BB-101-EV67

Comment: *Noise & Lighting - EPA appreciates the efforts that have been made to minimize noise and lighting impacts. However, in the EJ section, there does not appear to be a discussion/overlay of existing noise levels on the communities that surround the port and its transportation corridors. This baseline information should be summarized in the FEIS EJ section, or cross-referenced. We note that the GPA sponsor has programs designed to reduce air, noise and lighting impacts on the surrounding communities. For example, GPA built noise berms to offset significant noise impacts and have reduced their facility lighting to conserve energy and offset impacts.*

Response: Disagree. A noise evaluation was conducted and is included in the FEIS. The results of this analysis are discussed in a new section after the Environmental Justice section of the document. No increases in cargo are expected to occur as a result of the proposed harbor deepening. As a result, the project would not affect the number of containers that move through the areas that surround the port. As noted above, the economic benefits of the project result from the use of larger, more cost-effective container ships, not an increase in the number of containers. Noise, air emissions, and traffic would not be increased as a result of the proposed deepening. Therefore, the proposed harbor deepening will have no appreciable additional landside impacts outside the Garden City Terminal or within the adjacent EJ communities.

1109-BB-101-EV68, 1109-BB-101-EV69

Comment: *Children's Health Documentation - Unlike the EJ section, demographics related to the population of children under age 18 within the project area relative to the reference population (i.e., county and state) are not fully incorporated. This information should be provided in the FEIS under Section 5.20 on children's health. Nevertheless, EPA appreciates the inclusion of a map depicting the location of schools, hospitals and child care facilities along the navigation channel. In terms of the impacts assessment, EPA notes that the DEIS indicates that the facilities are dispersed throughout the communities and are not located disproportionately near the navigation channel of the Garden City Terminal While these facilities may be dispersed, it is unclear whether some areas along the navigation channel, terminal or transportation corridor (trucks/locomotives), currently experience (or potentially would in the future) substantive impacts from noise, traffic, air taxies, etc., relative to more removed and unaffected (baseline) areas. In this regard, we are pleased to note that the DEIS provides information*

related to several measures that are being made to reduce air emissions and to improve traffic in area neighborhoods in the future.

Response: Demographics have been adequately addressed related to the population of children under age 18 within the project area and in comparison to the county and state reference population. In the EIS [Section 5.19 titled Protection of Children and Environmental Justice [EO 13045 and EO 12898] relevant issues were comprehensively discussed. Moreover, the EIS [Figure 5-59 in Section 5.19] shows the location of schools, hospital, and child care facilities dispersed along the navigation channel.

Currently the air quality in both Chatham County, Georgia and Jasper County, South Carolina is generally good. EPA has designated both counties as attainment areas.

Section 5.20 in the EIS states: *GPA continues to work closely with the State of Georgia to develop more improvements to the highway system outside the terminal. GPA has developed a plan that would provide expressway connection of Interstate highways directly to the Terminal. In 2010, the State of Georgia approved $120 million in bond revenue for use toward completing the Jimmy DeLoach Highway from Interstate 95 to the Garden City Terminal. That work is scheduled to begin in 2011 and be complete by the base year of the project. Additionally, the Georgia Department of Transportation's long-term highway plan includes construction of the Brampton Road Connector which will provide direct access from the Garden City Terminal to Interstate 516 and connections to Interstate 16. No other terminal in the US has such an expressway of highways directly to the terminal. Those road improvements are shown in the following figure. The completion of those roads will remove terminal traffic from neighborhoods and lessen congestion and the accompanying air quality impacts.* Also see Figure 5-63, which graphically shows these proposed road improvements.

GPA also plans to increase the percentage of containers that are handled by rail in the future. Since rail moves cargo with less fuel than trucks, use of rail reduces the total diesel emissions from the port operations.

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1109-BS-101-EV70

Comment: *Although the conclusions from technical meetings about these diverse models (including numerous comments) are incorporated into this DEIS, EPA recommends that a separate appendix or section in the main document be added to the FEIS to provide a synopsis of the modeling with emphasis on results. Similarly, we note that Section 1.03 (Major Conclusions and Findings) primarily only references other sections within the DEIS where topics are discussed such as water quality and fisheries (as opposed to providing an actual summary of conclusions for the reader). We therefore recommend that the FEIS summarize the COE's findings for those sections in an appendix or separate section in the main document. We believe such summary sections for modeling and other findings would improve the readability of the FEIS and consolidate results for public and agency review.*

Response: The EPA's recommendation to include a separate appendix or section to summarize the modeling analyses is acknowledged. However, the manner in which the data are presented is sufficient to allow the reader to evaluate impacts for the various project alternatives. Summaries of individual analyses are included in the Engineering Appendix of the GRR. For further clarification, a table has been added to Appendix C and Appendix L of the EIS listing the modeling reports produced and the location of the detailed analyses. Section 1.4 of the Engineering Appendix to the GRR lists all the Engineering

software used in the SHEP study in accordance with USACE Enterprise Standard (ES)-08101 *Software Validation for the Hydrology, Hydraulics and Coastal Community of Practice.*

1109-BB-101-EV71

Comment: *Despite this substantive effort, we recommend that the 22 National Pollutant Discharge Elimination System dischargers identified in the TMDL located along the Savannah River be discussed and preferably listed with their main impact identified. This is particularly relevant in this case since project and discharger impacts (oxygen-demanding effluent) both deplete river DO levels and thereby causing a local cumulative effect. The COE may wish to coordinate with the respective states and EPA to document these dischargers.*

Response: Information concerning the 22 National Pollutant Discharge Elimination System dischargers has been added to the Dissolved Oxygen portion of Appendix L of the EIS.

1109-BB-101-EC02

Comment: *Action Alternatives Description: Given that the DEIS indicates that approximately 70% of the vessels calling on the port are not at their maximum load and design draft, we suggest that the FEIS provide the relative capability (percentage greater than the existing 70%: pg. 3: App. K) of each deepening alternative to accommodate large post-Panamax vessels. Such an evaluation would show if any alternatives other than the -47 and -48 ft options (both being considered the Tentatively Recommended Plan by the COE in the DEIS) could also reasonably accommodate post-Panamax vessels without waiting on high tide or limiting cargo.*

Response: The Economics Appendix of the General Reevaluation Report shows sailing draft distributions for Panamax and Post-Panamax vessels in Tables 108, 112, and 113 in the without project condition and for each of the alternative project conditions. The assumption in the draft report analysis was that Post-Panamax vessels with design drafts of about 46 feet (PPX1) would call in the without project condition, as they are calling today and have been since 2006. Post-Panamax vessels with design drafts of about 48 feet (PPX2) would begin to call on some trade routes with a 44-foot channel, some routes with a 45-foot channel, and all benefiting routes with a 46-foot channel. The benefits attained from 46 to 47 and 48 feet are the result of the vessels being able to sail at greater depths and thus carry more cargo. Since the Draft EIS was prepared, some PPX2 have begun to call at Savannah with the existing 42-foot channel. Recent announcements by carriers indicate that more will be deployed in the near future. Therefore, the Final Reports include an analysis showing that Post-Panamax vessels up to design drafts of about 48 feet will call Savannah in the without project 42-foot channel condition. Use of tide will be required for all vessels sailing at drafts greater than about 4 to 5 feet less than the design draft of the channel.

1109-BB-101-EV72

Comment: *Jasper County Marine Terminal: We note that the Jasper County Marine Terminal was conceptually considered for Savannah River Mile (RM) 5 in Jasper County, South Carolina during the SHEP study timeframe. This terminal was referenced in the main document (pg. 5-119) and in Appendix L discussing cumulative effects (pg. 46). EPA understands that no detailed studies have been conducted for the facility and that this alternative mayor may not be presently considered as an alternative to the proposed deepening of the harbor. Nevertheless, we suggest that this alternate port terminal and its status (i.e., potential as a near-term, alternative) be disclosed and discussed in the main document of the FEIS under Alternatives (Section 3.00).*

Response: The SHEP NEPA alternatives analysis fully considered the proposed Jasper County Marine Terminal. Among other things, the Regional Port Analysis specifically evaluated current and projected port capacity, demand, and growth, and environmental impacts and constraints for other South Atlantic ports (Norfolk, VA; Wilmington, NC; Charleston, SC; Savannah, GA; and Jacksonville, FL) and a proposed Jasper County Marine Terminal. GRR, Appendix A, Attachment 3, Final Report, pp. 1-20, and Interim Reports. In addition, the analysis of a Jasper County Marine Terminal was rolled into a study of the potential costs and environmental impacts of locating the project at one of eight different sites along the Savannah River (four on the South Carolina side, four on the Georgia side) as discussed in EIS Section 3.0 and Appendix O. Among the conclusions reached as a result of the Regional Port Analysis, the Multi-Port Analysis, and the analysis of eight alternative sites for the project along the Savannah River were the following: a Jasper County Marine Terminal would not be cost effective when compared to improving Savannah Harbor based on the high cost involved (now estimated at $4 billion including the cost of constructing the new transportation infrastructure that would have to be built), and the timing (Jasper does not exist at present and cannot be constructed in time to meet the growth in demand occurring through Savannah Harbor).

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1109-B8-101-EV73

Comment: *The advantage of the discussed Jasper Terminal alternative is that it would be much closer to the coast than the Port of Savannah (5 RM versus 21 RM upstream the Savannah River) and therefore require significantly less channel dredging than the proposed expansion and thereby minimize additional fish habitat losses and increases in saltwater intrusion. Such a Jasper Terminal could one day also act as a reliever port to the existing Port of Savannah due to the Port of Savannah's one-way vessel traffic constraint, which would remain even after proposed project dredging. However, a terminal near the mouth of the Savannah River would result in significant wetland losses to construct its roadways/rail spurs and other infrastructure which currently do not exist there, as well as probable secondary developmental impacts in the surrounding area.*

Response: For the reasons noted above, a Jasper Ocean Terminal is not a reasonable, near-term option. The impacts of just dredging to River Mile 5 would be less than those in the proposed action; however, the overall consequences associated with a new container terminal in Jasper County are currently poorly understood. If a terminal were to be constructed in Jasper County, there are other potential impacts that must be evaluated, e.g., impacts from construction of the necessary road and rail infrastructure, replacement of the lost dredged material disposal capacity for the Savannah Harbor Federal Navigation Project, and the replacement of the mitigation features currently functioning in the proposed terminal sites. These and many other studies would have to be conducted to adequately compare the impacts of the two projects. The District considered all data which was [currently/readily] available, but a more comprehensive assessment of the impacts of a Jasper Ocean Terminal is not possible at this time. However, the Joint Project Office is planning to conduct the necessary analyses [file a Section 404(b) permit application] so the detailed potential impacts associated with development of a Jasper Terminal can be evaluated.

1109-BB-101-EV74

Comment: *Locations: The Speece Cone systems may be located in three locations (near Georgia Pacific, Hutchinson Island - west side, Hutchinson Island - east side). Table 5-24 projects 8-10 cones are proposed, depending on the alternative selected. The FEIS should include a detailed plan and commitment to specific Speece Cone locations, and include information about easements, rights-of-way, etc. where relevant.*

Response: The locations designated for the Speece cones in the FEIS are not expected to change. The District will obtain all appropriate real estate instruments prior to project construction.

1109-BB-101-EV75

Comment: *Operation: The energy consumption of Speece Cones could be an expensive operational cost from an electricity use perspective. In addition, depending on their final location, transmission line infrastructure to some of the cones may need to be constructed. The FEIS should consider these construction and operation costs in the overall project budget. EPA also understands that generators 'may be used to power isolated Speece Cones in lieu of constructing such transmission lines. If so, would these generators be operated by gasoline, diesel or electricity? If emissions are generated, have estimates been documented and minimized? Although outages of a few hours should not significantly affect river DO levels, the FEIS should discuss the likelihood of brownouts or generator malfunctions and any contingency plans for power losses for a longer term.*

Response: The installation and operational costs of the Speece cones were detailed in the Engineering Appendix [Appendix C], Attachment 3. Electricity to power the Speece cone operations will not be generated on-site [rather it would be obtained from the commercial grid]. The design includes a maintenance spare at each location to address potential equipment malfunctions. Power outages do occur from time to time, but they are normally of short duration and are not expected to impact the overall functionality of the oxygen injection systems.

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1109-BB-101-EV76

Comment: *Noise: While the DEIS concludes that the proposed harbor deepening "is not expected to result in more than minimal adverse impacts as a result of noise," and the Speece Cone systems may be located in locations that are not particularly noise-sensitive areas, no noise information from the operation of the Speece Cone systems was found in the main document of the DEIS (e.g., Section 5.21 under «A. Noise" on page 5-154 or in Section 5.2.2 under "Mitigation Impacts to Dissolved Oxygen" on page 5-48 were reviewed). The FEIS should disclose such information.*

Response: Additional information regarding the operational noise levels from the designer of the Speece Cone System has been included in Section 5 of the FEIS.

1109-BB-101-EV77

Comment: *EPA is requesting such noise information since we understand that operational noise levels during the Speece Cone project demonstration (pilot study) were substantial. Therefore, we request that noise levels during operation be modeled and the anticipated seasonal schedule for operation be documented. Moreover, we suggest that noise attenuation methods be considered in terms of shielding around the cones and insulation within the cones, or perhaps upgrades in technology to collectively*

generate less noise at the source (source reduction). Moreover, the cumulative noise impacts of the 8-10 Speece Cones proposed should also be considered if two or more are located proximally.

Response: Speece cone operational noise levels were investigated by the project design contractors and this information is presented in the FEIS.

1109-BB-101-EV78
Comment: *Truck Model Years: The model years of the Jockey trucks, for which the COE calculated emission rates, is unclear. Without model years, emissions estimates cannot be made.*

Response: The District used the following information: EPA-approved models NONROAD2005 for the 2007 calendar year using 0.1139 Sulfur fuel and NONROAD2008 for the 2010 calendar year using 15 ppm Sulfur fuel. From these NONROAD model runs, the District used the emissions for these different fuels [0.1139 and 15 ppm Sulfur] for item SCC #2270002051. SCC #2270002051 is identified as Jockey Trucks with an average 175 HP.

1109-BB-101-EV79
Comment: *MOBILE Modeling: The COE used the certification levels for incoming engines instead of the in-use emission factors. These factors can be calculated using MOBILE 6 or the new MOVES model. If the COE uses MOVES, there is an air toxics model which will provide a breakout of key air toxics from this fleet.*

Response: EPA, Region 5 provided the District with spreadsheets that used the MOBILE 6 model to calculate in-use truck emission rates [by vehicle class, model year and calendar year] for a set of calendar years. MOBILE 6 spreadsheets were used with the following assumptions:

By Model Year Runs:

Calendar Years :	**1980,1990,2000,2005,2010,2020 (July Evaluation)**
Summer Temperatures:	**72 to 92 degrees Fahrenheit , min/max**
Pollutants:	**Criteria Pollutants and PM2.5 (exhaust PM only)**
Fuels:	**Default for gasoline sulfur and 15 ppm for diesel sulfur**
Other inputs:	**Default**

The workbook consists of 21 worksheets, one for each of seven calendar years and one of three gasoline and diesel fuel types.

A description of each one of them follows:

Worksheet name	Calendar Year	Sulfur content of Fuel in ppm	
		Gasoline	**Diesel**
bymy1	1980	default	15
bymy2	1990	default	15
bymy3	1995	default	15
bymy4	2000	default	15
bymy5	2005	default	15
bymy6	2010	default	15

Each of the above worksheets contain data on grams per mile for 28 vehicle classes , for ages 0 to24, for VOC,CO, NOX and total exhaust PM2.5

Also included are data on miles per day, travel fraction and age fraction.

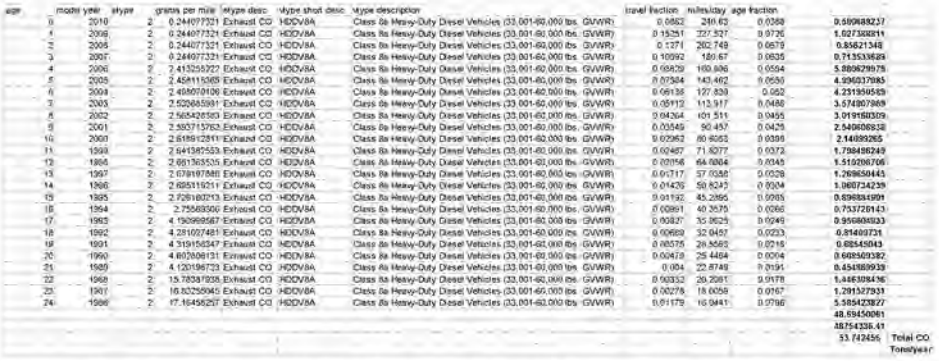
Georgia Port Authority (GPA) provided the number of trucks arriving/departing at the Garden City Terminal, but did not know model year, weight, or average speed at the terminal. However, GPA did provide the average time for each truck at the port. The District incrementally increased the GPA's truck time at the terminal to account for any stand-by time at the entrance/exit gates, as well as time required to enter/leave the Savannah Metro Area. The District then made the following assumptions: each truck was 33,000 lb (HDDV8A) and that **average** speed in the terminal is 27.6 miles/hr.

Below is a sample calculation for CO, using the MOBILE 6 spread sheets:

Multiply gm/mile by 27.6 miles/hour equals gm/hr of criteria pollutant;

Then multiply gm/hr by travel fraction to get national average default for all model years.

Sum each column to get grams of criteria pollutant and multiply by 1,001,228.8 hours/year and 0.00000110231131 to get tons/year. Therefore, the total tons of CO per year for all trucks at Garden City Terminal would be 53.7 tons [see last number on the far right column, below].



age	model year	stype	grams per mile	stype desc	stype short desc	stype description		travel fraction	miles/day	age fraction		
0	2010	2	0.244077321	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.0662	249.63	0.0368	0.599688237	
1	2009	2	0.244077321	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.15251	237.527	0.0726	1.027388811	
2	2008	2	0.244077321	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.1271	202.749	0.0679	0.85821348	
3	2007	2	0.244077321	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.10092	180.67	0.0635	0.713533689	
4	2006	2	2.413255922	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.08829	169.806	0.0594	5.880629975	
5	2005	2	2.458115365	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.07534	143.462	0.0539	4.996317985	
6	2004	2	2.498519106	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.06138	127.838	0.052	4.231590569	
7	2003	2	2.529865991	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.05112	113.917	0.0488	3.574807969	
8	2002	2	2.565426583	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.04264	101.511	0.0455	3.019160309	
9	2001	2	2.593715763	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.03549	90.457	0.0425	2.540608838	
10	2000	2	2.618912811	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.02962	80.6083	0.0396	2.14089265	
11	1999	2	2.641387553	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.02467	71.8277	0.0372	1.788486249	
12	1998	2	2.661363535	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.02056	64.0004	0.0349	1.512096706	
13	1997	2	2.678197848	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.01717	57.0336	0.0328	1.269650445	
14	1996	2	2.695319211	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.01426	50.8243	0.0304	1.060734239	
15	1995	2	2.726180213	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.01192	45.2895	0.0285	0.896834991	
16	1994	2	2.75583506	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.00991	40.3575	0.0266	0.753726143	
17	1993	2	4.190999567	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.00827	35.9625	0.0249	0.956804033	
18	1992	2	4.281007481	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.00689	32.0457	0.0233	0.814409721	
19	1991	2	4.319156547	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.00575	28.5583	0.0218	0.68545043	
20	1990	2	4.602606131	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.00479	25.4464	0.0204	0.608509382	
21	1989	2	4.120196723	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.004	22.6749	0.0191	0.454889939	
22	1988	2	15.78587938	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.00332	20.2081	0.0178	1.446308436	
23	1987	2	16.80255045	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.00276	18.0059	0.0167	1.281327931	
24	1986	2	17.16458257	Exhaust CO	HDDV8A	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs.	GVWR)	0.01179	16.0441	0.0156	5.585423822	
											48.69450061	
											48754338.41	
											53.742456	Total CO Tons/year

The District then calculated the following pollutants [HC, VOC, NOx, PM10, and PM2.5] for trucks at the Garden City Terminal. Note: MOBILE 6 spreadsheets did not have a VOC category for heavy duty trucks [HDDV8A]. However, after reviewing the Port of Portland Air Inventory Spreadsheets a VOC value of 1.005* HC was applied. This formula value was applied to calculate the VOC of heavy duty trucks [HDDV8A] at the Garden City Terminal.

It should be noted that the District did not use the new MOVES models to estimate the air emissions/toxics at the port. Rather, values for the 28 air toxics were derived by multiplying the toxic ratios by either VOC or PM10. These toxic ratios were provided by USEPA, Region 5, and pulled out/condensed from the NMIM "SCCToxics" database table.

1109-8B-101-EV80

Comment: *Locomotive Calculations: The hours of use from a daily average to a weekly average do not add up. Additional information is needed on how the weekly average was calculated. The 21 hours/day and only 69 hours/week for switching implies that the locomotives are being used a little over three days. Further, idling emissions can be significant. This should be calculated in the FEIS.*

Response: The District calculated both the daily and weekly average for locomotives in FEIS-Appendix K. Data provided by the Georgia Ports Authority on locomotive use at the port indicated the following **average** hours of operation:

1. Norfolk Southern used 11 locomotives for an average of 11 trips per week to and from the port. GPA stated that the line-haul locomotives only remain at the port an **average** of three hours. Therefore, the estimated average weekly and yearly line-haul locomotive hours of operation at the port are: 33 hours per week (11 locomotives/week times 3 hours/locomotive = 33 hours) and for the year is 1716 hours (33 times 52 weeks = 1716).

2. CSX used 4 switch locomotives an **average** of 3 times per week for about 21 hours per day plus 1 time per week for about 6 hours per day or on average about 69 hours per week [3 times 21 hours per day plus 6 hours per day = 69 hours]. On average the switch locomotives were used 69 hours per week times 52 weeks in a year equals 3588 hours of operation in a year.

Please note, both the hours of use for the line-haul and switch locomotives are **average estimates**. Cargo operations [goods hauled in/out and switched from the port by train] are not carried out continuously 24 hour per day 7 day a week.

The hours provided for both line-haul and switch locomotives include idling. However, GPA did not know the exact percentage of idling versus in-operation. The NONROAD model assumes that the idling air emission rate is lower than the in-operation rate. The District assumed the same in-operation air emission rate for locomotives, whether idling or in-operation. Therefore, the locomotive air emission estimates are greater [more conservative] than if idling had been factored into the equation. The District used category SCC 2285002015 for locomotives as the air emission rate [NONROAD2005 model for the 2007 calendar year using 1139 ppm Sulfur diesel fuel and NONROAD2008 model for the 2010 calendar year[using 15 ppm Sulfur diesel fuel].

1109-BB-101-EV81

Comment: *Emission Analysis: The DEIS is limited in the supporting data for the emission estimates provided. The COE should provide model inputs and outputs for calculation of the on-highway and non-road emissions. This information will provide a sound support for the data listed in the DEIS. Without such support, the validity of the estimates cannot be assessed.*

Response: All spreadsheets used for the calculation of air emissions found in Appendix K are located in Attachment B and are available upon request. The air emission inventory that the District conducted [described in EIS - Appendix K] was a comprehensive analysis of port-dependent emissions. All air releases [including criteria pollutants, air toxics, and greenhouse gas emissions] were calculated for all depths [42, 44, 45, 46, 47, and 48 feet] and all years [2015, 2020, 2025, 2030, 2032, and 2065]. It included emissions from the following sources:

- Dredges used during the new work dredging
- Dredges used during maintenance dredging
- Ocean-Going Vessels
- LNG Vessels
- Tug Boats
- Intra-Harbor Shifts
- Tour Boats
- Landside equipment at GPA terminals
- Landside equipment at non-GPA terminals
- Trucks calling at the Garden City Terminal
- Locomotives serving the Garden City Terminal
- GPA fleet vehicles
- Air Toxics
- Greenhouse gases

The District followed the procedures outlined in EPA's 2009 Final Report titled "Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories"

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1109-BB-101-EV82

Comment: *Port Growth & Efficiency: Page 6 Section 4.0 notes that "At 2032, the capacity of the port would be reached. This means that between 2032 and 2065, no additional growth occurs in commodities or annual vessel numbers. No additional vessels could load/off-load at the port each year between 2032 and 2065." Page 80 notes that: 'The reduced emissions reflect the lower number of container ships that would call in a given year with a deeper harbor." However, page 62 notes that: "Growth in such (cargo handling) efficiency has been commonly observed in the past, and is expected to continue to occur at Savannah, but the ability to predict its amount and timing are quite difficult." If increased cargo handling efficiencies occur, then the port might accommodate additional visits by large ships. EPA recommends that the COE make estimates concerning the likely efficiency increases that might occur, how this might allow additional cargo to pass through the port, and the associated increase in air pollution emissions. It should be noted that page 94 states: "The volume of air toxics emitted as a result of port operations is expected to increase as the volume of cargo passing through the port rises." This scenario should be evaluated in the FEIS.*

Response: GPA will increase efficiency at the 1,200 acre GCT by over 250% [6.5 million TEUs in 2030 / 2.6 million TEUs currently]. This means the TEUs per acre capacity at GCT is expected to increase from currently 2, 167 TEUs per acre (2,600,000 TEUs/1200 acres) to 5,417 TEUs per acre (6,500,000 TEUs/1200 acres) in 2030, a similar increase of over 250%. Geography will constrain the capacity of GCT effectively at 6.5 million TEUs by 2030.

Appendix K [Page 94] K does state that "The volume of air toxics emitted as a result of port operations is expected to increase as the volume of cargo passing through the port rises." The District should have indicated on page 94 that **with or without the harbor deepening the volume of air toxics would increase until the port reaches capacity in 2030 with 6.5 million TEUs**.

The proposed harbor deepening would not increase air emissions in the project area when compared to the No-Action Alternative of -42 foot depth. With less air emissions there will be less air toxics and greenhouse gases emitted.

1109-BB-101-EC03, 1109-BB-101-EC04

Comment: *It is unclear how this projected increase in post-Panamax visits would be possible if, as the DEIS states in the Abstract (pg. 1): "In excess of 70% of the vessels do not call on Savannah Harbor at their maximum capacity or design draft. The "light loading" of vessels increase costs to the shipper, which are eventually passed on to the consumer. Less efficient vessels also generally result in higher shipping costs." Page 3 of Appendix K supports this concern, stating: "The GPA indicates that 70% of the container vessels that called on the port in 2006 were operationally constrained by the channel depth. As the newer, larger container vessels increase their calls at the port, that percentage will increase." Post-Panamax ships are among the ships that will be operationally constrained. Given that they comprise nearly the entire increase in calls to the port over the next two decades, the number of ships that would be operationally constrained by the current channel depth could increase dramatically - to nearly all ships calling at the port.*

EPA assumes that the resulting delays from congestion and the need to schedule visits to the terminals according to the tides would be economic disincentives to the use of the Port of Savannah, and result in a redirection of trade to other ports if the channel were not deepened. If redirection of trade to other ports did not occur, the EPA further assumes that the base case would result in greater waiting times for the

ships to be able to navigate to and from the terminals and corresponding additional air pollution emissions.

Response: Container vessels seldom operate at their design drafts. Sailing drafts vary considerably along vessel itineraries. Channel limitations at Savannah are not such that it precludes Post-Panamax (PPX) vessels from calling. In fact, the number of PPX vessel calls are increasing in number with even larger ships anticipated in the near future. However, they will operate at Savannah sailing lighter than they otherwise could with a deeper channel.

Congestion in the harbor has increased over time as more and more ships call at the port. In the without project condition, this situation is worse as it requires more ships to carry the same amount of cargo in a given year. With the deepening alternatives, both the number of vessels calling and the congestion decrease, when compared to the without project conditions. The air emissions from the additional tidal delays that the fleet would experience over time in the without project condition have not been included in the air quality analysis. Those emissions would decrease with implementation of the project alternatives because of a reduction in the number of vessels in a given year and their waiting time.

1109-BB-101-EV83, 1109-BB-101-EV84

Comment: *Port Truck Calls: Page 39 Section 5.14 refers to trucks calling at the Garden City Terminal. The FEIS should include any data on the number of trucks calling at the Ocean City Terminal and private terminals along the river. Also, Table 5-50 cites the number of trucks calling at Garden City in 2008. These values are identical to those in an earlier version of this document from 2006. The values should be updated or the date on the table corrected.*

Response: The majority of the truck calls at the port occur at the Garden City Terminal. According to the FEIS [Section 5.20], *GPA continues to work closely with the State of Georgia to develop more improvements to the highway system outside the Garden City Terminal. GPA has developed a plan that would provide expressway connection of Interstate highways directly to the Terminal. In 2010, the State of Georgia approved $120 million in bond revenue for use toward completing the Jimmy DeLoach Highway from Interstate 95 to the Garden City Terminal. That work is scheduled to begin in 2011 and be complete by the base year of the project. Additionally, the Georgia Department of Transportation's long-term highway plan includes construction of the Brampton Road Connector which will provide direct access from the Garden City Terminal to Interstate 516 and connections to Interstate 16. No other terminal in the US has such an expressway of highways directly to the terminal. Those road improvements are shown in the following figure. The completion of those roads will remove terminal traffic from neighborhoods and lessen congestion and the accompanying air quality impacts.* Also see Figure 5-63, which graphically shows these proposed road improvements.

GPA also plans to increase the percentage of containers that are handled by rail in the future. Since rail moves cargo with less fuel than trucks, use of rail reduces the total diesel emissions from the port operations.

All of the infrastructure improvements proposed by GPA to highways and rail systems will be to service the Garden City Terminal rather than any of other port facilities.

Emission estimates for trucks at the other terminals [Ocean City Terminal and the other 20-privately owned terminals] were derived from the Port of Washington/Tacoma - Puget Sound Maritime Air Emissions Inventory, 2007. In 2002, the tonnage for Savannah = 20.7 M, Seattle = 19.6 M, and Tacoma -

= 20.6 M, so emission-wise these ports should be similar [ICF International Memo, dated Nov 17, 2006]. The methodology for calculating truck emission estimates for the other terminals was taken from EPA's **"Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories, Final Report, dated April 2009"**.

Table 5-50 was revised and updated to reflect 2008 conditions.

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1109-BB-101-EV85

Comment: *Locomotive Emissions: The last sentence on page 44 indicates the COE obtained information from the NMIM "SCC Toxics" database provided by EPA Region 5. For the FEIS, the COE should identify the source of emission information used for locomotives and commercial marine sources."*

Response: The District identified [FEIS-Appendix K] the information sources used for the emission inventory. Emissions from marine diesel engines and shore side locomotives were calculated using methods described in: 1. EPA's - **"Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories, Final Report, dated April 2009"** and 2. Supplemental information for locomotives emissions - CFR dated April 3, 2007 [Vol. 72, Number 63 Proposed Rules pp 16037 to 16086].

1109-BB-101-EV86, 1109-BB-101-EV87

Comment: *Table 5-63 Values: The values in this table (pg. 45) should be checked since they differ significantly from values in the draft version of the table provided by the COE some time ago. This table compares air toxics emissions from the port with those from the entire county. This is an inappropriate comparison in that air toxics pose a threat primarily to those who are near the source. A comparison between emissions at the port and those countywide could be misleading because the emissions from port activities are more localized than those from the county as a whole. The comparison of air toxics emissions between the county and port presented in this table should be accompanied with an acknowledgement that localized impacts at the port could be significant. We suggest the COE include an emissions density map, population density map, and map identifying locations of sensitive populations which would be informative for the reader in evaluating this information."*

Response: Concur. The values in Table 5-63 have been verified for accuracy. The District disagrees that comparing air toxic emissions generated by the proposed harbor deepening to those of the County is inappropriate. Table 5-63 clearly shows that the projected air toxic emissions for all harbor terminals are minor [about 1.9%] compared to the County's total.

Appendix K [Table 6-7] reveals that in 2002 and 2007, the coal fired Kraft Steam Electric Plant operating in Port Wentworth [Chatham County GA], respectively discharged 7,189.4 tons and 7,704.7 tons of SO2. For these same years this plant also discharged 1,367,644 tons and 1,653,099 ton of CO2 [EPA data]. Hence, air emissions from this single facility would subsume all the estimated emissions for the deepened harbor [see Table 5-78 on page 63 in Appendix K]. Regardless, the evaluations verify that the proposed action will have lesser localized air quality impacts on communities in the port environs than the existing No- Action Alternative.

The District has included a population density map of the project area. However, an air emissions density map is not needed because releases resulting from a deepened harbor would be less than those

from the No Action Alternative [-42 foot depth or existing baseline condition]. Additionally, a map identifying the location of sensitive populations is already in the EIS [Figure 5-56).

1109-BB-101-EV88

Comment: *The first sentence on page 45 refers to Table 5-61. Should this refer to Table 5-63? The first sentence says that the table lists the relationship of 28 toxics to other calculated pollutants. Is there a column missing that would indicate percentages or ratios between the toxics and other pollutants? How did the COE develop the values listed in Table 5-63? If ratios were used to estimate emissions based on other parameters, how those ratios were developed should be detailed in the FEIS (i.e., what specifically are the numerator and denominator for each and where were those data were obtained?). The quantity of air toxics emissions should be identified by source type. This would help determine the areas that would benefit most from emission reduction efforts.*

Response: Concur. The first sentence on page 45 refers to Table 5-63, not 5-61. The second sentence or paragraph has also been revised to indicate that Table 5-63 is a list of 28 air toxics that was calculated for both the Total Port Emissions in 2008 and the US EPA NEI data for Chatham County, Georgia. For clarity, the District included another column which shows the ratios used between the toxics and VOCs or PM10. Moreover, this section was revised to reflect how these air toxic ratios were developed and the air toxics emissions will be identified by source type.

1109-BB-101-EV89

Comment: *2006 Air Quality Analysis: The first sentence on the last paragraph of page 3 refers the reader to the "Air Quality Analysis, Savannah Harbor Expansion Project" which was prepared in 2006. The text says that this report is available from the Savannah District. However, we suggest it be included as an appendix to the FEIS, or alternatively, be made available online.*

Response: The reference to a 2006 Air Quality Analysis in Attachment A has been deleted from page 3 in Appendix K as it is no longer valid. As indicated on page 4 in Appendix K, the District provided the 2006 report to the EPA, Region 4 office for review and comment. As a result of this review, EPA requested the analysis be expanded to include (1) the emissions from landside equipment servicing these vessels, (2) the air toxins emitted by both the vessels and the landside equipment, and (3) similar analyses associated with the privately-owned terminals in the harbor. EPA recognized that the emissions associated from vessels calling at privately-owned terminals were not likely to be affected by the proposed harbor deepening. However, the Agency desired a comprehensive air quality assessment of all facilities to accurately place any future emission increase/decrease in its proper context.

1109-BB-101-EV90

Comment: *Editorial **Comment**: The first sentence on the last paragraph of page 5 states that the 2006 Air Emissions Analysis is Attachment A. However, Attachment A is the container fleet forecast.*

Response: Concur. Attachment A discusses the container fleet forecast. Its reference to the noted 2006 Air Quality Analysis has been deleted in the FEIS. As indicated on page 4 of Appendix K, the District provided the 2006 report to EPA, Region 4 office for review and comment. As a result of this review, EPA requested the analysis be expanded to include (1) the emissions from landside equipment that servicing vessels, (2) the air toxins emitted by both the vessels and the landside equipment, and (3) similar analyses associated with the privately-owned terminals in the harbor. EPA recognized that the emissions associated from vessels calling at privately-owned terminals were not likely to be affected by

the proposed harbor deepening. However, the Agency desired a comprehensive air quality assessment of all facilities to accurately place any future emission increase/decrease in its proper context.

1109-BB-101-EV91

Comment: *EO 12898: The DEIS (pg. 5-144) states that "Executive Order 12898 deals with Environmental Justice." This statement should be amended in the FEIS to reflect that the EO deals with EJ "in minority and low-income populations". The DEIS also indicates that the EO states that "....the Federal government would review the effects of its proposed actions on low income communities." We believe this statement should be removed in the FEIS because it is not found in the EO. We offer that it is more accurate to retain the following statement: "Federal agencies are 'to the greatest extent practicable and permitted by law' identify and address 'as appropriate', disproportionately high and adverse human health and environmental effects of its programs, policies and activities on minority populations and low-income populations in the United States.*

Response: Concur. Section 5.20, has been revised.

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1109-BB-101-EV92

Comment: *EO J 3045: EPA appreciates the inclusion of a children's health section related to Executive Order (EO) 13045, which deals with the protection of children from environmental health and safety risks. As part of the background information, the DEIS indicates that the EO states that" ... the Federal government would review the effects of its proposed actions on children because they may suffer disproportionately from the environmental health risks and safety risk." This statement should be removed in the FEIS since we do not believe it is accurate. However, the subsequent DEIS statement accurately reflects the EO and should be retained: "Federal agencies are to 'identify and assess environmental health risks and safety risks that may disproportionately affect children;' and 'ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.'*

Response: Concur. In the EO 13045 discussion found in the FEIS [Section 5.20], the District has deleted the following statement: "... the Federal government would review the effects of its proposed actions on children because they may suffer disproportionately from the environmental health risks and safety risk." The remainder of the EO 13045 discussion was retained.

1109-BB-101-EV93

Comment: *Sea Level Rise - EPA and the COE concur that as sea level increases at Savannah, the amount of tidal freshwater wetlands will decrease. Since there have been continual records of sea level at Savannah for over 200 years, EPA understands that the COE decided that it would rely heavily on that site-specific historical data in its prediction of future trends in sea level rise at this site. Examination of the historic information revealed that sea level has been rising relatively constantly at Savannah at an average of +3 mm per year. Therefore, the COE decided to use a continuation of this historic rate of sea level rise at Savannah in its predictions of future wetland distributions in the estuary. EPA notes that the +3 mm per year value is within the bounds of sea level rise predicted for the next century in the 2007 report from the International Panel on Climate Change (to. 18 to +0.59 meters).*

Response: The District is pleased that EPA continues to concur with the approach taken by the District. The referenced 2007 report from the International Panel on Climate Change agrees with the earlier EPA report that discussed sea level rise at this project site and upon which the Wetland ICT based its recommendation to use 3 mm/year as the long term average for sea level rise at Savannah.

1109-BB-101-EV94

Comment: *Fisheries - EPA gives deference to the fishery experts of FWS, NOAA and their state counterparts regarding project impacts and mitigation. However, we wish to offer that EPA conceptually supports a fish passage at the New Savannah Bluff Lock and Dam since it would open up 20 river miles of former (pre-dam) habitat above the dam that is not affected by the SHEP dredging. We also agree with the COE that the original 2002 proposal for such passage should be updated; however, we will defer to NOAA, FWS and their state counterparts regarding any new or preferred designs as to the engineering of the passage structure.*

Conceptually, however, we believe that whatever design is selected should be easily available to, and usable by, all anadromous/catadromous species of SHEP concern (in terms of their varying size and behavior) and perhaps optimal for the Shortnose sturgeon due to the reduction of its habitat by past and proposed dredging below the dam and its federally endangered species status.

Response: The design for the fish passage structure at New Savannah Bluff Lock and Dam has been revised based on the outcome of a fish passage workshop and site visit with the interagency coordination team and fish passage experts. NOAA has concurred that the conceptual design is acceptable for passage of anadromous/catadromous species of SHEP concern as indicated in their Biological Opinion [Appendix Z of the EIS]. As the design process progresses, the District would coordinate with the natural resource agencies to ensure that the fish passage structure functions as intended.

1109-BB-101-EV95

Comment: *Maintenance Related to Savannah NWR- The federal government is responsible for maintenance of the Diversion Canal, the channels in Little Back River and Middle River, and the canals and control works for the SNWR. In May 2010, the COE entered into a contract to rehabilitate a major portion of the project, with work beginning in July 2010. The COE has requested the additional funds that are required to complete the rehabilitation work. The FEIS should include additional details on the progress of this important work.*

Response: The FEIS has been revised to incorporate information on the status of that work. Repair of the system on Federal lands was completed in December 2011.**Page 30**

1109-BB-101-EV96

Comment: *Bank Erosion at Old Fort Jackson - The concerns that had been expressed during public review of the Tier I EIS about bank erosion at Old Fort Jackson have been addressed. In 2003, the COE partnered with the GDNR (which owns the site) to stabilize the shoreline. Similarly, the Manager of the Fort Pulaski National Monument has expressed concerns about the ongoing erosion that is occurring along portions of their river shoreline. The COE determined that the erosion is the result of several factors, but an increase in vessel size is not expected to "substantially" increase the rate of the ongoing erosion, but may have some effect. EPA recommends that the COE partner with the National Park Service to address river shoreline erosion at the Fort Pulaski National Monument.*

Response: The previous Bank Erosion Study dated November 2006 was updated in June 2011 to include the most recent fleet forecast and sailing draft distribution. The analysis concluded that shoreline erosion at Fort Pulaski National Monument averages about 3.0 to 3.3 feet per year due to all causes, and no additional erosion would be caused by ship traffic associated with deepening the river.

Concur. The District is willing to partner with the National Park Service to address shoreline erosion at Fort Pulaski National Monument. The District is presently performing work for the National Monument to address protection of the Cockspur Lighthouse, and we could provide similar services to address riverbank erosion on their property.

1109-BB-101-EV97

Comment: *COE-SHPO Programmatic Agreement - We suggest that a signed and dated Programmatic Agreement between the COE and the State Historic Preservation Office (SHPO) from Georgia and South Carolina be included in Appendix G.*

Response: The signed Programmatic Agreement is included as Appendix G of the FEIS.

United States Department of the Interior
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January 21, 2011

Colonel Jeffrey M. Hall
U.S. Army Corps of Engineers
Savannah District
100 W. Oglethorpe Avenue
Savannah, Georgia 31401-3640

RE: Savannah Harbor Expansion Project, General Reevaluation Report (GRR) and Draft Tier II Environmental Impact Statement (DEIS)

Dear Colonel Hall:

The Department of the Interior (Department) has reviewed the subject documents. The Savannah Harbor Expansion Project (SHEP) involves deepening the harbor from the current inner harbor depth of 42 feet by as much as 6 feet to a maximum authorized depth of 48 feet. Authorizing language in the Water Resources Development Act of 1999 stipulates that the project may proceed only after the Secretary of the Interior, Secretary of Commerce, and Administrator of the Environmental Protection Agency approve the selected plan and determine that the associated mitigation plan adequately addresses its potential environmental impacts. The subject documents describe various models that were developed to predict changes to the environment resulting from alternative channel depths and mitigation measures. Predicted changes to the environment include: salinity increases, loss of tidal freshwater marsh, reduced striped bass reproduction and recruitment, negative impacts to shortnose sturgeon habitat, reduced dissolved oxygen (DO), and potential exposure of wildlife to cadmium in dredged sediments.

General Comments

Plan Selection

The Corps of Engineers' (Corps) analysis shows that incremental net economic benefits of the alternatives are maximized at a depth of 45 feet, decrease from 45 to 47 feet, and are negative at 48 feet. The 47-foot depth provides the greatest total net economic benefits and is identified as the national economic development (NED) plan. The maximum authorized depth of 48 feet is the locally preferred plan (LPP) of the non-Federal cost share sponsor, the Georgia Ports Authority. The additional economic benefits of the LPP relative to the NED plan (about 1 percent more), but higher costs (about 6 percent more), represent negative incremental net benefits. The DEIS states the tentatively recommended plan is either the 47-foot alternative (NED plan) or the 48-foot alternative (LPP), although three other federal agencies must approve final plan selection and have expressed reservations about the deeper alternatives.

The Department's preferred plan for deepening Savannah Harbor is the 45-foot depth alternative, because it minimizes the loss of freshwater tidal wetlands, impacts to Savannah National Wildlife Refuge (NWR), and risk and uncertainty of impacts to trust fish and wildlife resources. Previous channel deepening projects have reduced tidal freshwater marsh within the Savannah River estuary from about 12,000 acres to about 3,300 acres. The majority of the remaining freshwater tidal wetlands occur on Savannah NWR. Further deepening the channel from its present depth of 42 feet would further reduce this important and increasingly rare national resource. At the NED plan depth (47 feet), a net loss of 223 acres of tidal freshwater wetlands is predicted after flow-diversion mitigation is implemented. At the LPP depth (48 feet), a net loss of 337 acres of tidal freshwater wetlands is predicted after flow-diversion mitigation is implemented. The loss of an additional 114 acres of freshwater tidal wetlands associated with the LPP would represent a 50 percent increase in impacts to the Savannah NWR over the NED plan and a cumulative loss of approximately 10 percent of the basin's remaining freshwater tidal wetlands. For this reason, the Department does not support the LPP.

Sea Level Rise

The potential effect of sea level rise on wetland habitats is mentioned throughout the DEIS. The document discusses drought, sea level rise, and channel deepening, but does not analyze the interaction between these major influences. In Appendix C (Mitigation Planning) and elsewhere in the DEIS, the Corps suggests that if the rate of sea level rise exceeds the historic rate, the proposed compensatory mitigation (e.g., land additions to the Savannah NWR for the loss of 223 acres of freshwater tidal wetlands under the NED plan) would overcompensate project impacts, because some of those acres would have converted to brackish or salt marsh without the project. The Corps proposes to reassess sea level rise effects in the future and assign "advance mitigation" credits to the project for use with future actions. The Department objects to this proposal, because sea level rise would have a negligible impact in the upper estuary if not for the cumulative impacts of previous harbor deepening. The rate of sea level rise is uncertain and substantial impacts resulting from sea level rise are likely well into the future. Conversely, the impacts of further harbor deepening will begin almost immediately. In addition, due to the complexity of the system and limitations of the models, the Department has concerns that the models may underestimate wetland impacts. The Department regards "advance mitigation" in this context as the functional equivalent of a mitigation bank, and U.S. Fish and Wildlife Service (FWS) Mitigation Policy (64 FR 49229-49234) does not allow the use of NWR lands for mitigation banks to compensate for the effects of activities authorized by the Department of the Army under Section 10 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. Therefore, the Department does not support the concept of advance mitigation based on a future evaluation of the relative impacts of sea level rise. We do support, however, obtaining a waiver in this instance from the Corps' policy to implement the agency-coordinated level of mitigation for the base year (the year construction is completed) impacts, rather than mitigating for the project's average annual impacts or reassessing sea level rise impacts in the future.

Monitoring/Adaptive Management

Assuring the effectiveness of the mitigation features proposed in the DEIS is essential to the Department's approval of the selected project plan. These features were developed using pre-construction data and models to predict potential effects to the estuary. The DEIS states that natural variation alone will nearly guarantee that conditions during the first few years after construction are different from those under which the models were first calibrated. Currently, the Monitoring and Adaptive Management Plan proposes 5 years post-construction monitoring of key mitigation features, which we believe is not long enough. It is the Department's position that 10 years post-construction monitoring is necessary for the adaptive management process to

work; i.e., to ensure that impacts to natural resources in this complex system resulting from project construction are limited to those predicted. Further, the Department recommends a more precise definition of observed conditions that would prompt changes to the mitigation features, and a time-line for making decisions and taking corrective actions thereafter. The Department is also concerned that funding for adaptive management will depend upon the Corps' annual appropriations process. It is relatively certain that impacts to trust resources of the Department will occur following construction, but the effectiveness of the mitigation features is much less certain. Therefore, the Department cannot agree that the proposed mitigation adequately addresses project impacts unless contingency funding for monitoring and adaptive management is assured.

The Department is concerned about the reliance on the hydrodynamic and water-quality models in the Adaptive Management Plan (AMP, Appendix D). The Plan does not include ecological performance measures to independently evaluate the effectiveness of the mitigation for the deepening of the Savannah Harbor. The models were developed to evaluate potential resource impact from deepening and to evaluate various mitigation actions to minimize environmental degradation of valued resources. The mitigation plan results in major changes to flow dynamics of the Lower Savannah River Estuary. Six of the seven mitigation features involve alterations to flow paths. The expected result of the mitigation is that the post-construction ecosystem will function in a similar manner to the pre-construction ecosystem. The monitoring data, along with ecological performance measures, should be used to evaluate the effectiveness of the mitigation features.

The AMP does not include ecosystem performance measures for the majority of the resources that the mitigation is trying to protect. The only ecological performance measure found was for the re-vegetation of Area 1S. For the other resources, the Corps proposes to use a modified version of the draft Federal Expectation for Hydrodynamic and Water-Quality Model Calibration and Confirmation performance measures. The intent is to collect additional data, simulate pre- and post-project scenarios with the models, evaluate the calibration of the models, re-calibrate the models (if necessary), and then evaluate the effectiveness of the mitigation.

It is not clear in the AMP how the draft Federal Expectation for Hydrodynamic and Water-Quality Model Calibration and Confirmation performance measures equates to ecological performance measures. The hydrodynamic and water-quality models currently do not meet these model calibration goals in many areas of the system (see Tetra Tech, 2006; Appendices B-K, P, and Q). If the current models do not meet the calibration performance goals, how will evaluating the model calibration performance for the post-project inform resource decision makers if the ecosystem is being protected by the mitigation features?

It is important to perform a post audit of the models to better assess their predictive capacity and uncertainties. Model calibration goals are not the same as ecological performance measures. By relying solely on the post audit of the models for the evaluation of the mitigation, an opportunity for utilizing the tremendous amount of data and analysis that were used to develop the DEIS is not being realized. The development of the DEIS involved tremendous amounts of data collection and analysis of various resources that needed protection. These data and analyses should be used in developing ecosystem performance measures. The ecosystem performance measure could be expressed as the magnitude, duration and frequency of the parameter of interest and appropriate thresholds for actions by resource agencies.

There are references in the Plan of the using the monitoring data to show if "…impacts are occurring beyond the range of those expected" and the monitoring data "…will be useful in identifying whether any impacts are occurring beyond the range of those expected" (p. 27). The expected range of impacts was never defined in the AMP. At every sampling and gaging location for a resource of concern, an ecological performance measure should be developed to define the expected ecosystem response to the deepening mitigation.

There is currently a network of 12 real-time gages that collect water level, velocity, specific conductance, and (or) temperature. Many of these stations have been collecting data since the most recent deepening in 1994. The AMP outlines additional stations that will be added to the network. These data, along with discrete sampling data, and ecological performance measures can be analyzed directly to evaluate the effectiveness of the mitigation features.

Many of the funding figures appear to be inconsistent between sections of the AMP and between the AMP and the GRR. For example, chloride sampling is listed at $100,000 on page 18 and $80,000 on page 24, marsh data collection is listed at $18,000 on page 17 and $20,000 on page 24, and long-term monitoring is listed at $347,000 on page 37 and $428,400 in the GRR.

Cadmium

Procedures for disposing of sediments that contain cadmium concentrations exceeding 14 parts per million (ppm) are discussed in three parts of the DEIS: 1) Section 5.4.2.2; 2) Appendix D - Monitoring and Adaptive Management; and 3) Appendix M - Sediment Quality Evaluation. These discussions are unclear and inconsistent. In particular, we recommend clarifying the proposed cadmium monitoring program. The Department recommends a program of monitoring wildlife activity in disposal areas and cadmium levels in bird tissues that is independent of the Dredge Material Containment Area (DMCA) capping criteria. Wildlife monitoring should begin with sediment placement and continue as long as all other monitoring of the DMCA. Tissue monitoring should occur: 1) prior to sediment placement to collect baseline data; 2) during sediment placement; and 3) post placement until 3 consecutive years of samples contain cadmium concentrations that are less than the potential adverse effect level, which is to be determined. The Department supports the sampling protocol (species and timing) described in Appendix D, page 23; and requests that the Corps continue to coordinate with the FWS prior to completion of the final EIS to finalize plans for biological monitoring within DMCAs, including tissue sampling.

The Department accepts the Corps' use of 4 ppm cadmium concentration in capping material as a trigger for remedial action in DMCAs. The Department understands that the Corps will move a DMCA to higher priority in the rotation for Operations and Maintenance (O&M) sediment placement and vegetation monitoring if 25 cumulative acres are found to have a cadmium concentration greater than or equal to 4 ppm. Sampling and placement will continue until the DMCA has less than 25 cumulative acres with a cadmium concentration greater than or equal to 4 ppm.

Risk and Uncertainty Analysis

The Savannah estuary is a complex system and predicting how this system may respond to substantial physical alterations (channel deepening, flow diversions, etc.) is fraught with uncertainties, which are well acknowledged within the DEIS. However, based on an analysis prepared by Kinetic Analysis Corporation (KAC), the DEIS concludes that the hydrodynamic model probably over-predicts salinity and under-predicts dissolved oxygen; i.e., the model errs towards the side of simulating conditions worse than would actually occur. We believe this

analysis may seriously misrepresent the risk associated with the water quality predictions. It is quite possible that the hydrodynamic model does not predict worst-case conditions. With the exception of the new channel depth, the KAC analysis relied upon the existing geometry of the Savannah River estuary. Several mitigation measures would significantly modify the system geometry, including significant flow diversion at McCoys Cut, closing Rifle Cut, filling the Back River sediment basin, and removing the tide gate. Flow routing and flow volume in the three main river channels would become significantly different from the current system. Therefore, we believe the degree of risk and uncertainty regarding expected water quality impacts, and in turn, wetland impacts, is considerably higher than the KAC analysis suggests. For this and other reasons, the Department recommends extending the proposed post-construction monitoring from 5 years to 10 years.

Specific Comments

Abstract

Page 1. The first paragraph of the Abstract discusses channel depths and then states that 70% of vessels do not call on Savannah at their maximum capacity or design draft, which implies that all light-loading is due to channel depth limitations. The Corps should include information on the percentage of vessels with loads constrained by channel depth and the percentage of light-loading due to other factors, such as prior calls at other ports. Additionally, the DEIS should include the predicted percentage of ships that will call on the port fully loaded or leave fully loaded if the channel is deepened.

Section 3, Alternatives

3.05, Tentatively Recommended Plan, page 3-22. The first paragraph of this section states that the tentatively recommended plan is either the 47-foot alternative or the 48-foot alternative. The third paragraph describes the tentatively recommended plan as the 48-foot alternative. The Errata Sheet of December 17, 2010, states that various references to the 48-foot alternative throughout the GRR and DEIS "should not be interpreted as a recommendation or preference for that alternative over the tentatively selected -47 feet NED [plan]." On September 9, 2010, the FWS provided comments on preliminary drafts of the GRR and DEIS, identified -45 feet as its preferred alternative for deepening the harbor and stated it did not support the 48-foot alternative. The final EIS will necessarily need to revise this section to discuss the multi-agency rationale for what is ultimately determined as the final plan selection.

3.11, Future Conditions Without the Project, page 3-29. This section states that 70% of vessels do not call on Savannah at their maximum capacity or design draft, which implies that all light-loading is due to channel depth limitations. The Corps should include information on the percentage of vessels with loads constrained by channel depth and the percentage of light-loading due to other factors, such as prior calls at other ports. Additionally, the DEIS should include the predicted percentage of ships that will call on the port fully loaded or leave fully loaded if the channel is deepened.

Section 4, Affected Environment

4.01.2, Geology, page 4-7. The amount of dredged material by station for both inner harbor and outer harbor do not match between Section 3 (Table 3-8, pg. 3-27; Table 3-9, pg. 3-28) and

Section 4 (Table 4-4, pg. 4-7; Table 4-5, pg. 4-7). The Department recommends corrections for clarity.

4.02.4, Surface Water, pages 4- 13-14. The discussion on DO standards is confusing. The new DO standard established by the State of Georgia is not less than 5.0 mg/L throughout the year with an instantaneous minimum of 4.0 mg/L. A number of site-specific DO standards are listed. For clarity, this section should explain how the new standard of 5.0 mg/L compares to the measured monthly ranges of DO in the Savannah River at the currently authorized depth of 42 feet.

4.04, Marine and Estuarine Resources, page 4-20. This section states that optimum striped bass spawning success requires salinity less than 1.7 ppt. Studies on the Savannah River indicate that striped bass spawn almost exclusively in areas where maximum salinity near the surface is less than 1.0 ppt. The Department recommends revision to state salinity of less than 1.0 ppt is optimum.

4.06, Invasive Species, page 4-43. This section should discuss the common reed (*Phragmites australis*) as an invasive species. The document states elsewhere (page 4-55, section 4.07) that common reed will probably dominate the confined disposal facilities (CDFs). We believe that the common reed in the CDFs is the invasive strain. According to the U.S. Geological Survey (USGS), the invasive strain originated in Europe and was possibly spread via ships' ballast. Section 5 of the final EIS should evaluate the potential for the invasive strain to crowd out native species in marshes adjacent to the CDFs.

4.06, Invasive Species, page 4-43, (2nd Comment). This section addresses only one pathway, ballast water, for introduction of aquatic invasive species. Introduction of invasive species in the Savannah Harbor, both aquatic and terrestrial, is not limited to ballast water. Insects in pallets, or plants and seeds in soil on containers, are two examples of other pathways. Invasive species can dramatically alter an ecosystem, which is a major concern for the Savannah NWR. This section should address other pathways and terrestrial systems as well as aquatic systems.

4.07, Terrestrial Resources, page 4-47. The Savannah NWR is 29,175 acres, not 25,600 acres.

4.08, Wetlands and Floodplains, page 4-62. This section refers to a 1992 Planning Aid Report, but the FWS report in question is dated September 16, 1982.

Section 5, Environmental Consequences

5.1.1.1, Impacts from Excavation of Wetlands, page 5-1. The text states that the first two entries in Table 5-1 are Refuge lands, but the table labels the first three entries as Refuge lands. Figure 5-1 is illegible, but appears to depict the Kings Island Turning Basin along with another area for dredging. It is unclear where the third area of excavation is located (we believe 96+000 to 97+000). Figure 5-2 appears to depict the non-Refuge portion of excavation from 86+000 to 88+500, but it too is unclear. A proximity map would help locate these areas in relation to the Savannah NWR.

5.1.1.2, Impacts from Excavation of Wetlands, page 5-6. The discussion in the opening paragraph references Figure 5-52 as CDF 1S; however, Figure 5-52 is a picture of Old Fort Jackson (on p. 5-134). We believe the correct reference is to Figure 5-4 on page 5-7.

5.1.1.2, Impacts from Excavation of Wetlands, page 5-6 (2nd comment). The Corps proposes to restore up to 45 acres at Area 1S on the Savannah NWR, using 14.5 acres as "advance mitigation" for direct impacts to salt marsh. These impacts include widening channel bends and turning basins both on and off the Savannah NWR. "Advance mitigation" is the functional equivalent of a mitigation bank. FWS Mitigation Policy (64 FR 49229-49234) does not allow the use of NWR lands for mitigation banks; therefore, the Department cannot support the 14.5 acres as "advance mitigation."

5.1.1.2, Impacts from Excavation of Wetlands, page 5-6 (3rd comment). This section discusses wetland restoration on site 1S. Successful wetland restoration is dependent on three primary factors: soil, hydrology and vegetation. The proposed dredged material removal should expose the original wetland soil and restore the site to the elevation of adjacent marshes. Construction of a "feeder" creek system toward the interior of the restoration site from Middle River will facilitate tidal exchange; however, if restored elevations do not properly restore tidal flow, invasive vegetation with almost no wildlife value may occupy the site. The desired vegetation outcome on the site is to establish a mixed brackish marsh, similar to adjacent marsh. Chinese tallow tree and common reed, both highly invasive exotic species, have been identified in the marshes near the restoration site. Monitoring the success of the re-vegetation for 5 years should include control measures for exotic and invasive species, if detected.

5.1.2.1 Indirect Impacts to Wetlands, page 5-9. This section references a USGS report, by the Cooperative Research Unit, titled "Simulation of Water Levels and Salinity in the Rivers and Tidal Marshes in the Vicinity of the Savannah National Wildlife Refuge, Coastal South Carolina and Georgia" but does not provide the reference. Suggest the Final EIS include the reference (Conrads et al, 2006) in the text and in the References section.

5.1.2.1 Indirect Impacts to Wetlands, page 5-10: This section states "In March 2007, the Federal Cooperating Agencies discussed a USGS proposal to revise the linkage to increase its usefulness for evaluating potential mitigation measures." but the proposal was rejected. Suggest the Final EIS include a short explanation, and relevant information, on how this decision was reached.

5.1.2.2, Indirect Impacts to Wetlands, page 5-12. This section states that the primary stress to tidal freshwater marsh is prolonged drought, which is not supported by evidence. In 1875, when the controlling depth of the navigation channel was 12-15 feet, the Savannah estuary supported an estimated 12,000 acres of tidal freshwater marsh. In 2005, when the controlling depth was 42 feet, the estuary supported only 3,269 or 4,072 acres (depending on study method used). This section should instead state that the inland intrusion of salt water resulting from channel deepening is a constant stress on tidal freshwater marsh, and that prolonged drought exacerbates this stress.

5.1.2.2, Indirect Impacts to Wetlands, page 5-13. This section states the Corps evaluated the effects of sea level rise on tidal freshwater marsh. The Department maintains that sea level rise would have a negligible impact on the Savannah NWR if not for the cumulative impact of previous harbor deepening.

5.1.2.3, Mitigation – Flow Routing, page 5-29. This section examines various alterations to rivers and creeks to reduce the impacts to tidal freshwater marsh. It states that the proposed mitigation for the 47-foot alternative is predicated on a "base year" (immediately following construction) impact of 223 acres instead of a project-life average annual impact consistent with

Corps policy. The average annual impact is lower than 223 acres due to the effect of sea level rise during the next 50 years that would occur without the project. The Department maintains that sea level rise would have a negligible impact on the Savannah NWR if not for the cumulative impact of previous harbor deepening. Therefore, we support obtaining a waiver from the Corps' policy in this instance to instead implement the agency-coordinated level of mitigation.

5.2.1, Water Quality, Dissolved Oxygen, pages 5- 37-39. This section should compare the modeled DO levels in the Savannah River under the LLP and NED depth plans with the State of Georgia's DO standard. The new Georgia DO standard is not less than 5.0 mg/L throughout the year, with an instantaneous minimum of 4.0 mg/L.

5.2.3 Chloride Concentrations, page 5-54: The document states the "The Corps had an Independent Technical Review performed of the chloride model by a staff member of the USGS in Columbia, SC. The reviewer expressed about the ability of the model to make reliable predictions at the low chloride concentrations occurring at the City's intake." Suggest the Final EIS explain "what" the reviewer expressed and include documentation of the reviewer's expertise.

5.2.5, Contingency for City of Savannah Water Intake System, page 5-60. This section describes a secondary (supplemental) water supply intake line for the City of Savannah to be constructed if needed. Based on a preliminary review, the Department would prefer intake Site 1, because intake Site 2 is likely to adversely affect more wetland and wildlife habitat. The Department requests further coordination to evaluate impacts and make recommendations if the supplemental intake site is needed in the future.

5.3.2. B, Mitigation to Impacts to Fisheries, page 5-96. The Corps proposes to fund a stocking program for striped bass based on the amount of spawning and early life stage habitat lost due to water quality changes resulting from harbor deepening: "*the extent of the stocking needed could be reduced to the amount of habitat predicted to be impacted by the project. Thus, the percentage of habitat loss could be multiplied by the cost for a full-scale stocking program to determine the amount that would be sufficient to compensate for the habitat loss that is expected.*" The expected loss of habitat is 2.9% for the 45-foot alternative and 26.9% for the 47-foot alternative. The final EIS should include a proposal to monitor/measure post-construction loss of striped bass habitat. The final adaptive management plan should address striped bass, and if habitat loss exceeds the amount predicted, include provisions and assurances to increase stocking funds accordingly.

5.4.2.2, Sediment Quality Evaluation, pages 5-100-101. This section should clarify whether the Corps intends to collect 30 or 86 sediment samples per DMCA. The Department has previously stated a concern that 30 samples are not enough. The Corps proposes taking samples 15 cm deep: the Department recommends 86 samples of the cap material per DMCA taken 30 cm deep. The DEIS sometimes refers to 7 ppm of cadmium in the capping material to trigger remedial action. The Department recommends substituting a threshold of 4 ppm throughout the DEIS for clarity. This section should fully summarize bird tissue monitoring, which is partially summarized in Appendix D, page 23, and Appendix M, page 84. The Department understood that the Corps had agreed to bird tissue monitoring independent of monitoring cadmium soil concentration levels. Tissue monitoring should occur: 1) prior to sediment placement to collect baseline data; 2) during sediment placement; and 3) post placement until 3 consecutive years of samples contain cadmium concentrations that are less than the potential adverse effect level,

which is to be determined. The Department requests that the Corps continue to coordinate with the FWS prior to completion of the final EIS to finalize plans for biological monitoring within DMCAs, including tissue sampling.

5.5, Groundwater, page 5-105. Groundwater conditions were simulated with a constant pumping rate 200 years into the future to estimate the timing of sea water intrusion into the Upper Floridan Aquifer. The DEIS states elsewhere that Chatham and Effingham counties are experiencing population growth, and it is reasonable to assume that industrial water use may also increase with the potential harbor expansion. For the final EIS, the Department recommends revisiting the groundwater simulations with consideration of likely increases in pumping rates.

5.7, Marine and Estuarine Resources, pages 5-109-113. This section discusses direct dredging impacts and generally concludes that expected impacts are minor. However, the text does not describe the long-standing striped bass spawning season window that restricts dredging and is likely largely responsible for the minor impacts conclusion. On Page 14 of Appendix H is a statement that hydraulic dredging is not conducted in Savannah Harbor during the striped bass spawning season. The Corps should revise Section 5.7 and other relevant sections to discuss the striped bass spawning window, and describe where and when hydraulic harbor deepening dredging is restricted.

5.7.1.1, Direct Dredging Impacts, page 5-110. The flow of the Savannah River is highly variable within and between years; therefore the Corps should specify the period of record used for the following calculation: *"the average daily freshwater flow in the Savannah River at Clyo is about 11,290 cfs."* The analysis presented in this paragraph should use data that represents the seasonal timing and flow conditions typical during channel maintenance operations, and if necessary, revise the conclusions based on this analysis.

5.21.1, Other Items/Factors of Concern, page 5-156. This section covers the introduction of invasive species through ballast water, but should also address other pathways through ports, such as insect larva in pallets (e.g., red bay ambrosia beetle), or seeds and plants 'hitchhiking' in soil on containers.

5.22, Mitigation, page 5-157. The Department disagrees with this statement: *"The Corps believes that with implementation of the Mitigation Plan and Monitoring and Adaptive Management Plan, the proposed action would not have significant adverse impacts on the environment."* Under the 47- and 48-foot alternatives, which the Corps identifies as the tentatively recommended plans, the Savannah estuary would lose an estimated 223 and 337 acres of tidal freshwater marsh, respectively. We have identified loss of tidal freshwater marsh as the *"most important impact criterion in the Savannah Estuary"* (page 5-10). In-kind mitigation for this loss is not possible; therefore, significant adverse impacts remain even with implementation of the mitigation plan for the 47- and 48-foot alternatives. This is why the Department prefers the 45-foot alternative among the action alternatives, because it minimizes the loss of freshwater tidal wetlands, impacts to Savannah National Wildlife Refuge (NWR), and risk and uncertainty of impacts to trust fish and wildlife resources.

Appendix B, Biological Assessments for Threatened and Endangered Species
Section 8.02.4 – Impacts to Federally Listed Threatened and Endangered Species, West Indian Manatee, page 83. Manatees have been observed on the Savannah NWR since 1987. Six manatees were observed on the Savannah NWR on August 26, 2010, at a rice trunk on the Wildlife Drive. This area is directly across from Port Wentworth on the Back River. In

September of 2008, four manatees were found in the Savannah River (Front River) downstream of the Georgia Ports Authority Ocean Terminal that had been killed in a ship-related incident. This section states that manatee occurrence in the area is rare. Manatees have site fidelity to summer habitat sites, therefore, the FWS would expect the six observed on the Savannah NWR to return. The Georgia Department of Natural Resources (GADNR) has data on manatee mortality and public sightings in the Savannah River. From FWS personnel's observations and discussions with the GADNR, the FWS would not characterize manatee occurrence as rare. Usage is regular enough to characterize manatee occurrence in the Savannah River estuary as a small summer resident population.

Appendix C, Mitigation Planning

IV.A. Reducing Impacts – Hydrodynamic and Water Quality Modeling, page 30. This section states that the proposed mitigation for the 47-foot alternative is predicated on a "base year" (immediately following construction) impact of 223 acres instead of a project-life average annual impact consistent with Corps policy. The average annual impact is lower than 223 acres due to the effect of sea level rise during the next 50 years that would occur without the project. The Department maintains that sea level rise would have a negligible impact on the Savannah NWR if not for the cumulative impact of previous harbor deepening. Therefore, we support obtaining a waiver from the Corps' policy in this instance to instead implement the agency-coordinated level of mitigation.

IV.D. Reducing Impacts – Improvements to Dissolved Oxygen, page 39. The MACTEC engineering firm's report on the test of a DO injection system concluded that the system could improve a DO deficit by 0.6-0.7 mg/l. An independent peer review by USGS found that this conclusion was not supported by the data. The USGS review found instead that the natural tidal cycle accounted for most of the variation in DO levels during the demonstration. This section of the final EIS should address the USGS report. The uncertainty regarding the results of the efforts to improve DO deficiencies is additional justification for expanding the water quality monitoring efforts from 5 to 10 years.

V.A. Replacement /Compensation – Restoration/Enhancement/Creation, pages 48-50. The acreages mentioned on these pages do not correspond with those found in other places in the DEIS. Pages 48 and 50 mention 15.68 acres of brackish marsh lost, while DEIS sections 5.1.1.1 and 5.1.1.2 mention 14.08 acres. Appendix C, pages 49 and 50 state the restoration area is 45 acres, while page 49 states the restoration area is 42 acres. Figure 19 on page 49 depicts two restoration areas of 34 and 8 acres for a total of 42 acres. Section 5.1.1.2 page 5-6 states the restoration area is 42 acres. The Department recommends correcting any mistakes in these sections or explaining the apparent inconsistencies.

This section discusses wetland restoration on site 1S for direct impacts to brackish marsh. The desired vegetation outcome is to establish a mixed brackish marsh, similar to adjacent marsh, on the site. Chinese tallow tree and common reed, both highly invasive exotic species, have been identified in the marshes near the restoration site. Monitoring the success of the re-vegetation for 5 years should include control measures for exotic and invasive species, if detected.

On page 49, it is not clear what is meant by *"The Corps would expand our restoration acreage to include their acreage (1.7 acres)."* Please clarify.

On page 50, the Corps states it intends to restore all of Area 1S, using a portion for "advance mitigation." The Department regards "advance mitigation" in this context as the functional equivalent of a mitigation bank, and FWS Mitigation Policy (64 FR 49229-49234) does not allow the use of NWR lands for mitigation banks.

V.B. - Preservation, page 54. This section states that the proposed mitigation for the 47-foot alternative is predicated on a "base year" (immediately following construction) impact of 223 acres instead of a project-life average annual impact consistent with Corps policy. The average annual impact is lower than 223 acres due to the effect of sea level rise during the next 50 years that would occur without the project. The Department maintains that sea level rise would have a negligible impact on the Savannah NWR if not for the cumulative impact of previous harbor deepening. Therefore, we support obtaining a waiver from the Corps' policy in this instance to instead implement the agency-coordinated level of mitigation.

V.B. - Preservation, page 57. The following statement is misleading: "*If a higher rate of sea level rise actually occurs, some of the freshwater marshes would convert to more saline species, so they would not be available for impact by harbor deepening.*" These marshes are at risk to sea level rise only because of the cumulative effect of previous harbor deepening. Tidal freshwater marshes would not be at risk due to sea level rise at the harbor's original depth. Additionally, the impacts to freshwater marsh from harbor deepening will occur quickly compared to the timeframe for sea level rise.

V.B. - Preservation, pages 57-60. These pages discuss sea level rise and the possibility of over-mitigating if sea level rises faster than projected. The Corps proposes to reassess sea level rise at the end of the project's life in 50 years and assign wetlands mitigation credits to the project in an amount equivalent to the over-mitigation. The Department regards "advance mitigation" in this context as the functional equivalent of a mitigation bank, and FWS Mitigation Policy (64 FR 49229-49234) does not allow the use of NWR lands for mitigation banks. This section, among others in the DEIS, also states that the proposed mitigation for the 47-foot alternative is predicated on a "base year" (immediately following construction) impact of 223 acres instead of a project-life average annual impact consistent with Corps policy. The average annual impact is lower than 223 acres due to the effect of sea level rise during the next 50 years that would occur without the project. The Department maintains that sea level rise would have a negligible impact on the Savannah NWR if not for the cumulative impact of previous harbor deepening. Therefore, we support obtaining a waiver from the Corps' policy in this instance to instead implement the agency-coordinated level of mitigation.

V.C. - Compensation, page 65. This section discusses a fishway at New Savannah Bluff Lock and Dam as the primary mitigation feature for the project's impacts to shortnose sturgeon. Fishway effectiveness varies considerably and is difficult to predict. If effective, this measure would provide shortnose sturgeon upstream passage to the Augusta shoals and other riverine spawning areas. Dam removal would represent a more certain means to provide both upstream and downstream passage for shortnose sturgeon and other species, and would also restore riverine characteristics to this portion of the basin; therefore, the Department would prefer dam removal in lieu of a fishway. The Department requests that the Corps continue to coordinate with the FWS to finalize plans for either fishway design and construction or dam removal.

V.C. – Compensation, page 72-73. This section describes a secondary (supplemental) water supply intake line for the City of Savannah to be constructed if needed. Based on a preliminary review, the Department would prefer intake Site 1, because intake Site 2 is likely to adversely

affect more wetland and wildlife habitat. The Department requests further coordination to evaluate impacts and make recommendations if the supplemental intake site is needed in the future.

VI.A. Mitigation Plans - Wetlands, page 81. We believe the statement: "*The plug would be constructed of fill and rock and would extend to EL 10 (above the Mean High Water line)*" is incorrect. It is our understanding that the plug in Rifle Cut will extend to EL 10 above mean low water, which is 2 feet above mean high water -- not 10 feet, as indicated.

VI.A. Mitigation Plans - Wetlands, page 90 and Section VIII – Timing of Construction, page 113. This section should discuss the timing of acquiring the mitigation lands. The Department recommends beginning no later than the start of construction and completing the acquisitions within 2 years.

VI.A. Mitigation Plans - Wetlands, pages 92-93. The Corps proposes to restore the entire site at CDF 1S, using a portion as "advance mitigation" for direct impacts to salt marsh. Claiming credit for restoration to offset as-of-yet unidentified impacts elsewhere in the future is the functional equivalent of a mitigation bank. FWS Mitigation Policy (64 FR 49229-49234) does not allow the use of NWR lands for mitigation banks; therefore, the Department cannot support restoration at this site as advance mitigation.

Successful wetland restoration is dependent on three primary factors: soil, hydrology and vegetation. The proposed dredged material removal should expose the original wetland soil and restore the site to the elevation of adjacent marshes. Construction of a "feeder" creek system toward the interior of the restoration site from Middle River will facilitate tidal exchange; however, if restored elevations do not properly restore tidal flow, invasive vegetation with almost no wildlife value may occupy the site. The desired vegetation outcome is to establish a mixed brackish marsh, similar to adjacent marsh, on the site. Chinese tallow tree and common reed, both highly invasive exotic species, have been identified in the marshes near the restoration site. Monitoring the success of the re-vegetation for 5 years should include control measures for exotic and invasive species, if detected.

The following statement, from page 92, is inconsistent with the text of DEIS Section 5.1.1.2: "*Calculations derived from the SOP indicate that approximately 25.8 acres of restored saltmarsh would be required to mitigate for the 14.08 acres of impact. When combined with the 1.7 acres of previous mitigation, the resulting acreage of the mitigation site would be 25.8 acres.*" Adding 1.7 acres of mitigation to 25.8 acres equals 27.5 acres.

VI.B. Mitigation Plans – Dissolved Oxygen. Was the *Draft Savannah Harbor TMDL for Dissolved Oxygen* released by the U.S. Environmental Protection Agency in April 2010 evaluated for effects of the mitigation plan? With the changes in the flow dynamics, the Front River will have less flow and the residence times in the Harbor will increase. These changes could have a substantial impact on the waste load allocation. The effects on the allowable waste load to the system by the Project are not only caused by the deepening of the navigation channel but also the mitigation features affecting the flow dynamics of the estuary.

More than two years (2009 and 2010) of flow data have been collected on the Front, Middle, and Little Back Rivers. Six of the seven mitigation features involve alterations to flow paths in the system. Has the two years of measured flow been thoroughly compared with the flow predictions of the model? The *Draft Savannah Harbor TMDL* showed a frequency distribution

for the Little Back River. The model comparisons should include daily tidally filtered flows, flow volumes over specified periods, and flow partitioning between the three rivers under various flow regimes.

VI.E. Mitigation Plans - Chlorides, page 104. This section describes a secondary (supplemental) water supply intake line for the City of Savannah to be constructed if needed. Based on a preliminary review, the Department would prefer intake Site 1, because intake Site 2 is likely to adversely affect more wetland and wildlife habitat. The Department requests further coordination to evaluate impacts and make recommendations if the supplemental intake site is needed in the future.

VII. Consideration of 2008 USACE/USEPA Mitigation Rule, page 107. The DEIS uses county population projection data to estimate the percent increase in impervious surfaces, but should probably also consider industrial development adjacent to the Savannah River, in part due to harbor expansion. For example, a large industrial warehousing complex is proposed adjacent to the Refuge that would involve paving several thousand acres of forest land. The storm water runoff associated with these surfaces is a key threat to the sustainability of adjacent wetlands, which this section should address in the final EIS.

VIII. Timing of Construction, page 113. The table indicates that the Corps will provide funding to GADNR for the striped bass stocking program in late 2015 or early 2016. To offset project impacts that begin when construction is complete, GADNR must have stocking capacity in place in the first spawning season following construction. The Department recommends that the Corps transfer funding for the striped bass stocking program when dredging is initiated, which should provide enough lead time to develop stocking capacity.

Appendix D, Monitoring and Adaptive Management Program

There are inconsistencies of scope of work, roles, and required funding throughout. Strongly suggest a thorough update of Appendix D to bring this to current status and necessary funding. The GaWSC is ready to assist with this.

The USGS Georgia Water Science Center (GaWSC) led the effort in 2006 to develop the Monitoring Plan for the proposed SHEP. This was created from feedback from a multi-agency team with a broad-based variety of expertise that has been involved with the SHEP planning over the years. Much has changed with the SHEP since this plan was first developed five years ago, and subsequently the monitoring plan needs updating. The GaWSC has installed a considerable amount of additional monitoring locations that were originally outlined in the 2006 monitoring plan since its release, and this needs to be properly documented. Additionally, the GaWSC, in collaboration with the multi-agency team, has over the last two years performed the installation and operation of a chloride monitoring network for the City of Savannah water intakes on Abercorn Creek, and more detail regarding the initial results of this work should also be factored into Appendix D. The GaWSC is ready to assist in updating the monitoring plan to reflect the latest scope, roles, and budgetary needs.

Several new monitoring technologies have become available since the original plan was written in 2006. Real-time groundwater chloride monitoring should be considered as an early-warning system for the aquifers in case of damage to the confining layer. The GaWSC currently is performing similar monitoring in the Brunswick, Georgia area. Several existing USGS groundwater monitoring sites along the Savannah River channel could be upgraded to enable real

time monitoring of chloride concentrations. With the deployment of index-velocity stream gages currently in place, there are also techniques now available to estimate the sediment load flux within the Savannah Harbor and surrounding estuary using a sediment surrogate approach. These techniques were developed by the GaWSC and can be beneficial in providing insight into the environmental impacts caused by transported sediments as well as provide operational benefits to the management of the channel and port. It is anticipated that because a considerable amount of the proposed monitoring is already in place, a significant cost savings could be found to help offset the implementation of these new monitoring technologies to make a more robust monitoring effort for the SHEP.

Finally, with a large share of the monitoring data now being available in real-time, the ability to visualize and alert water resource managers and stakeholders of the real-time conditions in the Savannah River Estuary are presently available. The USGS real-time webpage, NWISWeb, currently displays all data being collected in the SHEP at http://waterdata.usgs.gov/ga/nwis/current/?type=flow&group_key=basin_cd. The USGS has developed a real-time alerting system can be activated to electronically notify individuals when parameter(s) have exceeded a pre-defined threshold (for example, see http://water.usgs.gov/wateralert/). A crucial part of any monitoring plan should now include the ability to disseminate the information using visualization and information delivery tools in order to keep stakeholders informed and allow water managers to make informed decisions in a real-time manner.

3. GOALS OF AN ADAPTIVE MANAGEMENT PLAN, page 5-6. It is stated that if a mitigation feature is changed, monitoring will continue for an additional year. This period may be too short depending on the feature that was changed, when the change was made, and the hydrologic condition for the additional year. The ecosystem has a much different response during wet and dry years.

5.B. Pre-construction Monitoring – Major Components, page 7. The Hydrologic Monitoring Plan is five years old and needs to be updated to reflect the current gaging network, advances in monitoring technologies, and changes in gaging costs for installation and annual operation and maintenance. The Hydrologic Monitoring Plan was edited by the U.S. Geological Survey (USGS) S.C. *and* Ga. Water Science Centers.

The length of the sampling period of "one lunar cycle" is not clear. Is it a 25-hour period, 14-, or 28-day cycle? With what has been learned about the dynamics of the system and data collection, is this the most cost-effective period to collect data for evaluating the ecosystem and the performance of the models?

The section on physical monitoring indicates that the project would fund USGS to collect pre-construction hydrologic data for "up to one year," but all references to pre-construction monitoring on page 8 are to "one year." The Department recommends 1 year of pre-construction monitoring.

5.C. Pre-construction Monitoring – Details of the Monitoring, page 8 and Figure 3. There are two existing water quality stations on Back River (021989784 and 021989791), and one on Front River (02198920), that have long-term salinity data. The Department recommends using this long-term salinity data set, from the end of the last harbor deepening construction to the start of any new deepening construction, as baseline salinity conditions for these sites and to supplement the 1 year of pre-construction water quality monitoring.

5.C. Pre-construction Monitoring – Details of the Monitoring, page 8. Pre-construction monitoring for 1 year is intended to create or supplement a pre-project baseline. However, information based on only 1 year of data may not provide an adequate baseline. Using existing longer-term data from water quality stations on Back River and Front River should help address this problem (see previous comment on Appendix D, section 5.C, page 8 and Figure 3). Similarly, wetland and fishery studies performed during project planning represent useful baseline information. This section and others in the final EIS should describe in greater detail developing baseline conditions for the various monitoring parameters. In addition, this section states: "*Monitoring would be conducted between the time a decision is made on implementing a harbor expansion and the time the construction begins which would affect aquatic resources in the inner harbor.*" If construction is delayed for more than 1 year after a decision for harbor expansion, the Department recommends continuing pre-construction monitoring until construction begins.

The proposed water-quality parameters are not described. To be more complete, the full contingent of parameters available for continuous monitoring should be listing, which are: water temperature, specific conductance, pH, dissolved oxygen, and turbidity. Each parameter brings a specific scientific benefit to the monitoring plan, as well as complements each other with diagnostic troubleshooting of equipment failure.

5.C. Pre-construction Monitoring – Details of the Monitoring, page 9, Figure 3. This figure needs to be updated to reflect current (2011) real-time network.

5.C. Pre-construction Monitoring – Details of the Monitoring, Page 10. The USGS Georgia Water Science Center currently performs all of the monitoring in the SHEP

The funding figures are 5-years old and need to be revisited.

5.C. Pre-construction Monitoring – Details of the Monitoring, Page 12. The goals of the Intense Monitoring are not clear. "This sampling would address those constituents that…cannot be monitored by continuous recorders." The parameters and constituents listed; river discharge, flow volumes, flow velocity, flow direction, water surface elevation, depth, salinity, dissolved oxygen, water temperature, turbidity, pH, and specific conductance, can be monitored continuously. The remaining constituents are a short list: suspended solids, 5-day biochemical oxygen demand (BOD), and chlorides. Other parameters, constituents, and rates to consider are nutrients, long-term BOD, nitrification rates, sediment oxygen demand rate, re-aeration rates and tidal marsh dissolved-oxygen production/depletion rates.

Based upon the results of the initial chloride monitoring performed by the GaWSC, the Department recommends that SHEP chloride monitoring include a real-time index velocity streamgage at Bear Creek, and full chloride monitoring stations at Abercorn Creek (near the intakes) and on the Savannah River at I-95. Much of the monitoring infrastructure is already in place at the last two stations. The Bear Creek streamgage and some of the water-quality instrumentation would need to be reinstalled.

5.C. Pre-construction Monitoring – Details of the Monitoring, Page 14. The Georgia Fish and Wildlife Cooperative Research Unit, not the South Carolina Fish and Wildlife Cooperative Research Unit, have the fisheries personnel available to monitor the movement of fish.

5.E. Summary, Page 15. In the Cost Summary, Oversight and Contracting are listed under "Biological" but not under "Geomorphic." Should the there be a similar item under "Geomorphic"?

6.B. MONITORING DURING CONSTRUCTION-Major Components, page 16. "On a regular basis, the Corps would assess how well the … models predict…" What is the frequency of this assessment? Every 4 months? Were other locations for sampling chlorides concentrations considered, such as the mouth of Abercorn Creek and I-95?

6.C. MONITORING DURING CONSTRUCTION-Details of Monitoring, page 18. Were other locations for sampling chlorides concentrations considered, such as the mouth of Abercorn Creek and I-95?

6.D. MONITORING DURING CONSTRUCTION-Reporting, Page 19. What is the reporting interval between the end of the 4-month data- collection periods and the release of the model evaluation reports?

6.E. MONITORING DURING CONSTRUCTION-Cost Summary, Page 19. In the Cost Summary, Oversight and Contracting are listed under "Biological" but not under "Geomorphic." Should the there be a similar item under "Geomorphic"?

7.A. Post-construction Monitoring –Goals, page 20. Are there details for the Transfer Efficiency Study of the dissolved-oxygen system? The data collection for the demonstration project was inadequate to show any conclusive effect of the injection system on the receiving waters.

7.B. Post-construction Monitoring – Major Components, page 21. The Corps commits to biological monitoring when soil cadmium concentration is greater than or equal to 4 ppm, but does not define biological monitoring. The Department understood the Corps had agreed to tissue cadmium sampling independent of soil cadmium sampling. Tissue sampling should occur: 1) prior to sediment placement to collect baseline data; 2) during sediment placement; and 3) post placement until 3 consecutive years of samples contain cadmium concentrations that are less than the potential adverse effect level, which is to be determined.

The Department accepts the Corps' use of 4 ppm cadmium concentration in capping material as a trigger for remedial action in DMCAs. The Department understands that the Corps will move a DMCA to higher priority in the rotation for O&M sediment placement and vegetation monitoring if 25 cumulative acres are found to have a cadmium concentration greater than or equal to 4 ppm. Sampling and placement will continue until the DMCA has less than 25 cumulative acres with a cadmium concentration greater than or equal to 4 ppm.

This section states that the Corps will sample the top 15 cm of the cap material. The Department recommends sampling the top 30 cm of the cap material. This section also states that the Corps will conduct biological monitoring when soil cadmium concentrations exceed 4 ppm if the area "cannot be covered by O&M sediments within 6 months." This approach would risk a failure to conduct biological monitoring in an area that the Corps intends to cover within 6 months, but for whatever reason, may not. The Department recommends biological monitoring when concentrations exceed 4 ppm without regard to when the Corps intends to cover the area with O&M sediments.

The Department requests that the Corps continue to coordinate with the FWS prior to completion of the final EIS to finalize plans for biological monitoring within DMCAs, including tissue sampling.

7.B. Post-construction Monitoring – Major Components, page 22. No monitoring is proposed for striped bass, but should be. We recommend a post-project assessment of striped bass habitat using the water quality monitoring data and updated water quality simulations. Model updates are already planned that would facilitate a low-cost assessment using the established striped bass habitat criteria. The Department recommends comparing conditions during the fourth year of post-project monitoring with pre-construction predicted habitat impacts, and formulating corrective actions as necessary based on the results.

7.B. Post-construction Monitoring – Major Components, page 23. The Department supports the sampling protocol (species and timing) described in this section, with one exception (or clarification). Sampling when the CDFs are wet is proposed for April and September. However, the next sentence says three individuals of two species (six total) "will be collected **each year**" (emphasis added). We recommend revising this to state that these six individuals will be collected twice a year (April and September) when the CDFs are wet.

7.C. Post-construction Monitoring – Details of the Monitoring, page 24. The DEIS shows various post construction monitoring ranging from 2 to 5 years. It is not unlikely that a drought or high-flow period lasting several years would occur during the post-construction monitoring period, which would complicate comparisons with pre-construction monitoring data. In addition, tidal freshwater wetlands respond slowly to salinity change. Therefore, the Department recommends increasing wetland and continuous water quality monitoring from 5 years post-construction to 10 years.

8.B Performance Measures – Post-construction Monitoring, page 28. We recommend developing a detailed data analysis plan for the post-construction water quality monitoring. The mitigation features will significantly alter the system, which will complicate the comparisons of pre- and post-construction conditions to determine the efficacy of the mitigation measures. A recent example of the need for such as plan was the re-oxygenation demonstration performed for the Savannah Harbor Expansion project. Monitoring data was collected, but the analysis of that data failed to conclusively quantify the effect of the demonstration project in the highly variable DO dynamics of the system.

8.B Performance Measures – Post-construction Monitoring, page 29. Concerning the revegetation of Area 1S, grading the site and its feeder creeks to the proper elevations is essential to avoid establishing invasive vegetation (e.g., Chinese tallow tree) that have little or no wildlife value. The discussion and table in this section should specify criteria for successful establishment of native wetland plants. Monitoring the success of the re-vegetation for 5 years should include control measures for exotic and invasive species, if detected.

9.B. Adaptive Management-Decision Making Process, Decision Process, page 30. This section describes an informal inter-agency review process for monitoring data and reports during the 5-year post-construction monitoring period. Within 1 year after the 5-year post-construction monitoring period, the Corps would prepare a consolidated report of the various monitoring programs, followed by 30 days of agency review, an unspecified time period for further report revision, public review, and a potential elevation process. This time-line for making decisions on adaptive management actions would likely require a minimum of 1.5 years after the 5-year

post-construction monitoring period, and could take much longer. The Department recommends compressing this process so that final decisions on corrective actions are reached within 1 year after the monitoring period. In addition, because we have recommended extending the duration of post-construction monitoring from 5 years to 10 years, we also recommend preparing and reviewing a consolidated report of the various monitoring programs at the end of 5 years, and again at the end of 10 years following project construction, to ensure that adaptive management decisions can be made when it becomes apparent that a problem exists, and in a timely manner.

9.B. Adaptive Management- Decision Making Process, pages 30-31. Appendix D contains two sections "9.B" – the second one should be "9.C."

9.B. Adaptive Management-Decision Making Process, Decision Criteria, page 31-32. The Federal modeling performance goals in the plan are those provided by review agencies in 2001 during hydrodynamic model development. Because the agencies were aware of the complexity of the system and model limitations, we allowed considerable latitude in the performance of the models. We are concerned that adopting the same tolerances for the performance of the constructed project is inappropriate, because actual impacts could differ substantially from the predicted impacts without triggering remedial action. Based on earlier coordination, the Corps modified the tolerances for achieving a goal of <1 ppt salinity to +/- 0.1 ppt, and we support this change. The goal for salinity in the range of 1-5 ppt has not been modified, and would allow considerable impact without triggering action. As proposed, a range of 0.5 to 1.5 ppt is acceptable for a salinity goal of 1 ppt (+/- 50%), while a range of 0.89 to 1.09 ppt is acceptable for a salinity goal of 0.99 ppt (+/- 10%). We recommend modifying the goal for salinity in the range 1-5 ppt to +/- 10 % (not +/- 0.5 ppt as currently stated) to make it more consistent with other goals and triggers for adaptive management.

10. Adaptive Management – Implementing Warranted Modifications, pages 32-33. This section states that the "Corps would seek and obtain its funds for this phase each year through the normal budget process," which concerns the Department. It is relatively certain that impacts to trust resources of the Department will occur following construction, but the effectiveness of the mitigation features is much less certain. Therefore, the Department cannot agree that the proposed mitigation plan adequately addresses project impacts unless contingency funding for monitoring/adaptive management activities is assured.

This section should also discuss an implementation schedule for needed corrective actions. The Department recommends initiating construction, or other appropriate remedial actions, within 1 year of a decision to modify a mitigation feature.

10.C. Adaptive Management – Monitoring after Implementing an Adaptive Management Feature, page 35. The Corps proposes to monitor the performance of corrective actions under the adaptive management program. It is unlikely that 1 year of post-construction monitoring is sufficient to determine the outcome of the action in a system as dynamic as the Savannah estuary. The Department recommends 3 years of post-construction monitoring of adaptive management actions.

11.B. Long Term Monitoring – Major Components, page 36. The Corps proposes to fund four water monitoring stations to determine whether the mitigation features are functioning as intended. A fifth station, Station 021989784, is located at the intake of the freshwater supply system for the 3,000 acres of managed wetlands on Savannah NWR and is therefore especially

important for monitoring project impacts to the Refuge. The Department recommends adding it to the Corps' list of supported stations.

Appendix L, Cumulative Impact Analysis

8.B. Wetlands, Page 16. This appendix does not include a section header to separate Section B, Tidal Freshwater Marsh, from Section A, Savannah NWR Freshwater Waterfowl Management Operations. We believe page 16 is the appropriate location for this.

8.B. Wetlands – Historic Basis, page 21. Figure 5 and the associated text do not provide an accurate representation of marshes in 1854. Most of the salt marsh shown on Figure 5 is in the Wright River system, not the Savannah system. The demarcation between freshwater marsh, brackish marsh, and salt marsh is not supported by historical information. As stated on page 20, Appendix L, tidal forest in the mid-1700's extended to the junction of Back River and the Savannah River, and brackish marshes extended to near the mouth of the river. Appendix Q, page 22, mentions that Hutchinson Island was used extensively for rice culture, which requires freshwater. Between the mid-1700's and mid-1800's, only minor modifications were made to the Savannah River. This information indicates that the depiction of marsh type extent in Figure 5 and the resulting areal estimates are mistaken, and that the freshwater limit extended to about river mile 7 in the mid-1850's. Figure 5 shows the interface at about river mile 19. The Department recommends correcting these errors.

Section 8.B. Wetlands – Present Condition, Tidal Freshwater Marshes, page 25. Figure 6 and the associated text do not provide an accurate representation of marshes in 1999. USGS estimates based on detailed field studies and Corps estimates based on the hydrodynamic model are generally consistent, but are substantially different from the estimates shown in Figure 6. The Department recommends corrections for clarity.

8.B. Wetlands – Present Actions/Stresses and Future Actions/Stresses, pages 27-28. This section states that the primary stress to tidal freshwater marsh is prolonged drought, which is not supported by evidence. In 1875, when the controlling depth of the navigation channel was 12-15 feet, the Savannah estuary supported an estimated 12,000 acres of tidal freshwater marsh. In 2005, when the controlling depth was 42 feet, the estuary supported only 3,269 or 4,072 acres (depending on study method used). This section should instead state that the inland intrusion of salt water resulting from channel deepening is a constant stress on tidal freshwater marsh, and that prolonged drought exacerbates this stress.

This section also states that the Corps evaluated the effects of sea level rise on tidal freshwater marsh. The Department maintains that sea level rise would have a negligible impact within the Savannah NWR if not for the cumulative impact of previous harbor deepening.

8.B. Wetlands – Alternatives to Mitigate for Cumulative Effects – Tidal Freshwater Marshes, page 32. The acres listed for preservation for the 48-foot project (2,094) are not consistent with the acres listed elsewhere in the document (2,683). The Department recommends corrections for clarity.

8.C. Wetlands – Saltmarsh and Brackish Marsh, page 32. The discussion of the mitigation for the loss of non-freshwater tidal marshes is confusing. Previous sections – Appendix C, Section V, and elsewhere – speak of impacts to 14.08 acres of salt and brackish marsh with 42 (or 45) acres listed as mitigation for the 44-foot alternative. Appendix C lists 15.68 acres of

brackish marsh loss for all the proposed harbor deepening alternatives. This Appendix lists the loss of 3.0 acres of brackish marsh and 12.68 acres of saltmarsh, which equals the 15.68 acres of brackish marsh mentioned in Appendix C. This is confusing because both 14.08 acres and 15.68 acres are listed as marsh loss for either the 44–foot alternative or all alternatives. Also, the acreage proposed for restoration is not clear. The Department recommends revisions for clarity.

8.C. Wetlands – Saltmarsh and Brackish Marsh, page 33. Most of the salt marsh in the estimate provided in the "Present Condition" section is in the Wright River system, and not in the Savannah River system. The Department recommends corrections for clarity.

Appendix M - Sediment Quality Evaluation

7.3. Monitoring and Contingency Plan, pages 83-86. The Department recommends taking samples of the cap material to a depth of 30 cm instead of the 15 cm depth proposed. This section also cites 7 ppm cadmium concentration as the trigger for remedial action: we recommend this section be revised to be consistent with Appendix D (Section 7.B) which identifies 4 ppm as the trigger.

We recommend biological monitoring when cadmium exceeds 4 ppm regardless whether the Corps plans to cover the area with O&M sediments within 6 months. This section, and others, should define biological monitoring in the context of cadmium in disposal areas. The Department recommends a program of monitoring wildlife activity in disposal areas and cadmium levels in bird tissues that is independent of the Dredge Material Containment Area (DMCA) capping criteria. Wildlife monitoring should begin with sediment placement and continue as long as all other monitoring of the DMCA. Tissue monitoring should occur: 1) prior to sediment placement to collect baseline data; 2) during sediment placement; and 3) post placement until 3 consecutive years of samples contain cadmium concentrations that are less than the potential adverse effect level, which is to be determined. The Department supports the sampling protocol (species and timing) described in Appendix D, page 23, and requests that the Corps continue to coordinate with the FWS prior to completion of the final EIS to finalize plans for biological monitoring within DMCAs, including tissue sampling.

Our recommendations necessitate revisions to the "Decision Matrix for Cadmium Sampling" on page 86, including: remove references to 7 ppm cadmium concentrations; remove "if necessary" in reference to tissue sampling; do not differentiate between areas slated for covering before or after 6 months; and continue wildlife use studies until tissue monitoring is completed.

Appendix Q, Risk and Uncertainty Analysis in Environmental Evaluation and Approach

4.A. Uncertainty in Wetland Impact Predictions, page 7. Based on an analysis prepared by Kinetic Analysis Corporation (KAC), this section concludes that the hydrodynamic model probably over-predicts salinity and under-predicts dissolved oxygen, i.e., the model errs towards the side of simulating conditions worse than would actually occur. We believe this analysis may seriously misrepresent the risk and uncertainty associated with the water quality predictions. With the exception of the new channel depth, the KAC analysis relied upon the existing geometry of the Savannah River estuary. Several mitigation measures would significantly modify the system geometry, including significant flow diversion at McCoys Cut, closing Rifle Cut, filling the Back River sediment basin, and removing the tide gate. Flow routing and flow volume in the three main river channels would become significantly different from the current system. Therefore, we believe the degree of risk and uncertainty regarding expected water

quality impacts, and the resulting wetland impacts, is considerably higher than the KAC analysis suggests, which is one of the reasons why the Department recommends extending the proposed post-construction monitoring from 5 years to 10 years.

4.B. Uncertainty in the Amount of Sea Level Rise, page 8. This portion of the DEIS discusses risk and uncertainty in relation to sea level rise and the modeling of impacts to freshwater marsh. This section argues for predicating mitigation on the "base year" impacts (the year construction is complete) instead of average annual impacts over the life of the project (consistent with Corps policy), because "impacts that would occur soon after the base year are those most likely to occur and least subject to uncertainty from more distant projections of future conditions." Average annual impacts are less than base year impacts because sea level rise over 50 years will cause wetland losses without the project. The Department agrees with predicating mitigation on the base year impacts, but for a different reason. The Department maintains that sea level rise would have a negligible impact on Savannah NWR if not for the cumulative impact of previous harbor deepening.

4.C. Risk with Wetland Impact Predictions, page 8. Wetland impacts are inferred from salinity changes predicted by the hydrodynamic model. This section states: "*...the hydrodynamic model has roughly an 80 percent chance of over-predicting salinity levels at low salinity levels, thus leading to an over-prediction of salinity-induced impacts to wetlands. Therefore, the model is considered to present little risk for decision-makers evaluating salinity impacts to wetlands.*" The Department disagrees with this characterization, which was based on analysis by KAC that, with the exception of the new channel depth, relied upon the existing geometry of the Savannah River estuary. Several mitigation measures would significantly modify the system geometry, including significant flow diversion at McCoys Cut, closing Rifle Cut, filling the Back River sediment basin, and removing the tide gate. Flow routing and flow volume in the three main river channels would become significantly different from the current system. Therefore, we believe the degree of risk and uncertainty regarding expected water quality impacts is considerably higher than the KAC analysis suggests, and is a reason we recommend extending the proposed post-construction monitoring from 5 years to 10 years.

5.B. Risk with Dissolved Oxygen Predictions, page 10. This section states that the model slightly under-predicts DO levels and is therefore a good predictor of DO-related impacts. Because the project and the various mitigation features will substantially alter channel geometry of the lower river, and the hydrodynamic models are based on the current geometry, the Department attributes a relatively high degree of uncertainty with the model predictions of water quality impacts, including DO impacts. We recommend that the final EIS recognize and acknowledge this uncertainty. The risk to fish and other resources of underestimating DO impacts is further justification for expanding the monitoring effort beyond the currently proposed 5 years to 10 years.

9.00 REFERENCES

The Draft EIS references a USGS report, by the Cooperative Research Unit, titled "Simulation of Water Levels and Salinity in the Rivers and Tidal Marshes in the Vicinity of the Savannah National Wildlife Refuge, Coastal South Carolina and Georgia" but does not provide the reference. Suggest the Final EIS include the reference (Conrads et al, 2006) as follows:

Conrads PA, Roehl EA, Daamen RC, and Kitchens WM. 2006. Simulation of Water Levels and Salinity in the Rivers and Tidal Marshes in the Vicinity of the Savannah National Wildlife Refuge, Coastal South Carolina and Georgia. US Geological Survey, Scientific Investigations Report 2006–5187, 134 p. Available online at: http://pubs.usgs.gov/sir/2006/5187/pdf/sir20065187.pdf

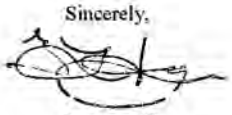
Draft General Re-Evaluation Report

Page 236, sections 12.3.1 and 12.3.2. Based on an analysis prepared by Kinetic Analysis Corporation (KAC), this section concludes that the hydrodynamic model probably over-predicts salinity and under-predicts dissolved oxygen, i.e., the model errs towards the side of simulating conditions worse than would actually occur. We believe this analysis may seriously misrepresent the risk and uncertainty associated with the water quality predictions. With the exception of the new channel depth, the KAC analysis relied upon the existing geometry of the Savannah River estuary. Several mitigation measures would significantly modify the system geometry, including significant flow diversion at McCoys Cut, closing Rifle Cut, filling the Back River sediment basin, and removing the tide gate. Flow routing and flow volume in the three main river channels would become significantly different from the current system. Therefore, we believe the degree of risk and uncertainty regarding expected water quality impacts is considerably higher than the KAC analysis suggests, and is a reason we recommend extending the proposed post-construction monitoring from 5 years to 10 years.

Pages 236-237, sections 12.3.3 and 12.3.4. This section states that the model slightly under-predicts DO levels and is therefore a good predictor of DO-related impacts. Because the project and the various mitigation features will substantially alter channel geometry of the lower river, and the hydrodynamic models are based on the current geometry, the Department attributes a relatively high degree of uncertainty with the model predictions of water quality impacts, including DO impacts. We recommend that the final EIS recognize and acknowledge this uncertainty. The risk to fish and other resources of underestimating DO impacts is further justification for expanding the monitoring effort beyond the currently proposed 5 years to 10 years.

The Department appreciates the opportunity to comment on this project. Let me know if you have questions about our comments. I can be reached on (404) 331-4524 or emailed at gregory_hogue@ios.doi.gov.

Sincerely,



Gregory Hogue
Regional Environmental Officer

cc:
Southeast Regional Administrator, Environmental Protection Agency
Southeast Regional Director, NOAA Fisheries Service
Southeast Regional Director, U.S. Fish and Wildlife Service
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Page 2

637-BB-141-EV01, 637-BB-141-EV02

Comment: *The Department's preferred plan for deepening Savannah Harbor is the 45-foot depth alternative, because it minimizes the loss of freshwater tidal wetlands, impacts to Savannah National Wildlife Refuge (NWR), and risk and uncertainty of impacts to trust fish and wildlife resources. Previous channel deepening projects have reduced tidal freshwater marsh within the Savannah River estuary from about 12,000 acres to about 3,300 acres. The majority of the remaining freshwater tidal wetlands occur on Savannah NWR. Further deepening the channel from its present depth of 42 feet would further reduce this important and increasingly rare national resource. At the NED plan depth (47 feet), a net loss of 223 acres of tidal freshwater wetlands is predicted after flow-diversion mitigation is implemented. At the LPP depth (48 feet), a net loss of 337 acres of tidal freshwater wetlands is predicted after flow-diversion mitigation is implemented. The loss of an additional 114 acres of freshwater tidal wetlands associated with the LPP would represent a 50 percent increase in impacts to the Savannah NWR over the NED plan and a cumulative loss of approximately 10 percent of the basin's remaining freshwater tidal wetlands. For this reason, the Department does not support the LPP.*

Response: The EIS/GRR has determined that the -47 foot alternative is the selected plan. The selected plan has less tidal freshwater wetland impact than the LPP. The District recognizes the Department of Interior's preference for the 45-foot depth alternative because it would result in the least adverse environmental impacts. However, deepening to -45 feet would incompletely achieve the project purpose and need, which is to address navigation inefficiencies in Savannah Harbor. The larger vessels that will be calling at Savannah need additional depth to load more fully and efficiently, which will achieve greater transportation cost savings. The Corps believes the Federal agencies should make their decisions after considering all factors involved, including the project purpose and need, economics, environmental impacts, and mitigation.

The loss/conversion/change in areal distribution of wetland community types within the Savannah Harbor estuary are the result of many factors. As discussed in the EIS, conversion of bottomland hardwoods to rice fields, shoreline/upslope development, sea level rise, etc. have contributed to changes in the amount of tidal freshwater marsh in the Savannah Harbor estuary. All of the Cooperating Agencies involved in this process were sensitive to, and indeed deferred to DOI/USFWS concerns regarding loss of tidal freshwater wetlands. To address those concerns, the Wetland Interagency Coordination Team developed mitigation consisting of preservation of over 2,000 acres of bottomland hardwood wetlands that would be added to the Savannah National Wildlife Refuge and preserved in perpetuity.

637-BB-141-EV03, 637-BB-141-EV04, 637-BB-141-EV05, 637-BB-141-EV06, 637-BB-141-EV07

Comment: *The potential effect of sea level rise on wetland habitats is mentioned throughout the DEIS. The document discusses drought, sea level rise, and channel deepening, but does not analyze the interaction between these major influences. In Appendix C (Mitigation Planning) and elsewhere in the DEIS, the Corps suggests that if the rate of sea level rise exceeds the historic rate, the proposed compensatory mitigation (e.g., land additions to the Savannah NWR for the loss of 223 acres of freshwater tidal wetlands under the NED plan) would overcompensate project impacts, because some of those acres would have converted to brackish or salt marsh without the project. The Corps proposes to reassess sea level rise effects in the future and assign "advance mitigation" credits to the project for use*

with future actions. The Department objects to this proposal, because sea level rise would have a negligible impact in the upper estuary if not for the cumulative impacts of previous harbor deepening. The rate of sea level rise is uncertain and substantial impacts resulting from sea level rise are likely well into the future. Conversely, the impacts of further harbor deepening will begin almost immediately. In addition, due to the complexity of the system and limitations of the models, the Department has concerns that the models may underestimate wetland impacts. The Department regards "advance mitigation" in this context as the functional equivalent of a mitigation bank, and U.S. Fish and Wildlife Service (FWS) Mitigation Policy (64 FR 49229-49234) does not allow the use of NWR lands for mitigation banks to compensate for the effects of activities authorized by the Department of the Army under Section 10 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. Therefore, the Department does not support the concept of advance mitigation based on a future evaluation of the relative impacts of sea level rise. We do support, however, obtaining a waiver in this instance from the Corps' policy to implement the agency-coordinated level of mitigation for the base year (the year construction is completed) impacts, rather than mitigating for the project's average annual impacts or reassessing sea level rise impacts in the future.

Response: The DEIS provided sufficient analysis of the impacts of drought, sea level rise, and channel deepening on wetlands in the Savannah Harbor estuary to provide the reader with an understanding of the effects of these phenomena. The District carried out all wetland studies and analyses identified by the Wetland Interagency Coordination Team as being required to evaluate the wetland impacts accruing to various project alternatives.

The analysis of sea level rise and its effects on tidal freshwater marsh in the estuary is a requirement of EC 1165-2-212. Additionally, ER 1105-2-100 states "Ecosystem outputs are not discounted, but should be computed on an average annual basis, taking into consideration that the outputs achieved are likely to vary over time". Based on these two requirements, Savannah District determined that the wetland mitigation (purchase of 2,245 acres of land for preservation) for the 47-foot depth channel would over compensate for project impacts in the event sea level rise exceeded historic rates. Nonetheless, the District requested a waiver of the requirements of ER 1105-2-100 regarding how environmental impacts are computed. The Assistant Secretary of the Army (Civil Works) has reviewed and approved the waiver, thereby allowing the mitigation to be based on the impacts that would occur at the time of construction. Hence, a portion of the original proposal has been removed – a comparison of impacts after the 50-year life of the project resulting from construction versus those caused by sea level rise. The amount of wetlands to be preserved [currently 2,245 acres in extent] as mitigation for the adverse impacts of the 47-foot channel deepening provides the appropriate level of mitigation for impacts that would occur at the time of project implementation.

The Wetland Interagency Coordination Team participated in the development of the procedures which were used to estimate the impacts of the various harbor deepening alternatives on wetlands. Because estuarine systems are so complex, numerical modeling will not be able to capture all of their interactions with absolute accuracy. Nonetheless, the District is confident that these analyses reasonably forecast eventual impacts to wetland community types. The selected alternative includes a post-construction monitoring plan which will empirically evaluate actual wetland impacts, as well as an adaptive management component which will adjust any of the mitigation features, as necessary.

Mitigation for all the project's direct wetland impacts can be accomplished via restoring 28.8 acres on Disposal Area 1-S. An additional 11.5 contiguous acres would also be restored on Area 1-S which would be applied to future wetland mitigation needs for future Savannah Harbor upgrades. The additional

acreage restored on the remainder of the site would only be used by the Federal government for Savannah Harbor activities. Hence, this would not constitute a wetland mitigation bank, since credits would not be sold to other entities.

As noted above, the Assistant Secretary of the Army (Civil Works) has granted the District's request for a waiver from Section 5, paragraph E-36.c.(1) of ER 1105-2-100 regarding how environmental impacts are computed. This waiver is based on the belief that the project should mitigate for the environmental impacts that would occur when the project is implemented and the fact that project impacts are more easily ascertained in the early life of the project, rather than 50 years later.

637-BB-141-EV08, 637-BB-141-EV09, 637-BB-141-EV10, 637-BB-141-EV11

Comment: *Assuring the effectiveness of the mitigation features proposed in the DEIS is essential to the Department's approval of the selected project plan. These features were developed using pre-construction data and models to predict potential effects to the estuary. The DEIS states that natural variation alone will nearly guarantee that conditions during the first few years after construction are different from those under which the models were first calibrated. Currently, the Monitoring and Adaptive Management Plan proposes 5 years post-construction monitoring of key mitigation features, which we believe is not long enough. It is the Department's position that 10 years post-construction monitoring is necessary for the adaptive management process to work; i.e., to ensure that impacts to natural resources in this complex system resulting from project construction are limited to those predicted. Further, the Department recommends a more precise definition of observed conditions that would prompt changes to the mitigation features, and a time-line for making decisions and taking corrective actions thereafter. The Department is also concerned that funding for adaptive management will depend upon the Corps' annual appropriations process. It is relatively certain that impacts to trust resources of the Department will occur following construction, but the effectiveness of the mitigation features is much less certain. Therefore, the Department cannot agree that the proposed mitigation adequately addresses project impacts unless contingency funding for monitoring and adaptive management is assured.*

Response: Concur. The SHEP's monitoring and adaptive management plan is specifically designed to evaluate the effectiveness of its constituent mitigation features. It is important to note that the plan includes funding to modify/supplement any mitigation feature the monitoring deems necessary.

A review of the monitoring protocol does not reveal a requirement for ten years of post-project monitoring; however, as requested by agencies including DOI/USFWS, the Corps has extended the length of the post-construction monitoring period to ten years for key components, including wetlands and water quality. The revised post-project monitoring should provide ample data regarding the project's impacts on physical parameters [dissolved oxygen, salinity, etc.] affecting water quality and other concerns, such as fish distribution, etc. Further, monitoring will be extended two additional years [to seven] to document the recovery of the CDF 1S marsh restoration site. This time extension would comport with monitoring requirements that the Regulatory Branch of USACE requires of permittees for similar activities.

The Monitoring and Adaptive Management Plan [pages 28-32] provides a discussion of post-construction monitoring and the decision- making process that would determine if additional monitoring and/or mitigation measures are warranted. The plan did not identify specific acceptability criteria for water quality or biologic parameters [page 28] that would trigger the need to implement additional monitoring or modify mitigation measures. This was by design, i.e., there was a concern that a specific

threshold for a parameter would limit the judgment of subject matter experts about when/what kind of changes might be needed when the monitoring data becomes available. Namely, the monitoring data might prompt a resource expert to recommend modifying a monitoring protocol and/or changing a particular mitigation measure, even though a specific threshold had not been reached. Further, the potential cumulative impacts of several parameters could become a concern even though the threshold limits had not been exceeded for any one parameter.

Decision points relative to changes in the monitoring plan or mitigation features can be reached at any time during the post-construction monitoring effort. As soon as they are finalized, monitoring data and reports would be made available to the resource agencies in support of this goal. The plan currently provides for a meeting each year between the District and the resource agencies to discuss the data collection and any protocol changes. However, such a meeting could be conducted at any time circumstance/concerns dictate. If the monitoring identifies impacts that are well outside of those predicted, consultation with the resource agencies would begin immediately. Corrective actions could range from a change in the monitoring plan to a cessation of construction activities until a given problem is rectified.

The District would obtain funds for project construction (including monitoring and adaptive management) through its established budget process. The Corps considers monitoring and adaptive management to be mitigation features, so they would be treated as "general navigation features" and budgeted along with funds for the channel deepening. The Corps would consider the project to still be in "Construction" until the end of the monitoring and adaptive management period. The Corps will develop a construction funding plan as well as a mitigation and adaptive management funding plan. The Corps will seek funding each year as identified in the funding plans. If the total costs exceed the estimates, the Corps would seek to obtain Corps approvals for any additional amounts needed through the normal budget process. Funds for un-programmed adaptive management needs would be considered should excess construction funds become available during the year. Adaptive management funds currently estimated at $2 million per year will be sought for the entire duration of the monitoring period and for any action needed based on the monitoring results. Any project funds that are not used during the year due to unforeseen circumstances would be carried forward as needed and justified. If modifications are found to be warranted and they are contained in the group of actions described in the following section and the EIS, they could be implemented without further public coordination or environmental approvals. If then-existing programmed funding is not sufficient to implement the above-mentioned warranted modifications, the Corps would seek to identify funds for reprogramming. Funds to be reprogrammed must first be identified as excess to another project's needs. If such funds are identified, the District will seek to obtain them to implement the needed adaptive management actions, thereby minimizing unanticipated adverse project effects.

After completion of the adaptive management phase, the Corps would budget for operation and maintenance of the channel and its mitigation features through the Operations and Maintenance funding program. The Corps expects the Record of Decision to state that approval of the project is conditioned on performance of the monitoring and adaptive management aspects of the project. That procedure is a method identified by CEQ in their 14 January 2011 guidance titled "Appropriate Use of Mitigation Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact" as being sufficient for a Federal agency to ensure that the monitoring and adaptive management would be performed. Further, the non-Federal sponsor, acting through the Georgia Ports Authority, has agreed to set aside in advance funds in an escrow account for the monitoring and adaptive management upon approval of the project.

Page 3

637-BB-141-EV12, 637-BB-141-EV13

Comment: *The Department is concerned about the reliance on the hydrodynamic and water-quality models in the Adaptive Management Plan (AMP, Appendix D). The Plan does not include ecological performance measures to independently evaluate the effectiveness of the mitigation for the deepening of the Savannah Harbor. The models were developed to evaluate potential resource impact from deepening and to evaluate various mitigation actions to minimize environmental degradation of valued resources. The mitigation plan results in major changes to flow dynamics of the Lower Savannah River Estuary. Six of the seven mitigation features involve alterations to flow paths. The expected result of the mitigation is that the post-construction ecosystem will function in a similar manner to the pre-construction ecosystem. The monitoring data, along with ecological performance measures, should be used to evaluate the effectiveness of the mitigation features.*

Response: The Monitoring and Adaptive Management Plan notes that field data collected during the post-construction monitoring and the hydrodynamic and water quality models are the main tools which will be used to determine how the project is performing and if the impacts are generally as expected. Further, the plan details that the District, Cooperating Agencies, and the state Natural Resource Agencies will review this data to determine whether impacts are generally as anticipated or whether changes to a specific project element, per se, and/or the mitigation plan are warranted. Even though the potential impacts of the project were evaluated under a range of likely conditions, the actual circumstances experienced after construction will be somewhat different from those used for evaluation in the project's feasibility phase. Consequently, the hydrodynamic and water quality models will be used to examine post-project performance under actual conditions , e.g., high/ low flows, drought, or some combination of these. The performance [accuracy] of the hydrodynamic and water models will be assessed once during pre-construction monitoring and twice during post-construction monitoring and recalibrated, as necessary. This repetition in modeling assessment/recalibration will improve their predictive accuracy by decreasing their range of uncertainty. The District and the natural resource agencies would use the modeling data [after the post-construction assessment/calibration] and compare it to actual field results to evaluate whether the system is performing as expected.

The Monitoring and Adaptive Management Plan provides a detailed discussion of how the above agencies will conduct the decision- making process, along with the concurrence process for modifying any project element or an agreed upon mitigation measures.

637-BB-141-EV14

Comment: *The AMP does not include ecosystem performance measures for the majority of the resources that the mitigation is trying to protect. The only ecological performance measure found was for the re-vegetation of Area 1S. For the other resources, the Corps proposes to use a modified version of the draft Federal Expectation for Hydrodynamic and Water-Quality Model Calibration and Confirmation performance measures. The intent is to collect additional data, simulate pre- and post-project scenarios with the models, evaluate the calibration of the models, re-calibrate the models (if necessary), and then evaluate the effectiveness of the mitigation.*

Response: A previous response addressed establishment of guidelines rather than specific environmental/biological performance measures. That notwithstanding, the overall goals are known for important indicator species such as Shortnose sturgeon, for which we do not want to cause drastic shifts in their distribution in the estuary. Based on previous field work and recent model predictions, the areal

extent of this habitat in the project area has been determined along with how much of that habitat may be affected by the various deepening alternatives. The adaptive management plan [Plan] provides for a year of pre-construction monitoring which would provide almost real-time data regarding this habitat, as well as a distribution study of Shortnose sturgeon within the entire study area. The Plan includes a ten-year post-construction monitoring component for these two study elements, as well as using the hydrodynamic and water quality models to evaluate project performance. Throughout and at the end of post-construction monitoring, resource agencies and the District will interpret all the collected data and reach conclusions regarding the project's overall impact on the estuary and any additional measures that may need to be taken to protect the health of a particular element therein.

637-BB-141-EV15

Comment: *It is not clear in the AMP how the draft Federal Expectation for Hydrodynamic and Water-Quality Model Calibration and Confirmation performance measures equates to ecological performance measures. The hydrodynamic and water-quality models currently do not meet these model calibration goals in many areas of the system (see Tetra Tech, 2006; Appendices B-K, P, and Q). If the current models do not meet the calibration performance goals, how will evaluating the model calibration performance for the post-project inform resource decision makers if the ecosystem is being protected by the mitigation features?*

Response: The natural resource agencies recognized that modeling could not replicate environmental conditions in the estuary with complete accuracy. Therefore, they established performance goals for the models which had to be generally met by their developers. Before the Corps used those tools to evaluate potential project impacts, the natural resource agencies agreed that the models acceptably met the performance criteria and were acceptable for impact evaluation purposes for this project. The Corps has scheduled three intense hydrodynamic data collection efforts if the project moves to implementation. Those efforts are designed to provide data that would allow the modelers to make the models more accurate, thereby reducing the uncertainties around the calculated values. The Corps expects that those opportunities for recalibration would result in the models exceeding the agencies' original performance expectations. The refined models would allow more accurate comparisons between the observed post-construction data and the values calculated for those conditions.

637-BB-141-EV16, 637-BB-141-EV17

Comment: *It is important to perform a post audit of the models to better assess their predictive capacity and uncertainties. Model calibration goals are not the same as ecological performance measures. By relying solely on the post audit of the models for the evaluation of the mitigation, an opportunity for utilizing the tremendous amount of data and analysis that were used to develop the DEIS is not being realized. The development of the DEIS involved tremendous amounts of data collection and analysis of various resources that needed protection. These data and analyses should be used in developing ecosystem performance measures. The ecosystem performance measure could be expressed as the magnitude, duration and frequency of the parameter of interest and appropriate thresholds for actions by resource agencies.*

Response: Concur. Field data collected in the estuary would be used to update/refine models to narrow the range between predicted and observed values.

As noted previously, the refinement of the models would not be the primary tool used to determine project impacts or the degree/kind of modifications which would be made to the mitigation plan. Instead, those refined models would allow more accurate comparisons between the observed post-construction data and the values calculated for those conditions. It is the comparison between observed post-construction field data and the values calculated for those conditions that would serve as the primary tool to determine project impacts and whether modifications to the mitigation plan are warranted. Further discussion regarding establishment of ranges of predicted values has been added to the monitoring and adaptive management plan [p. 16-17].

Page 4

637-BB-141-EV18

Comment: *There are references in the Plan of the using the monitoring data to show if "...impacts are occurring beyond the range of those expected" and the monitoring data "...will be useful in identifying whether any impacts are occurring beyond the range of those expected" (p. 27). The expected range of impacts was never defined in the AMP. At every sampling and gaging location for a resource of concern, an ecological performance measure should be developed to define the expected ecosystem response to the deepening mitigation.*

Response: Please see previous response on the establishment of performance measures. The range of values expected a given site would depend on the environmental conditions experienced at that time – river flow, temperature, tides, etc. Further discussion regarding establishment of ranges of predicted values has been added to the monitoring and adaptive management plan [p. 16-17].

637-BB-141-EV19

Comment: *Many of the funding figures appear to be inconsistent between sections of the AMP and between the AMP and the GRR. For example, chloride sampling is listed at $100,000 on page 18 and $80,000 on page 24, marsh data collection is listed at $18,000 on page 17 and $20,000 on page 24, and long-term monitoring is listed at $347,000 on page 37 and $428,400 in the GRR.*

Response: The chloride sampling costs [pages 18 and 24] differ from those for marsh collection data [pages 17 and 24] because they represent a different time frame, i.e., the expenditures on pages 17 and 18 are for monitoring during construction while the values on Page 24 are for post-project monitoring. The costs for long-term monitoring in the GRR have been corrected to reflect what is included in the Adaptive Management Plan. Although the commenter does not provide a specific references to costs in the GRR, it should be noted that final project costs listed in the GRR include a contingency percentage, which is added to the unit cost estimates upon completion and review of the total project cost estimate and cost-risk analysis by the Cost Engineer. As such, these costs may not correspond with the estimates presented in the EIS.

637-BB-141-EV20, 637-BB-141-EV21

Comment: *Procedures for disposing of sediments that contain cadmium concentrations exceeding 14 parts per million (ppm) are discussed in three parts of the DEIS: 1) Section 5.4.2.2; 2) Appendix D - Monitoring and Adaptive Management; and 3) Appendix M - Sediment Quality Evaluation. These discussions are unclear and inconsistent. In particular, we recommend clarifying the proposed cadmium monitoring program. The Department recommends a program of monitoring wildlife activity in disposal areas and cadmium levels in bird tissues that is independent of the Dredge Material Containment Area (DMCA) capping criteria. Wildlife monitoring should begin with sediment placement and continue as long as all other monitoring of the DMCA. Tissue monitoring should occur: 1) prior to sediment placement to collect baseline data; 2) during sediment placement; and 3) post placement until 3 consecutive years of samples contain cadmium concentrations that are less than the potential adverse effect level, which is to be determined. The Department supports the sampling protocol (species and timing) described in Appendix D, page 23; and requests that the Corps continue to coordinate with the FWS prior to completion of the final EIS to finalize plans for biological monitoring within DMCAs, including tissue sampling.*

Response: Through extensive coordination with the USFWS since release of the DEIS, the District has agreed to conduct bird blood/feather analyses as part of the monitoring efforts associated with the disposal of sediments having elevated cadmium levels. Independent of the concentrations of cadmium in cap/cover, the District will perform monthly biological monitoring of birds that use CDFs 14A/14B during and after sediment placement. Cadmium levels in blood will also be evaluated. Tissue analyses would be conducted if the blood analyses indicate a statistically significant difference in the baseline and project data. Section 5 of the EIS, Appendix D, and Appendix M have been revised to indicate this.

The District will coordinate any bird blood/feather and/or tissue sampling efforts with the FWS.

637-BB-141-EV22

Comment: *The Department accepts the Corps' use of 4 ppm cadmium concentration in capping material as a trigger for remedial action in DMCAs. The Department understands that the Corps will move a DMCA to higher priority in the rotation for Operations and Maintenance (O&M) sediment placement and vegetation monitoring if 25 cumulative acres are found to have a cadmium concentration greater than or equal to 4 ppm. Sampling and placement will continue until the DMCA has less than 25 cumulative acres with a cadmium concentration greater than or equal to 4 ppm.*

Response: Concur.

637-BB-141-EV23, 637-BB-141-EV24

Comment: *The Savannah estuary is a complex system and predicting how this system may respond to substantial physical alterations (channel deepening, flow diversions, etc.) is fraught with uncertainties, which are well acknowledged within the DEIS. However, based on an analysis prepared by Kinetic Analysis Corporation (KAC), the DEIS concludes that the hydrodynamic model probably over-predicts salinity and under-predicts dissolved oxygen; i.e., the model errs towards the side of simulating conditions worse than would actually occur. We believe this analysis may seriously misrepresent the risk associated with the water quality predictions. It is quite possible that the hydrodynamic model does not predict worst-case conditions. With the exception of the new channel depth, the KAC analysis relied upon the existing geometry of the Savannah River estuary. Several mitigation measures would significantly modify the system geometry, including significant flow diversion at McCoys Cut, closing Rifle Cut, filling the Back River sediment basin, and removing the tide gate. Flow routing and flow volume in the three main river channels would become significantly different from the current system. Therefore, we believe the degree of risk and uncertainty regarding expected water quality impacts, and in turn, wetland impacts, is considerably higher than the KAC analysis suggests. For this and other reasons, the Department recommends extending the proposed post-construction monitoring from 5 years to 10 years.*

Response: Please see previous response concerning extending the post-construction monitoring program from 5 to 10 years.

Namely, extending key components to ten years of post-monitoring data collection, including wetlands and water quality, will provide sufficient information for reasoned decision-making for resources of concern within the project area. Appendix D contains the details of the post-construction monitoring plan.

Page 5

637-BB-141-EC01

Comment: *The first paragraph of the Abstract discusses channel depths and then states that 70% of vessels do not call on Savannah at their maximum capacity or design draft, which implies that all light-loading is due to channel depth limitations. The Corps should include information on the percentage of vessels with loads constrained by channel depth and the percentage of light-loading due to other factors, such as prior calls at other ports. Additionally, the DEIS should include the predicted percentage of ships that will call on the port fully loaded or leave fully loaded if the channel is deepened.*

Response: The statement is not intended to imply that light loading of containerships is solely due to channel depth limitations. Rather the statement is intended to express in relative terms, to what extent container vessels calling Savannah incur some restrictions due to channel depth. The statement could also be worded as follows: "About 70% of the container ships that currently call at Savannah have design drafts greater than 38 feet, so they would need tidal assistance to safely traverse the channel when fully loaded." Those vessels either arrive and depart in light loaded conditions or have to make use of tides.

Containerships seldom sail at their design drafts. There are many reasons why vessels light load, among them are prior and post port limitations and the channel itself. In some instances a vessel "cubes" out before it "loads" out. To cube out means that a vessel has all of its spaces filled with either laden or empty containers, but the weight of the cargo and containers is such that it does not require the vessel's entire design draft. In other instances, vessels may not arrive or depart a particular port at its design draft because there is not enough cargo imported or exported on that particular leg of their trip. It is neither possible nor necessary to estimate the percentage of light loads due to various factors. Tables 108, 112, and 113 in the Economics Appendix show estimated sailing draft distributions of various classes of containerships, and the distributions of sailing drafts in the without project conditions and with each of the alternatives.

637-BB-141-EV25

Comment: *The first paragraph of this section states that the tentatively recommended plan is either the 47-foot alternative or the 48-foot alternative. The third paragraph describes the tentatively recommended plan as the 48-foot alternative. The Errata Sheet of December 17, 2010, states that various references to the 48-foot alternative throughout the GRR and DEIS "should not be interpreted as a recommendation or preference for that alternative over the tentatively selected -47 feet NED [plan]." On September 9, 2010, the FWS provided comments on preliminary drafts of the GRR and DEIS, identified -45 feet as its preferred alternative for deepening the harbor and stated it did not support the 48-foot alternative. The final EIS will necessarily need to revise this section to discuss the multi-agency rationale for what is ultimately determined as the final plan selection.*

Response: The Corps acknowledges theSDOI's preference for the 45-foot depth alternative. The FEIS contains the views expressed by the Cooperating Agencies, and the document will addresses all agency comments received during the DEIS process.

637-BB-141-EC02

Comment: *This section states that 70% of vessels do not call on Savannah at their maximum capacity or design draft, which implies that all light-loading is due to channel depth limitations. The Corps should include information on the percentage of vessels with loads constrained by channel depth and the percentage of light-loading due to other factors, such as prior calls at other ports. Additionally, the DEIS*

should include the predicted percentage of ships that will call on the port fully loaded or leave fully loaded if the channel is deepened.

Response: The statement is not intended to imply that light loading of containerships is solely due to channel depth limitations. Rather the statement is intended to express in relative terms, to what extent container vessels calling Savannah incur some restrictions due to channel depth. The statement could also be worded as follows: "About 70% of the container ships that currently call at Savannah have design drafts greater than 38 feet, so they would need tidal assistance to safely traverse the channel when fully loaded." Those vessels either arrive and depart in light loaded conditions or have to make use of tides.

Containerships seldom sail at their design drafts. There are many reasons why vessels light load, among them are prior and post port limitations and the channel itself. In some instances a vessel "cubes" out before it "loads" out. To cube out means that a vessel has all of its spaces filled with either laden or empty containers, but the weight of the cargo and containers is such that it does not require the vessel's entire design draft. In other instances, vessels may not arrive or depart a particular port at its design draft because there is not enough cargo imported or exported on that particular leg of their trip. It is neither possible nor necessary to estimate the percentage of light loads due to various factors. Tables 108, 112, and 113 in the Economics Appendix show estimated sailing draft distributions of various classes of containerships, and the distributions of sailing drafts in the without project conditions and with each of the alternatives.

637-BB-141-EV26

Comment: 4.01.2, Geology, page 4-7. *The amount of dredged material by station for both inner harbor and outer harbor do not match between Section 3 (Table 3-8, pg. 3-27; Table 3-9, pg. 3-28) and Section 4 (Table 4-4, pg. 4-7; Table 4-5, pg. 4-7). The Department recommends corrections for clarity.*

Response: Concur. The tables have been revised for consistency.

Page 6

637-BB-141-EV27

Comment: *The discussion on DO standards is confusing. The new DO standard established by the State of Georgia is not less than 5.0 mg/L throughout the year with an instantaneous minimum of 4.0 mg/L. A number of site-specific DO standards are listed. For clarity, this section should explain how the new standard of 5.0 mg/L compares to the measured monthly ranges of DO in the Savannah River at the currently authorized depth of 42 feet.*

Response: Concur. The DEIS has been revised to reflect the details of Georgia's water quality standards for Savannah Harbor. Additional information has been added to provide the reader with a better understanding of existing background dissolved oxygen levels.

637-BB-141-EV28

Comment: *This section states that optimum striped bass spawning success requires salinity less than 1.7 ppt. Studies on the Savannah River indicate that striped bass spawn almost exclusively in areas where maximum salinity near the surface is less than 1.0 ppt. The Department recommends revision to state salinity of less than 1.0 ppt is optimum.*

Response: The USFWS participated in the Fisheries Interagency Coordination Team which guided the Corps in its evaluations on Striped bass for this project. The Fisheries ICT was comprised of fishery experts from USFWS, NOAA Fisheries, EPA, GA DNR-WRD, and SC DNR. Representatives of those

organizations reviewed literature for Striped bass and, in particular, data from studies conducted in the Savannah River Basin. The criteria include the following: "Studies on the Savannah River indicate that striped bass almost exclusively spawn in areas where maximum salinity near the surface is less than one ppt (Van Den Avyle et al 1990, Reinert and Jennings 1998, Will et al 2000)." As a result, the interagency team recommended the Corps use a 90%-tile salinity value of <= 1 ppt to define acceptable Striped bass spawning habitat.

637-BB-141-EV29
Comment: *This section should discuss the common reed (Phragmites australis) as an invasive species. The document states elsewhere (page 4-55, section 4.07) that common reed will probably dominate the confined disposal facilities (CDFs). We believe that the common reed in the CDFs is the invasive strain. According to the U.S. Geological Survey (USGS), the invasive strain originated in Europe and was possibly spread via ships' ballast. Section 5 of the final EIS should evaluate the potential for the invasive strain to crowd out native species in marshes adjacent to the CDFs.*

Response: Concur. A discussion of the common reed (Phragmites australis) has been added to the Invasive Species section. Discussion has also been added to Section 5.0 regarding the potential for this invasive species to crowd out native species in marshes adjacent to the CDFs.

637-BB-141-EV30
Comment: *This section addresses only one pathway, ballast water, for introduction of aquatic invasive species. Introduction of invasive species in the Savannah Harbor, both aquatic and terrestrial, is not limited to ballast water. Insects in pallets, or plants and seeds in soil on containers, are two examples of other pathways. Invasive species can dramatically alter an ecosystem, which is a major concern for the Savannah NWR. This section should address other pathways and terrestrial systems as well as aquatic systems.*

Response: Concur. The discussion of introduction pathways of invasive species has been expanded

637-BB-141-EV31
Comment: *The Savannah NWR is 29,175 acres, not 25,600 acres.*

Response: Concur. The acreage for the SNWR on has been corrected.

637-BB-141-EV32
Comment: *This section refers to a 1992 Planning Aid Report, but the FWS report in question is dated September 16, 1982.*

Response: Concur. The date of the Planning Aid Report has been corrected.

637-BB-141-EV33
Comment: *The text states that the first two entries in Table 5-1 are Refuge lands, but the table labels the first three entries as Refuge lands. Figure 5-1 is illegible, but appears to depict the Kings Island Turning Basin along with another area for dredging. It is unclear where the third area of excavation is located (we believe 96+000 to 97+000). Figure 5-2 appears to depict the non-Refuge portion of excavation from 86+000 to 88+500, but it too is unclear. A proximity map would help locate these areas in relation to the Savannah NWR.*

Response: Concur. The text on Page 5-1 has been revised to indicate that the first three areas shown in Figure 5-1 are within Refuge lands. The graphics supporting this discussion have been improved to allow the reader to identify the locations/areal extent of project affected lands more easily.

637-BB-141-EV34

Comment: *The discussion in the opening paragraph references Figure 5-52 as CDF 1S; however, Figure 5-52 is a picture of Old Fort Jackson (on p. 5-134). We believe the correct reference is to Figure 5-4 on page 5-7.*

Response: Concur. The text has been revised.

Page 7

637-BB-141-EV35

Comment: *The Corps proposes to restore up to 45 acres at Area 1S on the Savannah NWR, using 14.5 acres as "advance mitigation" for direct impacts to salt marsh. These impacts include widening channel bends and turning basins both on and off the Savannah NWR. "Advance mitigation" is the functional equivalent of a mitigation bank. FWS Mitigation Policy (64 FR 49229-49234) does not allow the use of NWR lands for mitigation banks; therefore, the Department cannot support the 14.5 acres as "advance mitigation."*

Response: Restoration of 42 acres of marsh within Disposal Area 1-S exceeds the construction project's mitigation requirements (28.75 acres). Periodically, operation of the existing Federal Navigation Project adversely impacts small amounts of brackish and saltmarsh wetlands through activities conducted at the project's confined disposal facilities. When such instances are anticipated, the District develops mitigation to compensate for the impacts. Coordination with the USFWS and the Wetland Interagency Coordination Team have identified the potential for restoration of roughly 45 acres of brackish marsh at Disposal Area 1-S. Such restoration agrees with the goals of the USFWS and the Savannah National Wildlife Refuge to restore Refuge lands to more ecologically valuable conditions, when possible. Restoration of Disposal Area 1-S is the best potential brackish marsh mitigation activity in the estuary. In the future, the Corps would likely request approval from the Service to complete the remaining restoration of the site if it does not complete that work if/when harbor deepening occurs. Restoration of the entire site at one time would be better for the environment (and the Refuge) than would construction in that area on multiple occasions. The Corps proposes to restore the entire site at one time and consider the acreage that it restores beyond the project's initial mitigation requirement as advance mitigation. Performing mitigation in advance of an impact is generally preferred by natural resource agencies. The Corps is required to perform its mitigation prior to, or at the same time as the activity that causes the impact. Since the Corps would use the advance mitigation to compensate for impacts resulting from the same overall project – the Savannah Harbor Navigation Project – this would not be a mitigation bank. The advance mitigation acreage would not be available for use by others or for other projects. Instead, it would be reserved for Federal government use as wetland mitigation solely for the Savannah Harbor Navigation Project. Outside interests could not purchase the wetland credits. As a result, the restoration of the remaining roughly 11.5 acres at Disposal Area 1S should not be considered a mitigation bank.

637-BB-141-EV36

Comment: *The Corps proposes to restore up to 45 acres at Area 1S on the Savannah NWR, using 14.5 acres as "advance mitigation" for direct impacts to salt marsh. These impacts include widening channel bends and turning basins both on and off the Savannah NWR. "Advance mitigation" is the functional equivalent of a mitigation bank. FWS Mitigation Policy (64 FR 49229-49234) does not allow the use of NWR lands for mitigation banks; therefore, the Department cannot support the 14.5 acres as "advance mitigation.*

Response: See previous response. Mitigation for all the project's direct wetland impacts can be accomplished via restoring 28.8 acres on Disposal Area 1-S. An additional 11.5 contiguous acres would also be restored on Area 1-S which would be applied to other wetland mitigation needs for the Savannah Harbor Navigation Project. The additional credits from restoring the remainder of the site would only be used by the Federal government for Savannah Harbor activities. Hence, this would not constitute a wetland mitigation bank, since credits would not be sold to other entities.

637-BB-141-EV37

Comment: *This section references a USGS report, by the Cooperative Research Unit, titled "Simulation of Water Levels and Salinity in the Rivers and Tidal Marshes in the Vicinity of the Savannah National Wildlife Refuge, Coastal South Carolina and Georgia" but does not provide the reference. Suggest the Final EIS include the reference (Conrads et al, 2006) in the text and in the References section.*

Response: Concur. The subject reference has been added to both the text and the References section.

637-BB-141-EV38

Comment: *This section states "In March 2007, the Federal Cooperating Agencies discussed a USGS proposal to revise the linkage to increase its usefulness for evaluating potential mitigation measures." but the proposal was rejected. Suggest the Final EIS include a short explanation, and relevant information, on how this decision was reached.*

Response: Concur. The text has been revised to include details why the decision was made not to modify the model as suggested by the USGS.

637-BB-141-EV39

Comment: *This section states that the primary stress to tidal freshwater marsh is prolonged drought, which is not supported by evidence. In 1875, when the controlling depth of the navigation channel was 12-15 feet, the Savannah estuary supported an estimated 12,000 acres of tidal freshwater marsh. In 2005, when the controlling depth was 42 feet, the estuary supported only 3,269 or 4,072 acres (depending on study method used). This section should instead state that the inland intrusion of salt water resulting from channel deepening is a constant stress on tidal freshwater marsh, and that prolonged drought exacerbates this stress.*

Response: The EIS provides a detailed discussion regarding the relationship of previous harbor channel deepening and how these modifications fostered a progressive increase in upstream salinity levels. In turn, those increases lessened the extent of tidal freshwater marsh. The subject paragraph was intended to describe the baseline condition with respect to current stresses, e.g., prolonged drought and sea level rise, on the remaining tidal freshwater marsh.

637-BB-141-EV40

Comment: *This section states the Corps evaluated the effects of sea level rise on tidal freshwater marsh. The Department maintains that sea level rise would have a negligible impact on the Savannah NWR if not for the cumulative impact of previous harbor deepening.*

Response: This section of the document discusses the three actions that will most likely affect the remaining tidal freshwater marsh, viz., prolonged drought, sea level rise, and harbor deepening.

637-BB-141-EV41

Comment: *This section examines various alterations to rivers and creeks to reduce the impacts to tidal freshwater marsh. It states that the proposed mitigation for the 47-foot alternative is predicated on a "base year" (immediately following construction) impact of 223 acres instead of a project-life average annual impact consistent with Corps policy. The average annual impact is lower than 223 acres due to the effect of sea level rise during the next 50 years that would occur without the project. The Department maintains that sea level rise would have a negligible impact on the Savannah NWR if not for the cumulative impact of previous harbor deepening. Therefore, we support obtaining a waiver from the Corps' policy in this instance to instead implement the agency-coordinated level of mitigation.*

Response: See previous responses on this issue. The Assistant Secretary of the Army (Civil Works) has granted the District's request for a waiver from Section 5, paragraph E-36.c.(1) of ER 1105-2-100, i.e., removal of the requirement to use an average annual analysis of project impacts and mitigation requirements.

Page 8

637-BB-141-EV42

Comment: *This section should compare the modeled DO levels in the Savannah River under the LLP and NED depth plans with the State of Georgia's DO standard. The new Georgia DO standard is not less than 5.0 mg/L throughout the year, with an instantaneous minimum of 4.0 mg/L.*

Response: The discussion focuses on the impacts of the various harbor deepening alternatives and how each would affect the dissolved oxygen regime in Savannah Harbor. The proposed oxygen injection system is a mitigation measure which seeks to produce a "zero-sum" as regards dissolved oxygen and is not designed to bring the harbor into compliance with Georgia water quality standards.

637-BB-141-EV43

Comment: *The document states the "The Corps had an Independent Technical Review performed of the chloride model by a staff member of the USGS in Columbia, SC. The reviewer expressed about the ability of the model to make reliable predictions at the low chloride concentrations occurring at the City's intake." Suggest the Final EIS explain "what" the reviewer expressed and include documentation of the reviewer's expertise.*

Response: The Corps has supplemented the modeling efforts described in the DEIS to address concerns about detection of chloride ions [even at low levels] at the City of Savannah's water supply intake. Those revised analyses are included in the FEIS.

637-BB-141-EV44, 637-BB-141-EV45

Comment: *This section describes a secondary (supplemental) water supply intake line for the City of Savannah to be constructed if needed. Based on a preliminary review, the Department would prefer intake Site 1, because intake Site 2 is likely to adversely affect more wetland and wildlife habitat. The Department requests further coordination to evaluate impacts and make recommendations if the supplemental intake site is needed in the future.*

Response: The FEIS has been revised to include a raw water impoundment (as opposed to a supplemental intake) to mitigate for impacts to the City of Savannah's intake at Abercorn Creek. The District will coordinate the details of the design with the natural resource agencies to confirm that it minimizes environmental impacts. If wetland mitigation is needed, the Corps would follow the Savannah District Regulatory SOP to determine the mitigation that is required.

637-BB-141-EV46

Comment: *The Corps proposes to fund a stocking program for striped bass based on the amount of spawning and early life stage habitat lost due to water quality changes resulting from harbor deepening: "the extent of the stocking needed could be reduced to the amount of habitat predicted to be impacted by the project. Thus, the percentage of habitat loss could be multiplied by the cost for a full-scale stocking program to determine the amount that would be sufficient to compensate for the habitat loss that is expected." The expected loss of habitat is 2.9% for the 45-foot alternative and 26.9% for the 47-foot alternative. The final EIS should include a proposal to monitor/measure post-construction loss of striped bass habitat. The final adaptive management plan should address striped bass, and if habitat loss exceeds the amount predicted, include provisions and assurances to increase stocking funds accordingly.*

Response: Concur. The Monitoring and Adaptive Management Plan has been revised to include annual Impact Assessments, which include verification of model predictions regarding impacts to Striped bass habitat. Monitoring studies would be conducted during the second, fourth, and ninth years of the Post-Construction Monitoring.

637-BB-141-EV47

Comment: *This section should clarify whether the Corps intends to collect 30 or 86 sediment samples per DMCA. The Department has previously stated a concern that 30 samples are not enough. The Corps proposes taking samples 15 cm deep: the Department recommends 86 samples of the cap material per DMCA taken 30 cm deep. The DEIS sometimes refers to 7 ppm of cadmium in the capping material to trigger remedial action. The Department recommends substituting a threshold of 4 ppm throughout the DEIS for clarity. This section should fully summarize bird tissue monitoring, which is partially summarized in Appendix D, page 23, and Appendix M, page 84. The Department understood that the Corps had agreed to bird tissue monitoring independent of monitoring cadmium soil concentration levels. Tissue monitoring should occur: 1) prior to sediment placement to collect baseline data; 2) during sediment placement; and 3) post placement until 3 consecutive years of samples contain cadmium concentrations that are less than the potential adverse effect level, which is to be determined. The Department requests that the Corps continue to coordinate with the FWS prior to completion of the final EIS to finalize plans for biological monitoring within DMCAs, including tissue sampling.*

Response: Appendix D and Appendix M have been updated to reflect the extensive coordination between USFWS and the District since release of the DEIS. Specifically, the District will conduct sediment analyses and avian monitoring and blood/feather sampling independent the sediment cadmium concentrations. Vegetation tissue and liver tissue sampling would only be conducted after

certain thresholds are met as outlined in Section 8 of Appendix D. Sediment sampling would be conducted to a depth of 15cm before the cap/cover is placed and to a depth of 30cm after placement of new work cap/cover sediments or O&M sediments. The District intends to collect 86 sediment samples in each CDF where the cadmium-laden materials are placed. Each successive event would be collected in the same manner. . We will clarify this position throughout the EIS, as well as the Corps' intent to take 86 sediment samples in each DMCA where cadmium-laden sediments would be deposited. After receiving the DOI comments, the District examined the depth of plant roots in the CDFs. In general, we found that the majority of the roots of plants found in the CDFs that serve as food for invertebrates average 7.5 inches and extend to 9.2 inches below the surface. Some species with tap roots extend further, but those species are not commonly used for forage by insects, birds, or animals. Based on this inspection, we concur that sampling dry and moist sediments to a depth of 30 cm (12 inches) would be sufficient to characterize the sediment cadmium concentrations that would be available for uptake into biotic systems. In locations with standing water, cadmium would be essentially insoluble and the potential path for uptake would be through invertebrates residing in the upper layers of the sediment. Anoxic conditions would occur a few inches below the sediment surface, so we believe that sampling to a depth of 15 cm (6 inches) is sufficient to characterize the sediment cadmium concentrations in areas with standing water. However, at the request of DOI and USFWS, sediment samples collected after placement of the cap/cover will be collected to a depth of 30cm. Once tissue sampling is initiated, it would be conducted for a period of five years unless tissue levels do not exceed potential adverse levels for three consecutive years. Then no further monitoring would be deemed necessary.

Page 9

637-88-141-EV48

Comment: *Groundwater conditions were simulated with a constant pumping rate 200 years into the future to estimate the timing of sea water intrusion into the Upper Floridan Aquifer. The DEIS states elsewhere that Chatham and Effingham counties are experiencing population growth, and it is reasonable to assume that industrial water use may also increase with the potential harbor expansion. For the final EIS, the Department recommends revisiting the groundwater simulations with consideration of likely increases in pumping rates.*

Response: The groundwater pumping rates were simulated using a constant rate for 200 years. The State of Georgia required this approach, which is a conservative one in light of EPD's recent actions to reduce groundwater removal from the Upper Floridan aquifer. GA DNR-EPD has placed a restriction on any new permits for groundwater withdrawal and they are mandating reductions in groundwater withdrawal for existing permitees. Based on these EPD initiatives, the analysis in the EIS of project impacts is considered conservative. The District agrees that increased demand for water in Chatham and Effingham counties is likely; however, unless the above mandates are rescinded, this demand will not be met with increased withdrawals from the aquifer.

637-88-141-EV49

Comment: *This section discusses direct dredging impacts and generally concludes that expected impacts are minor. However, the text does not describe the long-standing striped bass spawning season window that restricts dredging and is likely largely responsible for the minor impacts conclusion. On Page 14 of Appendix H is a statement that hydraulic dredging is not conducted in Savannah Harbor during the striped bass spawning season. The Corps should revise Section 5.7 and other relevant sections to discuss the striped bass spawning window, and describe where and when hydraulic harbor deepening dredging is restricted.*

Response: Concur. Section 5.7 and Appendix H have been revised to include a discussion of dredging restrictions during the Striped bass spawning season.

637-BB-141-EV50

Comment: *The flow of the Savannah River is highly variable within and between years; therefore the Corps should specify the period of record used for the following calculation: "the average daily freshwater flow in the Savannah River at Clyo is about 11,290 cfs." The analysis presented in this paragraph should use data that represents the seasonal timing and flow conditions typical during channel maintenance operations, and if necessary, revise the conclusions based on this analysis.*

Response: The EIS is revised to clarify the period of record used in the calculation of average daily freshwater river flow. Some portion of the navigation channel is being maintained every month of the year. The main point of that paragraph was the comparison between the volume flowing through a cutterhead dredge (70 cfs) and that in the entire river (average of 11,290 cfs). A large dredge captures a very small proportion of the volume of water in the Savannah River at any given time. Therefore, entrainment concerns associated with the operation of a hydraulic pipeline dredge are minimal. Even if drought flows of 4,000 cfs occur in the Savannah River estuary when dredging occurs, the same relationship exists and the same conclusion can be made.

637-BB-141-EV51

Comment: *This section covers the introduction of invasive species through ballast water, but should also address other pathways through ports, such as insect larva in pallets (e.g., red bay ambrosia beetle), or seeds and plants 'hitchhiking' in soil on containers.*

Response: Concur. This section has been revised to include this discussion.

637-BB-141-EV52

Comment: *The Department disagrees with this statement: "The Corps believes that with implementation of the Mitigation Plan and Monitoring and Adaptive Management Plan, the proposed action would not have significant adverse impacts on the environment." Under the 47- and 48-foot alternatives, which the Corps identifies as the tentatively recommended plans, the Savannah estuary would lose an estimated 223 and 337 acres of tidal freshwater marsh, respectively. We have identified loss of tidal freshwater marsh as the "most important impact criterion in the Savannah Estuary" (page 5-10). In-kind mitigation for this loss is not possible; therefore, significant adverse impacts remain even with implementation of the mitigation plan for the 47- and 48-foot alternatives. This is why the Department prefers the 45-foot alternative among the action alternatives, because it minimizes the loss of freshwater tidal wetlands, impacts to Savannah National Wildlife Refuge (NWR), and risk and uncertainty of impacts to trust fish and wildlife resources.*

Response: That statement has been removed from the EIS. It has been replaced with statements that indicate that the Mitigation and Monitoring and Adaptive Management Plan would provide adequate mitigation for all alternative depths considered.

637-BB-141-EV53

Comment: *Manatees have been observed on the Savannah NWR since 1987. Six manatees were observed on the Savannah NWR on August 26, 2010, at a rice trunk on the Wildlife Drive. This area is directly across from Port Wentworth on the Back River. In September of 2008, four manatees were found*

in the Savannah River (Front River) downstream of the Georgia Ports Authority Ocean Terminal that had been killed in a ship-related incident. This section states that manatee occurrence in the area is rare. Manatees have site fidelity to summer habitat sites, therefore, the FWS would expect the six observed on the Savannah NWR to return. The Georgia Department of Natural Resources (GADNR) has data on manatee mortality and public sightings in the Savannah River. From FWS personnel's observations and discussions with the GADNR, the FWS would not characterize manatee occurrence as rare. Usage is regular enough to characterize manatee occurrence in the Savannah River estuary as a small summer resident population.

Response: The phrase "their occurrence is rare" has been removed from the document.

Page 10

637-BB-141-EV54

Comment: *This section states that the proposed mitigation for the 47-foot alternative is predicated on a "base year" (immediately following construction) impact of 223 acres instead of a project-life average annual impact consistent with Corps policy. The average annual impact is lower than 223 acres due to the effect of sea level rise during the next 50 years that would occur without the project. The Department maintains that sea level rise would have a negligible impact on the Savannah NWR if not for the cumulative impact of previous harbor deepening. Therefore, we support obtaining a waiver from the Corps' policy in this instance to instead implement the agency-coordinated level of mitigation.*

Response: See previous response to this issue. The waiver has been approved.

637-BB-141-EV55

Comment: *The MACTEC engineering firm's report on the test of a DO injection system concluded that the system could improve a DO deficit by 0.6-0.7 mg/l. An independent peer review by USGS found that this conclusion was not supported by the data. The USGS review found instead that the natural tidal cycle accounted for most of the variation in DO levels during the demonstration. This section of the final EIS should address the USGS report. The uncertainty regarding the results of the efforts to improve DO deficiencies is additional justification for expanding the water quality monitoring efforts from 5 to 10 years.*

Response: As proposed, the project includes ten years of water quality monitoring. The project would install and operate five new continuous water quality monitors and use data from three other monitors that already collect data in the harbor. The monitoring also includes a Transfer Efficiency Study of the oxygen injection system after installation. The District believes that water quality conditions in Savannah Harbor will have reached equilibrium well before the end of the ten-year monitoring plan. Hence, sufficient data will have been collected to ascertain project impacts on the water quality regime.

637-BB-141-EV56

Comment: *The acreages mentioned on these pages do not correspond with those found in other places in the DEIS. Pages 48 and 50 mention 15.68 acres of brackish marsh lost, while DEIS sections 5.1.1.1 and 5.1.1.2 mention 14.08 acres. Appendix C, pages 49 and 50 state the restoration area is 45 acres, while page 49 states the restoration area is 42 acres. Figure 19 on page 49 depicts two restoration areas of 34 and 8 acres for a total of 42 acres. Section 5.1.1.2 page 5-6 states the restoration area is 42 acres. The Department recommends correcting any mistakes in these sections or explaining the apparent inconsistencies.*

Response: Concur. The Corps has revised the EIS to clarify these numbers.

637-BB-141-EV57

Comment: *This section discusses wetland restoration on site 1S for direct impacts to brackish marsh. The desired vegetation outcome is to establish a mixed brackish marsh, similar to adjacent marsh, on the site. Chinese tallow tree and common reed, both highly invasive exotic species, have been identified in the marshes near the restoration site. Monitoring the success of the re-vegetation for 5 years should include control measures for exotic and invasive species, if detected.*

Response: Concur. The monitoring plan for the restored wetland area has been revised to include monitoring for invasive species and implementation of control measures, if required.

637-BB-141-EV58

Comment: *On page 49, it is not clear what is meant by "The Corps would expand our restoration acreage to include their acreage (1.7 acres)." Please clarify.*

Response: The District has revised this section as follows: "The Georgia Ports Authority graded down a 1.7 acre area on Disposal Area 1-S several years ago as mitigation for habitat and functional wetland losses attendant to previous facility upgrade. This area is within the restoration site which will be used as mitigation for the SHEP. Together they will provide a continuous 42.0 acre restored wetland site.

Page 11

637-BB-141-EV59

Comment: *On page 50, the Corps states it intends to restore all of Area 1S, using a portion for "advance mitigation." The Department regards "advance mitigation" in this context as the functional equivalent of a mitigation bank, and FWS Mitigation Policy (64 FR 49229-49234) does not allow the use of NWR lands for mitigation banks.*

Response: See previous response. Mitigation for all the project's direct wetland impacts can be accomplished via restoring 28.8 acres on Disposal Area 1-S. An additional 11.5 contiguous acres would also be restored on Area 1-S which would be applied to future wetland mitigation needs for future Savannah Harbor upgrades. The additional credits from restoring the remainder of the site would only be used by the Federal government for Savannah Harbor activities. Hence, this would not constitute a wetland mitigation bank, since credits would not be sold to other entities.

637-BB-141-EV60

Comment: *This section states that the proposed mitigation for the 47-foot alternative is predicated on a "base year" (immediately following construction) impact of 223 acres instead of a project-life average annual impact consistent with Corps policy. The average annual impact is lower than 223 acres due to the effect of sea level rise during the next 50 years that would occur without the project. The Department maintains that sea level rise would have a negligible impact on the Savannah NWR if not for the cumulative impact of previous harbor deepening. Therefore, we support obtaining a waiver from the Corps' policy in this instance to instead implement the agency-coordinated level of mitigation.*

Response: See previous response. Savannah District has requested and received a waiver to deviate from the requirements of ER 1105-2-100.

637-BB-141-EV61

Comment: *The following statement is misleading: "If a higher rate of sea level rise actually occurs, some of the freshwater marshes would convert to more saline species, so they would not be available for impact by harbor deepening." These marshes are at risk to sea level rise only because of the cumulative effect of previous harbor deepening. Tidal freshwater marshes would not be at risk due to sea level rise at the harbor's original depth. Additionally, the impacts to freshwater marsh from harbor deepening will occur quickly compared to the timeframe for sea level rise.*

Response: See previous response. The Savannah District has requested and received a waiver to deviate from the requirements of ER 1105-2-100 based on the fact that project impacts to tidal freshwater marshes would occur soon after the harbor is deepened.

637-BB-141-EV62

Comment: *These pages discuss sea level rise and the possibility of over-mitigating if sea level rises faster than projected. The Corps proposes to reassess sea level rise at the end of the project's life in 50 years and assign wetlands mitigation credits to the project in an amount equivalent to the over-mitigation. The Department regards "advance mitigation" in this context as the functional equivalent of a mitigation bank, and FWS Mitigation Policy (64 FR 49229-49234) does not allow the use of NWR lands for mitigation banks. This section, among others in the DEIS, also states that the proposed mitigation for the 47-foot alternative is predicated on a "base year" (immediately following construction) impact of 223 acres instead of a project-life average annual impact consistent with Corps policy. The average annual impact is lower than 223 acres due to the effect of sea level rise during the next 50 years that would occur without the project. The Department maintains that sea level rise would have a negligible impact on the Savannah NWR if not for the cumulative impact of previous harbor deepening. Therefore, we support obtaining a waiver from the Corps' policy in this instance to instead implement the agency-coordinated level of mitigation.*

Response: See previous responses. The waiver has been approved..

637-BB-141-EV63, 637-BB-141-EV64

Comment: *This section discusses a fishway at New Savannah Bluff Lock and Dam as the primary mitigation feature for the project's impacts to shortnose sturgeon. Fishway effectiveness varies considerably and is difficult to predict. If effective, this measure would provide shortnose sturgeon upstream passage to the Augusta shoals and other riverine spawning areas. Dam removal would represent a more certain means to provide both upstream and downstream passage for shortnose sturgeon and other species, and would also restore riverine characteristics to this portion of the basin; therefore, the Department would prefer dam removal in lieu of a fishway. The Department requests that the Corps continue to coordinate with the FWS to finalize plans for either fishway design and construction or dam removal.*

Response: Removal of the New Savannah Bluff Lock and Dam cannot be recommended at this time. Although the structure is no longer used to support navigation on the Savannah River, most recent direction from Congress was for the Corps to rehabilitate the structure and convey it to local interests.

The design for the fish passage structure at New Savannah Bluff Lock and Dam has been revised since coordination of the DEIS to provide for an-off channel rock ramp design. The District will continue to coordinate with the USFWS and the other Cooperating Agencies about the design of the fishway at New Savannah Bluff Lock and Dam.

637-BB-141-EV65

Comment: *This section describes a secondary (supplemental) water supply intake line for the City of Savannah to be constructed if needed. Based on a preliminary review, the Department would prefer intake Site 1, because intake Site 2 is likely to adversely affect more wetland and wildlife habitat. The Department requests further coordination to evaluate impacts and make recommendations if the supplemental intake site is needed in the future.*

Response: See previous response on this issue. Construction of a raw water storage impoundment is proposed as mitigation for the increased chloride levels that would occur at the City of Savannah's intake on Abercorn Creek during high tides and low flows. The Corps will coordinate construction plans for this storage impoundment with the resource agencies.

Page 12

7-BB-141-EV66

Comment: *We believe the statement: "The plug would be constructed of fill and rock and would extend to EL 10 (above the Mean High Water line)" is incorrect. It is our understanding that the plug in Rifle Cut will extend to EL 10 above mean low water, which is 2 feet above mean high water -- not 10 feet, as indicated.*

Response: Concur. The text has been revised to indicate that the top of the plug in Rifle Cut would be at elevation 10 which is two feet above MHW.

637-BB-141-EV67

Comment: *This section should discuss the timing of acquiring the mitigation lands. The Department recommends beginning no later than the start of construction and completing the acquisitions within 2 years.*

Response: Concur. The project would begin acquiring the preservation lands the first year that Congress provides construction funds. It is the Corps' and GPA's intent to complete the acquisition within the first two years, but that may not be possible because of the number of actions that would need to be completed. The acquisition requirements include completing various real estate actions such as appraisals, Environmental Baseline Surveys, etc. Discussion to this effect has been added to the Mitigation Plan [Appendix C] and Section VIII.

637-BB-141-EV68

Comment: *The Corps proposes to restore the entire site at CDF 1S, using a portion as "advance mitigation" for direct impacts to salt marsh. Claiming credit for restoration to offset as-of-yet unidentified impacts elsewhere in the future is the functional equivalent of a mitigation bank. FWS Mitigation Policy (64 FR 49229-49234) does not allow the use of NWR lands for mitigation banks; therefore, the Department cannot support restoration at this site as advance mitigation.*

Response: See previous responses concerning restoration of Disposal Area 1S and advance wetland mitigation credits.

637-BB-141-EV69

Comment: *Successful wetland restoration is dependent on three primary factors: soil, hydrology and vegetation. The proposed dredged material removal should expose the original wetland soil and restore the site to the elevation of adjacent marshes. Construction of a "feeder" creek system toward the interior of the restoration site from Middle River will facilitate tidal exchange; however, if restored elevations do not properly restore tidal flow, invasive vegetation with almost no wildlife value may occupy the site. The desired vegetation outcome is to establish a mixed brackish marsh, similar to adjacent marsh, on the site. Chinese tallow tree and common reed, both highly invasive exotic species, have been identified in the marshes near the restoration site. Monitoring the success of the re-vegetation for 5 years should include control measures for exotic and invasive species, if detected.*

Response: Concur. See previous responses on this issue.

637-BB-141-EV70

Comment: *The following statement, from page 92, is inconsistent with the text of DEIS Section 5.1.1.2: "Calculations derived from the SOP indicate that approximately 25.8 acres of restored saltmarsh would be required to mitigate for the 14.08 acres of impact. When combined with the 1.7 acres of previous mitigation, the resulting acreage of the mitigation site would be 25.8 acres." Adding 1.7 acres of mitigation to 25.8 acres equals 27.5 acres.*

Response: Page 92 has been revised. The Corps intends to restore about 40.3 acres of wetlands on Disposal Area 1S, in addition to the 1.7 acres previously graded down by the Georgia Ports Authority.

637-BB-141-EV71

Comment: *Was the Draft Savannah Harbor TMDL for Dissolved Oxygen released by the U.S. Environmental Protection Agency in April 2010 evaluated for effects of the mitigation plan? With the changes in the flow dynamics, the Front River will have less flow and the residence times in the Harbor will increase. These changes could have a substantial impact on the waste load allocation. The effects on the allowable waste load to the system by the Project are not only caused by the deepening of the navigation channel but also the mitigation features affecting the flow dynamics of the estuary.*

Response: The project includes oxygen injection to offset [mitigate] adverse impacts resulting from all of the deepening alternatives. The District understands that potential impacts to dissolved oxygen are the primary concern in regards to the Savannah Harbor Draft TMDL. The modeling that the Corps performed ensures that the proposed mitigation would remove the adverse effects of harbor deepening on dissolved oxygen levels in the harbor. Water quality experts in EPA or GA DNR have not expressed any concern regarding changes in flow and any potential subsequent impacts to the TMDL from implementation of the harbor deepening or its mitigation.

637-BB-141-EV72

Comment: *More than two years (2009 and 2010) of flow data have been collected on the Front, Middle, and Little Back Rivers. Six of the seven mitigation features involve alterations to flow paths in the system. Has the two years of measured flow been thoroughly compared with the flow predictions of the model? The Draft Savannah Harbor TMDL showed a frequency distribution for the Little Back River. The model comparisons should include daily tidally filtered flows, flow volumes over specified periods, and flow partitioning between the three rivers under various flow regimes.*

Response: This specific analysis has not been conducted. The District performed all model analyses requested by the Water Quality Interagency Coordination Team.

Page 13

637-BB-141-EV73

Comment: *This section describes a secondary (supplemental) water supply intake line for the City of Savannah to be constructed if needed. Based on a preliminary review, the Department would prefer intake Site 1, because intake Site 2 is likely to adversely affect more wetland and wildlife habitat. The Department requests further coordination to evaluate impacts and make recommendations if the supplemental intake site is needed in the future.*

Response: See previous responses on this issue.

637-BB-141-EV74

Comment: *The DEIS uses county population projection data to estimate the percent increase in impervious surfaces, but should probably also consider industrial development adjacent to the Savannah River, in part due to harbor expansion. For example, a large industrial warehousing complex is proposed adjacent to the Refuge that would involve paving several thousand acres of forest land. The storm water runoff associated with these surfaces is a key threat to the sustainability of adjacent wetlands, which this section should address in the final EIS.*

Response: Similar to the projected cargo volume expected to pass through Garden City Terminal with or without the project, the Corps does not expect deepening the harbor to affect the rate at which the Savannah Harbor, and any associated industrial development, occurs. As such, any future development is considered part of the future without project condition, and its impacts would not be attributable specifically to the construction of the SHEP. The Corps did consider industrial development in the Savannah area as part of its assessment of how the wetland mitigation plan complies with the 2008 USEPA/USACE Mitigation Rule.

637-BB-141-EV75

Comment: *The table indicates that the Corps will provide funding to GADNR for the striped bass stocking program in late 2015 or early 2016. To offset project impacts that begin when construction is complete, GADNR must have stocking capacity in place in the first spawning season following construction. The Department recommends that the Corps transfer funding for the striped bass stocking program when dredging is initiated, which should provide enough lead time to develop stocking capacity.*

Response: The schedule has been revised to reflect that funding for Striped bass stocking would be made available to the Georgia DNR before dredging occurs in the inner harbor.

637-BB-141-EV76

Comment: *There are inconsistencies of scope of work, roles, and required funding throughout. Strongly suggest a thorough update of Appendix D to bring this to current status and necessary funding. The GaWSC is ready to assist with this.*

Response: Appendix D has been revised to correct inconsistencies of scope of work, roles and required funding.

637-BB-141-EV77

Comment: *The USGS Georgia Water Science Center (GaWSC) led the effort in 2006 to develop the Monitoring Plan for the proposed SHEP. This was created from feedback from a multi-agency team with a broad-based variety of expertise that has been involved with the SHEP planning over the years. Much has changed with the SHEP since this plan was first developed five years ago, and subsequently the monitoring plan needs updating. The GaWSC has installed a considerable amount of additional monitoring locations that were originally outlined in the 2006 monitoring plan since its release, and this needs to be properly documented. Additionally, the GaWSC, in collaboration with the multi-agency team, has over the last two years performed the installation and operation of a chloride monitoring network for the City of Savannah water intakes on Abercorn Creek, and more detail regarding the initial results of this work should also be factored into Appendix D. The GaWSC is ready to assist in updating the monitoring plan to reflect the latest scope, roles, and budgetary needs.*

Response: The Corps used the Hydrologic Monitoring Plan that the GaWSC developed with the other resource agencies for the Savannah estuary as the foundation for the hydrodynamic and WQ monitoring efforts. The Corps then modified that plan as needed to address issues specific to the harbor deepening project.

637-BB-141-EV78

Comment: *Several new monitoring technologies have become available since the original plan was written in 2006. Real-time groundwater chloride monitoring should be considered as an early-warning system for the aquifers in case of damage to the confining layer. The GaWSC currently is performing similar monitoring in the Brunswick, Georgia area. Several existing USGS groundwater monitoring sites along the Savannah River channel could be upgraded to enable real time monitoring of chloride concentrations. With the deployment of index-velocity stream gages currently in place, there are also techniques now available to estimate the sediment load flux within the Savannah Harbor and surrounding estuary using a sediment surrogate approach. These techniques were developed by the GaWSC and can be beneficial in providing insight into the environmental impacts caused by transported sediments as well as provide operational benefits to the management of the channel and port. It is anticipated that because a considerable amount of the proposed monitoring is already in place, a significant cost savings could be found to help offset the implementation of these new monitoring technologies to make a more robust monitoring effort for the SHEP.*

Response: Based on studies conducted during SHEP together with previous monitoring of groundwater wells, real-time groundwater monitoring is not warranted. The proposed monitoring program includes four groundwater monitoring well pairs to establish a before-project baseline and monitor post-project chloride levels in the Upper Floridan aquifer. These wells would be monitored annually. Because of the slow rate of movement of water through the confining layer, that program would provide a sufficient

warning system for potential unexpected impacts. Further, the District does not believe that use of new technology to monitor sediment load fluxes is warranted to address potential impacts from this project.

Page 14

637-BB-141-EV79

Comment: *Finally, with a large share of the monitoring data now being available in real-time, the ability to visualize and alert water resource managers and stakeholders of the real-time conditions in the Savannah River Estuary are presently available. The USGS real-time webpage, NWISWeb, currently displays all data being collected in the SHEP at http://waterdata.usgs.gov/ga/nwis/current/?type=flow&group_key=basin_cd. The USGS has developed a real-time alerting system can be activated to electronically notify individuals when parameter(s) have exceeded a pre-defined threshold (for example, see http://water.usgs.gov/wateralert/). A crucial part of any monitoring plan should now include the ability to disseminate the information using visualization and information delivery tools in order to keep stakeholders informed and allow water managers to make informed decisions in a real-time manner.*

Response: The Monitoring and Adaptive Management Plan identifies the USGS as a likely organization to conduct the continuous water quality monitoring. Five new continuous recording water quality stations will be installed by this project. The USGS collects this data at 15-minute interval and can make the continuous real-time data available to resource managers and the general public through the USGS National Water Information System Web (NWIS Web). A program similar to that would provide sufficient real-time water quality monitoring data for the Savannah Harbor estuary.

637-BB-141-EV80

Comment: *It is stated that if a mitigation feature is changed, monitoring will continue for an additional year. This period may be too short depending on the feature that was changed, when the change was made, and the hydrologic condition for the additional year. The ecosystem has a much different response during wet and dry years.*

Response: The text has been revised to indicate that monitoring of an adaptive management measure would be conducted for two years and for a third year or longer if the Federal resource agencies agree that it would be prudent.

637-BB-141-EV81

Comment: *The length of the sampling period of "one lunar cycle" is not clear. Is it a 25-hour period, 14-, or 28-day cycle? With what has been learned about the dynamics of the system and data collection, is this the most cost-effective period to collect data for evaluating the ecosystem and the performance of the models?*

Response: The Hydrologic Monitoring portion of the Monitoring and Adaptive Management Plan has been updated to clarify that this intense monitoring would be performed over a 28-day period.

637-BB-141-EV82

Comment: *The section on physical monitoring indicates that the project would fund USGS to collect pre-construction hydrologic data for "up to one year," but all references to pre-construction monitoring on page 8 are to "one year." The Department recommends 1 year of pre-construction monitoring.*

Response: Concur. Pre-construction monitoring to establish a baseline will have a one year duration.

637-BB-141-EV83
Comment: *There are two existing water quality stations on Back River (021989784 and 021989791), and one on Front River (02198920), that have long-term salinity data. The Department recommends using this long-term salinity data set, from the end of the last harbor deepening construction to the start of any new deepening construction, as baseline salinity conditions for these sites and to supplement the 1 year of pre-construction water quality monitoring.*

Response: Concur. The District will consider all existing data when it compiles the pre-construction monitoring information.

Page 15

637-BB-141-EV84, 637-BB-141-EV85, 637-BB-141-EV86
Comment: *Pre-construction monitoring for 1 year is intended to create or supplement a pre-project baseline. However, information based on only 1 year of data may not provide an adequate baseline. Using existing longer-term data from water quality stations on Back River and Front River should help address this problem (see previous comment on Appendix D, section 5.C, page 8 and Figure 3). Similarly, wetland and fishery studies performed during project planning represent useful baseline information. This section and others in the final EIS should describe in greater detail developing baseline conditions for the various monitoring parameters. In addition, this section states: "Monitoring would be conducted between the time a decision is made on implementing a harbor expansion and the time the construction begins which would affect aquatic resources in the inner harbor." If construction is delayed for more than 1 year after a decision for harbor expansion, the Department recommends continuing pre-construction monitoring until construction begins.*

Response: Concur. See previous response.

As previously stated, the District will use all available data in determining the pre-construction baseline.

One year of monitoring would be performed before dredging starts in the inner harbor (pre-construction monitoring).

637-BB-141-EV87
Comment: *The proposed water-quality parameters are not described. To be more complete, the full contingent of parameters available for continuous monitoring should be listing, which are: water temperature, specific conductance, pH, dissolved oxygen, and turbidity. Each parameter brings a specific scientific benefit to the monitoring plan, as well as complements each other with diagnostic troubleshooting of equipment failure.*

Response: Concur. The list of water quality parameters which will be monitored has been added to the Monitoring and Adaptive Management Plan.

637-BB-141-EV88
Comment: *This figure needs to be updated to reflect current (2011) real-time network.*

Response: Figure 3 of the Monitoring and Adaptive Management Plan has been updated.

637-BB-141-EV89, 637-BB-141-EV90

Comment: *The USGS Georgia Water Science Center currently performs all of the monitoring in the SHEP The funding figures are 5-years old and need to be revisited.*

Response: Savannah District will be responsible for performing all monitoring for the proposed harbor deepening project. The Corps plans to use multiple organizations to perform the various types of monitoring that would be conducted. It expects to seek assistance of the GaWSC for some aspects of the work – the continuous water quality monitors.

The cost figures for the continuous water quality monitoring were reviewed and revised as appropriate.

637-BB-141-EV91

Comment: *The goals of the Intense Monitoring are not clear. "This sampling would address those constituents that...cannot be monitored by continuous recorders." The parameters and constituents listed; river discharge, flow volumes, flow velocity, flow direction, water surface elevation, depth, salinity, dissolved oxygen, water temperature, turbidity, pH, and specific conductance, can be monitored continuously. The remaining constituents are a short list: suspended solids, 5-day biochemical oxygen demand (BOD), and chlorides. Other parameters, constituents, and rates to consider are nutrients, long-term BOD, nitrification rates, sediment oxygen demand rate, re-aeration rates and tidal marsh dissolved-oxygen production/depletion rates.*

Response: The District has revised the EIS to clarify the goals of the intense water quality monitoring program.

637-BB-141-EV92

Comment: *Based upon the results of the initial chloride monitoring performed by the GaWSC, the Department recommends that SHEP chloride monitoring include a real-time index velocity streamgage at Bear Creek, and full chloride monitoring stations at Abercorn Creek (near the intakes) and on the Savannah River at I-95. Much of the monitoring infrastructure is already in place at the last two stations. The Bear Creek streamgage and some of the water-quality instrumentation would need to be reinstalled.*

Response: After completing the revised chloride analysis and development of the raw water impoundment, the District has determined that a real-time index velocity stream gage at Bear Creek is not warranted. The District will consider chloride monitoring stations at Abercorn Creek and on the Savannah River at I-95.

637-BB-141-EV93

Comment: *The Georgia Fish and Wildlife Cooperative Research Unit, not the South Carolina Fish and Wildlife Cooperative Research Unit, have the fisheries personnel available to monitor the movement of fish.*

Response: The District would decide which organization would conduct the Shortnose sturgeon distribution studies during development of the SOW for that effort. The work would only be performed by a qualified agency or contractor.

Page 16

637-BB-141-EV94
Comment: *In the Cost Summary, Oversight and Contracting are listed under "Biological" but not under "Geomorphic." Should the there be a similar item under "Geomorphic"?*

Response: The District reviewed its cost estimates and revised estimates where appropriate.

637-BB-141-EV95, 637-BB-141-EV96
Comment: *"On a regular basis, the Corps would assess how well the ... models predict..." What is the frequency of this assessment? Every 4 months? Were other locations for sampling chlorides concentrations considered, such as the mouth of Abercorn Creek and I-95?*

Response: An assessment of the model's performance would be performed every four months by comparing its predictions to actual measurements taken by the continuous water quality meters

The District considered numerous potential water quality monitoring locations. It believes that the stations identified in the Monitoring Plan will allow adequate identification of potential project impacts and assessment the performance of the mitigation plan.

637-BB-141-EV97
Comment: *Were other locations for sampling chlorides concentrations considered, such as the mouth of Abercorn Creek and I-95?*

Response: See previous response.

637-BB-141-EV98
Comment: *What is the reporting interval between the end of the 4-month data- collection periods and the release of the model evaluation reports?*

Response: The hydrodynamic and water quality model assessments would be conducted every four months. It is reasonable to assume that a brief technical report summarizing the work and results could be prepared within 60 days.

637-BB-138-EV99
Comment: *In the Cost Summary, Oversight and Contracting are listed under "Biological" but not under "Geomorphic." Should the there be a similar item under "Geomorphic"?*

Response: See previous response to this question.

637-BB-141-EV100
Comment: *Are there details for the Transfer Efficiency Study of the dissolved-oxygen system? The data collection for the demonstration project was inadequate to show any conclusive effect of the injection system on the receiving waters.*

Response: The overall objective of the Transfer Efficiency Study would be to determine the efficiency by which the injection systems add oxygen to the water column. Once there is a quantitative

determination of oxygen availability, a comparison can be made as to how this amount relates to that needed to mitigate project related impacts. A scope of work has not yet been developed.

637-BB-141-EV101

Comment: *The Corps commits to biological monitoring when soil cadmium concentration is greater than or equal to 4 ppm, but does not define biological monitoring. The Department understood the Corps had agreed to tissue cadmium sampling independent of soil cadmium sampling. Tissue sampling should occur: 1) prior to sediment placement to collect baseline data; 2) during sediment placement; and 3) post placement until 3 consecutive years of samples contain cadmium concentrations that are less than the potential adverse effect level, which is to be determined.*

Response: See previous response to this question.

637-BB-141-EV102

Comment: *The Department accepts the Corps' use of 4 ppm cadmium concentration in capping material as a trigger for remedial action in DMCAs. The Department understands that the Corps will move a DMCA to higher priority in the rotation for O&M sediment placement and vegetation monitoring if 25 cumulative acres are found to have a cadmium concentration greater than or equal to 4 ppm. Sampling and placement will continue until the DMCA has less than 25 cumulative acres with a cadmium concentration greater than or equal to 4 ppm.*

Response: See previous response to this question.

637-BB-141-EV103, 637-BB-141-EV104

Comment: *This section states that the Corps will sample the top 15 cm of the cap material. The Department recommends sampling the top 30 cm of the cap material. This section also states that the Corps will conduct biological monitoring when soil cadmium concentrations exceed 4 ppm if the area "cannot be covered by O&M sediments within 6 months." This approach would risk a failure to conduct biological monitoring in an area that the Corps intends to cover within 6 months, but for whatever reason, may not. The Department recommends biological monitoring when concentrations exceed 4 ppm without regard to when the Corps intends to cover the area with O&M sediments.*

Response: See previous response to this question.

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637-BB-141-EV105

Comment: *The Department requests that the Corps continue to coordinate with the FWS prior to completion of the final EIS to finalize plans for biological monitoring within DMCAs, including tissue sampling.*

Response: The Corps has coordinated with the USFWS concerning this issue during development of the FEIS. The monitoring described in the FEIS includes the results of that coordination.

637-BB-141-EV106

Comment: *No monitoring is proposed for striped bass, but should be. We recommend a post-project assessment of striped bass habitat using the water quality monitoring data and updated water quality simulations. Model updates are already planned that would facilitate a low-cost assessment using the*

established striped bass habitat criteria. The Department recommends comparing conditions during the fourth year of post-project monitoring with pre-construction predicted habitat impacts, and formulating corrective actions as necessary based on the results.

Response: Concur. The District agrees that a post-project assessment of Striped bass habitat impacts using the most recent water quality monitoring data and updated water simulations would be appropriate. This would be conducted during the second, fourth, and ninth years of the post-construction monitoring. Appropriate sections of the document including the Monitoring and Adaptive Management Plan have been revised to indicate the inclusion of this work.

637-BB-141-EV107

Comment: *The Department supports the sampling protocol (species and timing) described in this section, with one exception (or clarification). Sampling when the CDFs are wet is proposed for April and September. However, the next sentence says three individuals of two species (six total) "will be collected* ***each year"*** *(emphasis added). We recommend revising this to state that these six individuals will be collected twice a year (April and September) when the CDFs are wet.*

Response: Concur. The Monitoring and Adaptive Management Plan has been revised to indicate that six individuals will be collected twice a year (April and September) when the CDFs are wet.

637-BB-138-EV108

Comment: *The DEIS shows various post construction monitoring ranging from 2 to 5 years. It is not unlikely that a drought or high-flow period lasting several years would occur during the post-construction monitoring period, which would complicate comparisons with pre-construction monitoring data. In addition, tidal freshwater wetlands respond slowly to salinity change. Therefore, the Department recommends increasing wetland and continuous water quality monitoring from 5 years post-construction to 10 years.*

Response: The District has revised the monitoring plan to include ten years of post-construction monitoring, which is sufficient to capture a range of flows over which to identify the project's impacts and evaluate the performance of the mitigation features.

637-BB-141-EV109, 637-BB-141-EV110

Comment: *We recommend developing a detailed data analysis plan for the post-construction water quality monitoring. The mitigation features will significantly alter the system, which will complicate the comparisons of pre- and post-construction conditions to determine the efficacy of the mitigation measures. A recent example of the need for such as plan was the re-oxygenation demonstration performed for the Savannah Harbor Expansion project. Monitoring data was collected, but the analysis of that data failed to conclusively quantify the effect of the demonstration project in the highly variable DO dynamics of the system.*

Response: A detailed data analysis plan is not warranted in a feasibility study. That more detailed work would typically be performed after decisions are made to implement a project. However, based on coordination with the NMFS and the USFWS during preparation of the FEIS, additional details concerning data analysis have been added to the Monitoring and Adaptive Management Plan (Appendix D). The District believes the level of detail in the EIS describing the monitoring that would be performed is sufficient.

The initial reports of that limited demonstration project (re-oxygenation demonstration) were supplemented and revised by GPA's contractors, and the revised reports containing additional information quantifying the effects on D.O. were provided to the natural resource agencies.

637-BB-141-EV111, 637-BB-141-EV112

Comment: *Concerning the revegetation of Area 1S, grading the site and its feeder creeks to the proper elevations is essential to avoid establishing invasive vegetation (e.g., Chinese tallow tree) that have little or no wildlife value. The discussion and table in this section should specify criteria for successful establishment of native wetland plants. Monitoring the success of the re-vegetation for 5 years should include control measures for exotic and invasive species, if detected.*

Response: Table 4 in the Monitoring and Adaptive Management Plan specifies the criteria which will be used to determine if wetland growth in Disposal Site 1S is occurring at an acceptable rate. The plan has been revised to include monitoring for invasive species [especially common reed and Chinese tallow tree] together with measures to control such species should they prove to be a problem.

637-BB-141-EV113, 637-BB-141-EV115

Comment: *This section describes an informal inter-agency review process for monitoring data and reports during the 5-year post-construction monitoring period. Within 1 year after the 5-year post-construction monitoring period, the Corps would prepare a consolidated report of the various monitoring programs, followed by 30 days of agency review, an unspecified time period for further report revision, public review, and a potential elevation process. This time-line for making decisions on adaptive management actions would likely require a minimum of 1.5 years after the 5-year post-construction monitoring period, and could take much longer. The Department recommends compressing this process so that final decisions on corrective actions are reached within 1 year after the monitoring period. In addition, because we have recommended extending the duration of post-construction monitoring from 5 years to 10 years, we also recommend preparing and reviewing a consolidated report of the various monitoring programs at the end of 5 years, and again at the end of 10 years following project construction, to ensure that adaptive management decisions can be made when it becomes apparent that a problem exists, and in a timely manner.*

Response: The District believes the timelines discussed in the Monitoring and Adaptive Management Plan regarding data compilation, draft report preparation, and agency/public review are reasonable.

As stated in previous responses, the District believes that up to ten years of selective post-construction monitoring is sufficient. It should be stressed that the opportunity for Cooperating Agencies to make recommendations about changes in project and/or mitigation measures will not be limited to the immediate period after completion of the post-construction monitoring. The Monitoring and Adaptive Management Plan includes a meeting between the District and the natural resource agencies at the end of each monitoring year to discuss any changes to the monitoring requirements, the project, or the mitigation features. This type of meeting could be held on a more frequent basis if circumstances require.

Page 18

637-BB-141-EV114
Comment: *Appendix D contains two sections "9.B" – the second one should be "9.C."*

Response: Concur. Correction has been made.

637-BB-138-EV116
Comment: *The Federal modeling performance goals in the plan are those provided by review agencies in 2001 during hydrodynamic model development. Because the agencies were aware of the complexity of the system and model limitations, we allowed considerable latitude in the performance of the models. We are concerned that adopting the same tolerances for the performance of the constructed project is inappropriate, because actual impacts could differ substantially from the predicted impacts without triggering remedial action. Based on earlier coordination, the Corps modified the tolerances for achieving a goal of <1 ppt salinity to +/- 0.1 ppt, and we support this change. The goal for salinity in the range of 1-5 ppt has not been modified, and would allow considerable impact without triggering action. As proposed, a range of 0.5 to 1.5 ppt is acceptable for a salinity goal of 1 ppt (+/- 50%), while a range of 0.89 to 1.09 ppt is acceptable for a salinity goal of 0.99 ppt (+/- 10%). We recommend modifying the goal for salinity in the range 1-5 ppt to +/- 10 % (not +/- 0.5 ppt as currently stated) to make it more consistent with other goals and triggers for adaptive management.*

Response: The District revised Appendix D to include the suggested goal for salinity predictions (+/- 10% in the 1-5 ppt range). While this goal may not be achievable, modelers would strive to reach this objective.

637-BB-141-EV117
Comment: *This section states that the "Corps would seek and obtain its funds for this phase each year through the normal budget process," which concerns the Department. It is relatively certain that impacts to trust resources of the Department will occur following construction, but the effectiveness of the mitigation features is much less certain. Therefore, the Department cannot agree that the proposed mitigation plan adequately addresses project impacts unless contingency funding for monitoring/adaptive management activities is assured.*

Response: See previous response to this question.

637-BB-141-EV118
Comment: *This section should also discuss an implementation schedule for needed corrective actions. The Department recommends initiating construction, or other appropriate remedial actions, within 1 year of a decision to modify a mitigation feature.*

Response: The District concurs with the goal of initiating construction within one year of a decision to implement an adaptive management feature. However, a one-year time limitation on implementing a remedial action may not be achievable in all circumstances. If the action were identified in the EIS and contingency funds were available, a one-year duration would be reasonable. However, if the remedial action was outside the identified scope of the EIS, additional NEPA documentation [and time] would be required. Significant modifications to the project or its mitigation features could exceed available funding, requiring a request for additional money. Those steps could easily take more than one year to complete.

637-BB-141-EV119

Comment: *The Corps proposes to monitor the performance of corrective actions under the adaptive management program. It is unlikely that 1 year of post-construction monitoring is sufficient to determine the outcome of the action in a system as dynamic as the Savannah estuary. The Department recommends 3 years of post-construction monitoring of adaptive management actions.*

Response: This section has been revised to provide for two years of monitoring after implementation of an adaptive management feature. A longer monitoring period may be considered should the Corps and the Cooperating Agencies deem it necessary and the monitoring could be conducted using funds within the approved threshold identified for Adaptive Management.

637-BB-141-EV120

Comment: *The Corps proposes to fund four water monitoring stations to determine whether the mitigation features are functioning as intended. A fifth station, Station 021989784, is located at the intake of the freshwater supply system for the 3,000 acres of managed wetlands on Savannah NWR and is therefore especially important for monitoring project impacts to the Refuge. The Department recommends adding it to the Corps' list of supported stations.*

Response: The continuous water quality monitoring station at the intake to the Savannah National Wildlife Refuge is already funded by the Georgia Ports Authority. The Georgia Ports Authority has stated their intention to continue funding operation of this station.

Page 19

637-BB-141-EV121

Comment: *This appendix does not include a section header to separate Section B, Tidal Freshwater Marsh, from Section A, Savannah NWR Freshwater Waterfowl Management Operations. We believe page 16 is the appropriate location for this.*

Response: Concur. The District has revised the EIS as suggested.

637-BB-141-EV122

Comment: *Figure 5 and the associated text do not provide an accurate representation of marshes in 1854. Most of the salt marsh shown on Figure 5 is in the Wright River system, not the Savannah system. The demarcation between freshwater marsh, brackish marsh, and salt marsh is not supported by historical information. As stated on page 20, Appendix L, tidal forest in the mid-1700's extended to the junction of Back River and the Savannah River, and brackish marshes extended to near the mouth of the river. Appendix Q, page 22, mentions that Hutchinson Island was used extensively for rice culture, which requires freshwater. Between the mid-1700's and mid-1800's, only minor modifications were made to the Savannah River. This information indicates that the depiction of marsh type extent in Figure 5 and the resulting areal estimates are mistaken, and that the freshwater limit extended to about river mile 7 in the mid-1850's. Figure 5 shows the interface at about river mile 19. The Department recommends correcting these errors.*

Response: Figure 5 was originally developed during the studies relating to the development of the dissolved oxygen TMDL for the harbor. The District included it in the EIS to show that different natural resource agencies have different understandings of the historic conditions in the estuary. Since man has

made many changes in this estuary over time, some of the differences are the result of analyzing conditions at different points in time.

637-BB-141-EV123

Comment: *Figure 6 and the associated text do not provide an accurate representation of marshes in 1999. USGS estimates based on detailed field studies and Corps estimates based on the hydrodynamic model are generally consistent, but are substantially different from the estimates shown in Figure 6. The Department recommends corrections for clarity.*

Response: Figure 6 was originally developed as part of the s analyses for the dissolved oxygen TMDL for the harbor. The District included it in the EIS to show that different natural resource agencies have different understandings of the historic conditions in the estuary. Since man has made many changes in this estuary over time, some of the differences are the result of analyzing conditions at different points in time.

637-BB-141-EV124

Comment: *This section states that the primary stress to tidal freshwater marsh is prolonged drought, which is not supported by evidence. In 1875, when the controlling depth of the navigation channel was 12-15 feet, the Savannah estuary supported an estimated 12,000 acres of tidal freshwater marsh. In 2005, when the controlling depth was 42 feet, the estuary supported only 3,269 or 4,072 acres (depending on study method used). This section should instead state that the inland intrusion of salt water resulting from channel deepening is a constant stress on tidal freshwater marsh, and that prolonged drought exacerbates this stress.*

Response: The Present and Future Stresses Sections of this discussion have been revised to indicate that salinity levels are and will continue to be a stress on tidal freshwater marsh.

637-BB-141-EV125

Comment: *This section also states that the Corps evaluated the effects of sea level rise on tidal freshwater marsh. The Department maintains that sea level rise would have a negligible impact within the Savannah NWR if not for the cumulative impact of previous harbor deepening.*

Response: This section has been revised to show the relationship between sea level rise/past harbor deepening projects and their cumulative adverse effect on tidal freshwater wetlands.

637-BB-141-EV126

Comment: *The discussion of the mitigation for the loss of non-freshwater tidal marshes is confusing. Previous sections – Appendix C, Section V, and elsewhere – speak of impacts to 14.08 acres of salt and brackish marsh with 42 (or 45) acres listed as mitigation for the 44-foot alternative. Appendix C lists 15.68 acres of brackish marsh loss for all the proposed harbor deepening alternatives. This Appendix lists the loss of 3.0 acres of brackish marsh and 12.68 acres of saltmarsh, which equals the 15.68 acres of brackish marsh mentioned in Appendix C. This is confusing because both 14.08 acres and 15.68 acres are listed as marsh loss for either the 44–foot alternative or all alternatives. Also, the acreage proposed for restoration is not clear. The Department recommends revisions for clarity.*

Response: Appropriate sections of the document have been revised to indicate that the amount of direct marsh loss associated with harbor deepening is 15.68 acres. Revisions to the text were also made to describe the marsh restoration feature at Disposal Site 1-S, viz., a roughly 40.3-acre portion would be

topographically sculpted to create a suitable marsh habitat. This parcel also includes a 1.7-acre area previously graded down by the Georgia Ports Authority for similar mitigation purposes. Of the 42-acre total, only 28.8 acres would be necessary to mitigate for the subject harbor deepening. The remaining roughly 11.5 acres would serve as mitigation for other impacts from SHEP or O&M of the Savannah Harbor Navigation Project.

Page 20

637-BB-141-EV127

Comment: *Most of the salt marsh in the estimate provided in the "Present Condition" section is in the Wright River system, and not in the Savannah River system. The Department recommends corrections for clarity.*

Response: The information included in the EIS was originally developed by during analyses for the dissolved oxygen TMDL for the harbor. The District included it in the EIS to show that different natural resource agencies have different understandings of the historic conditions in the estuary. Since man has made many changes in this estuary over time, some of the differences are the result of analyzing conditions at different points in time.

637-BB-141-EV128

Comment: *The Department recommends taking samples of the cap material to a depth of 30 cm instead of the 15 cm depth proposed. This section also cites 7 ppm cadmium concentration as the trigger for remedial action: we recommend this section be revised to be consistent with Appendix D (Section 7.B) which identifies 4 ppm as the trigger.*

Response: See previous responses to this question.

637-BB-141-EV129

Comment: *We recommend biological monitoring when cadmium exceeds 4 ppm regardless whether the Corps plans to cover the area with O&M sediments within 6 months. This section, and others, should define biological monitoring in the context of cadmium in disposal areas. The Department recommends a program of monitoring wildlife activity in disposal areas and cadmium levels in bird tissues that is independent of the Dredge Material Containment Area (DMCA) capping criteria. Wildlife monitoring should begin with sediment placement and continue as long as all other monitoring of the DMCA. Tissue monitoring should occur: 1) prior to sediment placement to collect baseline data; 2) during sediment placement; and 3) post placement until 3 consecutive years of samples contain cadmium concentrations that are less than the potential adverse effect level, which is to be determined. The Department supports the sampling protocol (species and timing) described in Appendix D, page 23, and requests that the Corps continue to coordinate with the FWS prior to completion of the final EIS to finalize plans for biological monitoring within DMCAs, including tissue sampling.*

Response: There are two basic components of the monitoring plan in regard to the disposal of cadmium-laden sediments in the CDFs. The first involves sampling of the cadmium-laden sediments after placement in the CDFs. Second, the District would sample the initial cover/cap material to be placed over the cadmium sediments. This material would be other new work sediments that contain lower cadmium levels. After this cover has been placed, sediment samples would be collected and analyzed. If cadmium levels in the cover are equal to or exceed 4 mg/kg in a cumulative area of 25 acres or greater, an additional cover of maintenance dredging sediments would be applied. If the

concentration of cadmium in these samples is below 4 mg/kg, no further action would be required. If the samples exceed 4 mg/kg, then an additional cap of O&M material would be placed over the sediments and additional soil sampling conducted. This process would be repeated until cadmium concentrations in sediments in the CDF cover are 4 mg/kg or less.

637-BB-141-EV130
Comment: *Our recommendations necessitate revisions to the "Decision Matrix for Cadmium Sampling" on page 86, including: remove references to 7 ppm cadmium concentrations; remove "if necessary" in reference to tissue sampling; do not differentiate between areas slated for covering before or after 6 months; and continue wildlife use studies until tissue monitoring is completed.*

Response: The Decision Matrix has been removed from the document.637-BB-138-EV131
Comment: *Based on an analysis prepared by Kinetic Analysis Corporation (KAC), this section concludes that the hydrodynamic model probably over-predicts salinity and under-predicts dissolved oxygen, i.e., the model errs towards the side of simulating conditions worse than would actually occur. We believe this analysis may seriously misrepresent the risk and uncertainty associated with the water quality predictions. With the exception of the new channel depth, the KAC analysis relied upon the existing geometry of the Savannah River estuary. Several mitigation measures would significantly modify the system geometry, including significant flow diversion at McCoys Cut, closing Rifle Cut, filling the Back River sediment basin, and removing the tide gate. Flow routing and flow volume in the three main river channels would become significantly different from the current system. Therefore, we believe the degree of risk and uncertainty regarding expected water quality impacts, and the resulting wetland impacts, is considerably higher than the KAC analysis suggests, which is one of the reasons why the Department recommends extending the proposed post-construction monitoring from 5 years to 10 years.*

Response: See previous responses to this question.

Page 21

637-BB-141-EV132
Comment: *This portion of the DEIS discusses risk and uncertainty in relation to sea level rise and the modeling of impacts to freshwater marsh. This section argues for predicating mitigation on the "base year" impacts (the year construction is complete) instead of average annual impacts over the life of the project (consistent with Corps policy), because "impacts that would occur soon after the base year are those most likely to occur and least subject to uncertainty from more distant projections of future conditions." Average annual impacts are less than base year impacts because sea level rise over 50 years will cause wetland losses without the project. The Department agrees with predicating mitigation on the base year impacts, but for a different reason. The Department maintains that sea level rise would have a negligible impact on Savannah NWR if not for the cumulative impact of previous harbor deepening.*

Response: The DOI's comments concerning the effects of past harbor deepening on sea level rise and the SNWR are acknowledged.

637-BB-141-EV133, 637-BB-141-EV134
Comment: *Wetland impacts are inferred from salinity changes predicted by the hydrodynamic model. This section states: "...the hydrodynamic model has roughly an 80 percent chance of over-predicting salinity levels at low salinity levels, thus leading to an over-prediction of salinity-induced impacts to wetlands. Therefore, the model is considered to present little risk for decision-makers evaluating salinity*

impacts to wetlands." The Department disagrees with this characterization, which was based on analysis by KAC that, with the exception of the new channel depth, relied upon the existing geometry of the Savannah River estuary. Several mitigation measures would significantly modify the system geometry, including significant flow diversion at McCoys Cut, closing Rifle Cut, filling the Back River sediment basin, and removing the tide gate. Flow routing and flow volume in the three main river channels would become significantly different from the current system. Therefore, we believe the degree of risk and uncertainty regarding expected water quality impacts is considerably higher than the KAC analysis suggests, and is a reason we recommend extending the proposed post-construction monitoring from 5 years to 10 years.

Response: The District acknowledges the DOI's disagreement with the basic conclusion in the Risk and Uncertainty Analysis [page 8] that states "the hydrodynamic model has roughly an 80 percent chance of over-predicting salinity levels at low salinity levels, thus leading to an over-prediction of salinity-induced impacts to wetlands. Therefore, the model is considered to present little risk for decision- makers evaluating salinity impacts to wetlands". The Risk and Uncertainty Analysis was performed by an independent contractor. The USFWS reviewed those findings before it agreed that the model was sufficient for impact evaluation purposes on this project. The post-construction monitoring plan is designed to provide data to refine and improve the accuracy of the hydrodynamic and water quality models.

637-8B-141-EV136, 637-8B-141-EV135

Comment: *This section states that the model slightly under-predicts DO levels and is therefore a good predictor of DO-related impacts. Because the project and the various mitigation features will substantially alter channel geometry of the lower river, and the hydrodynamic models are based on the current geometry, the Department attributes a relatively high degree of uncertainty with the model predictions of water quality impacts, including DO impacts. We recommend that the final EIS recognize and acknowledge this uncertainty. The risk to fish and other resources of underestimating DO impacts is further justification for expanding the monitoring effort beyond the currently proposed 5 years to 10 years.*

Response: The risks and uncertainties of the proposed dissolved oxygen system for Savannah Harbor are fully discussed in the Risk and Uncertainty Analysis [page 9-11]. The post-construction monitoring plan is designed to provide data to refine and improve the accuracy of the hydrodynamic and water quality models, and quantify impacts from a harbor deepening.

Please see previous responses concerning extending the five-year post-construction monitoring plan to ten years.

637-8B-141-EV137

Comment: *The Draft EIS references a USGS report, by the Cooperative Research Unit, titled "Simulation of Water Levels and Salinity in the Rivers and Tidal Marshes in the Vicinity of the Savannah National Wildlife Refuge, Coastal South Carolina and Georgia" but does not provide the reference. Suggest the Final EIS include the reference (Conrads et al, 2006) as follows:*
Conrads PA, Roehl EA, Daamen RC, and Kitchens WM. 2006. Simulation of Water Levels and Salinity in the Rivers and Tidal Marshes in the Vicinity of the Savannah National Wildlife Refuge, Coastal South Carolina and Georgia. US Geological Survey, Scientific Investigations Report 2006–5187, 134 p. Available online at: http://pubs.usgs.gov/sir/2006/5187/pdf/sir20065187.pdf"

Response: Concur. This reference has been added to the references section.

Page 21

637-BB-141-EV138

Comment: *Based on an analysis prepared by Kinetic Analysis Corporation (KAC), this section concludes that the hydrodynamic model probably over-predicts salinity and under-predicts dissolved oxygen, i.e., the model errs towards the side of simulating conditions worse than would actually occur. We believe this analysis may seriously misrepresent the risk and uncertainty associated with the water quality predictions. With the exception of the new channel depth, the KAC analysis relied upon the existing geometry of the Savannah River estuary. Several mitigation measures would significantly modify the system geometry, including significant flow diversion at McCoys Cut, closing Rifle Cut, filling the Back River sediment basin, and removing the tide gate. Flow routing and flow volume in the three main river channels would become significantly different from the current system. Therefore, we believe the degree of risk and uncertainty regarding expected water quality impacts is considerably higher than the KAC analysis suggests, and is a reason we recommend extending the proposed post-construction monitoring from 5 years to 10 years.*

Response: Please see previous responses on this concern.

637-BB-141-EV139

Comment: *This section states that the model slightly under-predicts DO levels and is therefore a good predictor of DO-related impacts. Because the project and the various mitigation features will substantially alter channel geometry of the lower river, and the hydrodynamic models are based on the current geometry, the Department attributes a relatively high degree of uncertainty with the model predictions of water quality impacts, including DO impacts. We recommend that the final EIS recognize and acknowledge this uncertainty. The risk to fish and other resources of underestimating DO impacts is further justification for expanding the monitoring effort beyond the currently proposed 5 years to 10 years.*

Response: Please see previous responses on this concern.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

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JAN 25 2011 F/SER

Colonel Jeffrey M. Hall
District Commander
U.S. Army Engineer District, Savannah
ATTN: PD
Post Office Box 889
Savannah, Georgia 31402-0889

Dear Colonel Hall:

The National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS), Southeast Region has received the *Draft Tier II Environmental Impact Statement for the Savannah Harbor Expansion Project, Chatham County, Georgia and Jasper County, South Carolina* (DEIS) and *Draft General Re-evaluation Report for the Savannah Harbor Expansion Project, Chatham County, Georgia and Jasper County, South Carolina* (DGRR). NMFS Southeast Region is a cooperating agency with the Corps of Engineers, Savannah District (COE), for this project under the National Environmental Policy Act, and NMFS is also engaged in consultation with the COE for the project's effects on essential fish habitat (EFH) and endangered and threatened species, under the Magnuson-Stevens Fishery Conservation and Management Act and the Endangered Species Act (ESA), respectively. Further, the Water Resources Development Act of 1999 authorizes the Secretary of Commerce to approve the selected plan and determine that the associated mitigation plan adequately addresses the potential environmental impacts of the project.

Over the last two years NMFS has provided comments on the proposed project, as well as requests for information needed to better understand the potential impacts of the project on NMFS' trust resources. Many of these issues have been addressed through ongoing discussions with the COE, but some key issues remain outstanding. Enclosed we provide comments on the project, based on the DEIS and DGRR, which address project concerns related to EFH and ESA trust resources. We believe these remaining issues need to be resolved, and the resulting revised information incorporated into the Final Environmental Impact Statement. We will continue to work with the COE to seek mutually acceptable resolution of remaining issues.

Of paramount importance to NMFS is assuring the impacts of the project do not threaten the continued existence of the shortnose sturgeon, an endangered species that still persists in the Savannah River. The sturgeon's remaining foraging and refuge habitat is largely

within the Harbor, and the dredging and hydrological changes of the project will degrade large portions of this habitat, rendering it unsuitable for shortnose sturgeon. The two deficiencies of the DEIS and mitigation plan relating to shortnose sturgeon highlighted here are preventing us from fully evaluating project impacts on this species and significantly affecting the adequacy of the proposed mitigation plan.

Habitat Suitability Assessment for Shortnose Sturgeon

The habitat suitability assessment provided in the DEIS for shortnose sturgeon contains inconsistencies and deficiencies, which we have identified in discussions with the COE on multiple occasions. Thank you for your personal involvement in proposing and participating in yesterday's video conference to clarify these issues. We look forward to receiving the information and analyses we requested as soon as possible so we can have a complete assessment of the project's impact to shortnose sturgeon habitat, which is necessary for us to be able to comment meaningfully on the different project alternatives. At this time, we are unable to make any recommendations about the acceptability of any of the proposed deepening alternatives. However, we may offer specific depth recommendations after receiving the information and analyses that we discussed on the call and highlighted in the enclosure.

These inconsistencies and deficiencies in the sturgeon habitat assessment are also preventing us from initiating consultation on the project under section 7 of the ESA. NMFS expects to issue a biological opinion on project impacts within 135 days of the date these issues are resolved.

Mitigation for Sturgeon Impacts at the New Savannah Bluff Lock and Dam

While the impacts of the proposed project on endangered shortnose sturgeon cannot be fully understood prior to completing section 7 consultation, proposed dredging and hydrological changes are expected to have substantial adverse effects on that species' foraging and refuge habitat. Adequately mitigating for this habitat loss will require re-establishing access to habitat above the New Savannah Bluff Lock and Dam (NSBLD). The NSBLD is the lowest dam on the Savannah River and impedes the sturgeon's movement upstream. Because the SHEP is expected to remove downstream habitat, without additional access upstream, overall habitat will be greatly reduced. Access to currently unavailable upstream habitat will mitigate this habitat constriction.

As currently proposed the COE's fish passage is not likely to be successful in passing sturgeon to justify its use as mitigation against the much more certain impacts of the harbor deepening. If a fish passage structure is to be used as mitigation for impacts of the harbor deepening there will need to be extensive changes to the proposed design. Even if an effective design can be agreed upon, the fish passage structure would require maintenance and repair in perpetuity. The removal of the NSBLD is our preferred method to allow sturgeon access to upstream habitats. In comparison to the uncertain success and impermanence of the proposed passage structure, removal of the NSBLD would certainly restore access to upriver habitat in perpetuity. Additionally, cost information we included in our enclosed comments indicates removal would be the less expensive option in the short- and long-term. Such action would be consistent with the

COE Savannah District's recommendation in the September 2000 report on the NSBLD disposition study.

We are aware that, as a Congressionally-authorized structure, the COE would be required to seek Congressional authorization to remove the NSBLD. However, the COE must also seek authorization for the increased costs of the Savannah Harbor Expansion Project. Combining these authorization requests presents an ideal opportunity to redress the environmental damage of the COE's legacy dam while advancing the modern economic benefits of the project.

With respect to the EFH consultation, NMFS believes three key topics of information require further attention, and we request this information be included in the FEIS.

- First, the Ocean Bar Channel Extension is a project feature added relatively late to the project design. One consequence of the feature is that hardbottom habitat may be adversely affected by dredging the channel extension. In addition, additional dredge material will need to be placed in the area of the potential hardbottom dredging impact. To date, the COE has assured NMFS that surveys will be completed of the bar channel extension and that this survey information will be adequate to describe potential impacts of dredging to hardbottom habitat. Further, the areas where the additional dredged material will be placed support important managed species including red snapper. The dredge material has been proposed to be placed and configured in a way that would provide suitable fishery habitat in the impacted hardbottom areas. To fully assess the likely success of this mitigative measure, NMFS requests plans be included in the FEIS for the dredge material placement and configuration as well as information on monitoring the effectiveness and durability of these features.
- Second, dredge material is proposed for placement at a feeder berm near Tybee Island. This material is intended to replenish the beaches of Tybee Island downstream of the feeder berm. To ensure this result is likely, NMFS requests modeling be conducted to demonstrate the likely fate and disposition of the material placed at the Tybee Island feeder berm.
- Third, although considerable progress has been made in developing the Monitoring and Adaptive Management Plan described in DEIS Appendix D, NMFS requests further elaboration in two areas:
    - The Plan should specify criteria for evaluating the success of mitigation measures and should clearly articulate triggers for implementing corrective action as indicated by monitoring results and determined necessary in coordination with the resource agencies.
    - The Plan presently proposes to monitor wetlands and marshes for use by finfish but does not include monitoring of invertebrates such as shrimp and crabs. As key components of the ecosystem and as managed stocks (in the case of white shrimp), NMFS believes it is very important to understand the response of these species to the altered dynamic equilibrium that will be established in the estuary following project construction.

We appreciate the COE's efforts to identify and resolve the many technical and conservation issues associated with this large, complex, and potentially very important project. We will continue to provide interagency coordination on this project under all our authorities and to work with the COE to bring the remaining issues to resolution. Our primary contact for endangered species issues is Ms. Kay Davy. She may be reached by phone at (954) 356-6791 or by e-mail at Kay.Davy@noaa.gov . Questions regarding EFH may be addressed to Pace Wilber at (843) 762-8601 or by e-mail at Pace.Wilber@noaa.gov .

Sincerely,

James E. Weaver

for Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosure

National Oceanic and Atmospheric Administration, National Marine Fisheries Service

PRELIMINARY REMARKS: NOAA/NMFS submitted comments on January 25, 2011 in the form of a letter with backup comments (Letters 752 and 753). After the comments were submitted, the Corps engaged in additional consultation and coordination with NMFS and other natural resource agencies regarding threatened and endangered species. On November 4, 2011, NMFS issued its Biological Opinion (BO) for the project. The BO concurred with the findings of the Corps' Biological Assessment for Threatened and Endangered Species (BATES) that the SHEP may affect but would not likely adversely affect leatherback sea turtles, green sea turtles, hawksbill sea turtles, North Atlantic right whales, and humpback whales (species under NMFS jurisdiction). The BO further determined that construction of the SHEP would not jeopardize Kemp's ridley sea turtles, loggerhead sea turtles, Shortnose sturgeon, and Atlantic sturgeon, and imposed reasonable and prudent measures (RPM)/terms and conditions protecting these species. The project's compliance with the ESA regarding federally threatened and endangered species is fully documented in EIS Sections 4.09 and 5.11, and in Appendices B (BATES), and Z (Biological Opinion).

Page 1

752-BB-14-EV01

Comment: *Over the last two years NMFS has provided comments on the proposed project, as well as requests for information needed to better understand the potential impacts of the project on NMFS' trust resources. Many of these issues have been addressed through ongoing discussions with the COE, but some key issues remain outstanding. Enclosed we provide comments on the project, based on the DEIS and DGRR, which address project concerns related to EFH and ESA trust resources. We believe these remaining issues need to be resolved, and the resulting revised information incorporated into the Final Environmental Impact Statement. We will continue to work with the COE to seek mutually acceptable resolution of remaining issues.*

Response: As indicated in your letter, the Corps has been closely coordinating with NMFS Southeast Regional Office for a number of years to ensure all environmental impacts, including NMFS' trust resources, are adequately identified for each alternative plan. NOAA staff participated in the Fisheries Interagency Coordination Team since its creation in 2002. That team reviewed the tools the Corps would use to identify project impacts and defined how we would use those tools to calculate the number of impacts. Since the Alternative Formulation Briefing in 2008, the Corps provided additional modeling data at NOAA-NMFS' request on numerous occasions. Those modeling results indicate that the chosen mitigation plan adequately addresses predicted impacts to the affected resources. Each of NOAA-NMFS' identified remaining concerns will be addressed in the FEIS in either the response to comments appendix or through a revision to the report itself. As a Cooperating Agency, the Corps will continue to coordinate with NOAA-NMFS as the Corps progresses with implementation of this project.

752-BB-14-EV02, 752-BB-14-EV03

Comment: *Of paramount importance to NMFS is assuring the impacts of the project do not threaten the continued existence of the shortnose sturgeon, an endangered species that still persists in the Savannah River. The sturgeon's remaining foraging and refuge habitat is largely within the Harbor, and the dredging and hydrological changes of the project will degrade large portions of this habitat, rendering it unsuitable for shortnose sturgeon. The two deficiencies of the DEIS and mitigation plan relating to shortnose sturgeon highlighted here are preventing us from fully evaluating project impacts on this species and significantly affecting the adequacy of the proposed mitigation plan.*

Response: The Corps performed extensive studies to evaluate potential impacts fishery resources, including Shortnose sturgeon. The hydrodynamic and water quality models were developed over a number of years, and their use and modeling employed approaches that were agreed upon by all the Cooperating Agencies. The Corps conducted studies and worked in conjunction with the Fisheries Interagency Coordination Team (of which NOAA Fisheries was a member) to identify critical species and acceptable habitat criteria for each life stage. The results of the extensive analyses and mitigation planning, including flow re-routing and addition of dissolved oxygen, have minimized impacts to Shortnose sturgeon habitat. The latest modeling indicates that harbor deepening would reduce winter habitat for Shortnose sturgeon adults and juveniles, and increase the summer habitat for Shortnose sturgeon adults. Since spawning habitat is a critical factor in determining long term population levels for Shortnose sturgeon in this river basin, the increase in spawning habitat that the Corps proposes would more than offset for the remaining unavoidable impacts to winter habitat.

Based on the extensive coordination that has occurred and the changes to the project since release of the DEIS, NOAA has concurred that the project would not jeopardize the continued existence of Shortnose sturgeon in the Savannah River. Specific comments on the two deficiencies are addressed in comments below.

Page 2

752-88-14-EV04

Comment: *The habitat suitability assessment provided in the DEIS for shortnose sturgeon contains inconsistencies and deficiencies, which we have identified in discussions with the COE on multiple occasions. Thank you for your personal involvement in proposing and participating in yesterday's video conference to clarify these issues. We look forward to receiving the information and analyses we requested as soon as possible so we can have a complete assessment of the project's impact to shortnose sturgeon habitat, which is necessary for us to be able to comment meaningfully on the different project alternatives. At this time, we are unable to make any recommendations about the acceptability of any of the proposed deepening alternatives. However, we may offer specific depth recommendations after receiving the information and analyses that we discussed on the call and highlighted in the enclosure.*

Response: As noted in NOAA's comment, the Corps has coordinated extensively with NOAA-NMFS to provide additional data they have requested for the Shortnose sturgeon assessment. At NOAA's request, the Corps coordinated a change in the habitat suitability criteria with the Fisheries Interagency Coordination Team. The Corps provided NOAA with updated analyses to incorporate that change. The Corps concurs that there were inconsistencies in the EIS that have since been corrected and new information on Shortnose sturgeon impacts provided to NOAA-NMFS. However, the Corps does not concur that the analyses were deficient. The Corps conducted all analyses that the Fisheries Interagency Coordination Team identified as necessary to adequately address impacts to fisheries, including Shortnose sturgeon. In good faith, the Corps has also accommodated requests from NOAA for additional data which, in some cases, our subject matter experts do not see as critical to assessing project impacts to Shortnose sturgeon habitat because the outcomes would not change the proposed mitigation features. The Corps included the updated analyses in the FEIS.

Based on the extensive coordination that has occurred and the changes to the project since release of the DEIS, NOAA has concurred that the project would not jeopardize the continued existence of Shortnose sturgeon in the Savannah River as documented in their Biological Opinion, which is included in Appendix Z of the FEIS.

752-BB-14-EV05, 752-BB-14-EV06

Comment: *While the impacts of the proposed project on endangered shortnose sturgeon cannot be fully understood prior to completing section 7 consultation, proposed dredging and hydrological changes are expected to have substantial adverse effects on that species' foraging and refuge habitat. Adequately mitigating for this habitat loss will require reestablishing access to habitat above the New Savannah Bluff Lock and Dam (NSBLD). The NSBLD is the lowest dam on the Savannah River and impedes the sturgeon's movement upstream. Because the SHEP is expected to remove downstream habitat, without additional access upstream, overall habitat will be greatly reduced. Access to currently unavailable upstream habitat will mitigate this habitat constriction."*

Response: As noted in Section 5.03 of the EIS, the Cooperating Agencies and the Fisheries Interagency Coordination Team could not identify measures in the estuary that would restore or enhance Shortnose sturgeon habitat. Therefore, the team agreed in June 2007 that allowing passage around the lowest dam on the river, the New Savannah Bluff Lock and Dam, would provide an additional 20 miles of upstream habitat and would compensate for losses in Shortnose sturgeon habitat in the estuary due to harbor deepening.

The Corps acknowledges that the acreage of acceptable Shortnose sturgeon habitat in the estuary would be reduced. The Corps is pleased that NOAA acknowledges that providing Shortnose sturgeon access to spawning habitats upstream of the New Savannah Bluff Lock and Dam would adequately mitigate for habitat losses in the estuary.

752-BB-14-EV07, 752-BB-14-EV08

Comment: *As currently proposed the COE's fish passage is not likely to be successful in passing sturgeon to justify its use as mitigation against the much more certain impacts of the harbor deepening. If a fish passage structure is to be used as mitigation for impacts of the harbor deepening there will need to be extensive changes to the proposed design. Even if an effective design can be agreed upon, the fish passage structure would require maintenance and repair in perpetuity. The removal of the NSBLD is our preferred method to allow sturgeon access to upstream habitats. In comparison to the uncertain success and impermanence of the proposed passage structure, removal of the NSBLD would certainly restore access to upriver habitat in perpetuity. Additionally, cost information we included in our enclosed comments indicates removal would be the less expensive option in the short- and long-term. Such action would be consistent with the COE Savannah District's recommendation in the September 2000 report on the NSBLD disposition study.*

Response: The Cooperating Agencies agreed in 2007 that fish passage would provide acceptable mitigation feature for the proposed project impacts to Shortnose sturgeon habitats. The Corps was clear that it would propose a bypass structure that the natural resource agencies had previously approved at that site. In 2010, the Corps consulted the Federal and State regional natural resource agencies to determine if the state-of-the-art had advanced substantially since the present design was prepared. In response, NMFS expressed concern over the design of the passage similar to that stated in the comment. However, no fishery experts in the regional natural resource agencies identified any specific change to the proposed design that should be made as a result of recent documented fish passage research. Since no agency identified specific changes that should be incorporated, the Corps does not concur that extensive changes to the design must be implemented. To ensure that the bypass design was the best one possible for that location, the Corps convened a fish passage workshop after release of the DEIS to refine the design. As a result of that meeting, fish passage criteria were revised.

In coordination with NMFS and other resource agencies, the fish bypass design has been altered to allow a larger percentage of flow as well as more accessible entry and exit for Shortnose sturgeon. The Corps would also monitor the passage of Shortnose sturgeon through the structure to ensure it performs as intended.

The Corps acknowledges that removal of the lock and dam is NOAA's preferred method to allow Shortnose sturgeon access to upstream habitat. The Corps also acknowledges that removal of the lock and dam would benefit the ecosystem. However, removal of the New Savannah Bluff Lock and Dam is not a feasible mitigation alternative for the following reasons:

1) The lock and dam is a Congressionally-authorized project; therefore, the Corps is obligated to maintain the project as Congress provides funding to operate such projects.
2) The current authorization language (WRDA 2000, amended in Omnibus Act 2001) calls for repair and rehabilitation of the lock and dam structure, construction of a fish passage, and conveyance of Lock and Dam to the City of North Augusta.
3) Removal of the structure would adversely impact the freshwater supply of eight major users.

Page 3

752-BB-14-EV09

Comment: *With respect to the EFH consultation, NMFS believes three key topics of information require further attention, and we request this information be included in the FEIS.*

Response: The Corps performed extensive studies to evaluate potential impacts to fishery resources. The hydrodynamic and water quality models were developed over a number of years, and their use and modeling approach employed was agreed upon by all the Cooperating Agencies. The Corps conducted studies and worked in conjunction with a Fisheries Interagency Coordination Team to identify critical species, and acceptable habitat criteria for each critical life stage. The District carried out all fisheries studies and analyses identified by the Fishery Interagency Coordination Team as being required to adequately evaluate the impacts of the various project alternatives. The following five responses address the key topics referenced above.

752-BB-14-EV10, 752-BB-14-EV11

Comment: *First, the Ocean Bar Channel Extension is a project feature added relatively late to the project design. One consequence of the feature is that hardbottom habitat may be adversely affected by dredging the channel extension. In addition, additional dredge material will need to be placed in the area of the potential hardbottom dredging impact. To date, the COE has assured NMFS that surveys will be completed of the bar channel extension and that this survey information will be adequate to describe potential impacts of dredging to hardbottom habitat. Further, the areas where the additional dredged material will be placed support important managed species including red snapper. The dredge material has been proposed to be placed and configured in a way that would provide suitable fishery habitat in the impacted hardbottom areas. To fully assess the likely success of this mitigative measure, NMFS requests plans be included in the FEIS for the dredge material placement and configuration as well as information on monitoring the effectiveness and durability of these features.*

Response: The District does not believe that hardbottom communities exist in the proposed alignment of the entrance channel extension. However, the Corps has committed to perform surveys prior to

construction of the Entrance Channel extension to confirm that no hardbottom communities are within the proposed dredging area.

After coordination with GA DNR-CRD, the dredged material placement plan has been revised and now calls for placing all sediments excavated from the entrance channel in previously-approved areas: either in the Offshore Dredged Material Disposal Site or an upland confined disposal site. The Final EIS has been revised to reflect this change. It should be noted that the proposed features were designated as beneficial use of dredged material, not mitigation as indicated in NMFS' comment.

752-BB-14-EV12

Comment: *Second, dredge material is proposed for placement at a feeder berm near Tybee Island. This material is intended to replenish the beaches of Tybee Island downstream of the feeder berm. To ensure this result is likely, NMFS requests modeling be conducted to demonstrate the likely fate and disposition of the material placed at the Tybee Island feeder berm.*

Response: After coordination with GA DNR-CRD, the dredged material placement plan has been revised and now calls for placing all sediments excavated from the entrance channel in previously-approved areas: either in the Offshore Dredged Material Disposal Site or an upland confined disposal site. Since nearshore placement of new work sediments is no longer proposed, the Corps will not model or monitor the fate of the deposited sediments.

752-BB-14-EV13, 752-BB-14-EV14

Comment: *Third, although considerable progress has been made in developing the Monitoring and Adaptive Management Plan described in DEIS Appendix D, NMFS requests further elaboration in two areas:*

Response: The Monitoring and Adaptive Management Plan provides a discussion of post-construction monitoring and the decision making process that would determine if additional monitoring and/or mitigation measures are warranted. The plan does not identify specific acceptability criteria for water quality or biological parameters that would trigger the need for additional monitoring or modifications to the various mitigation measures. Specific parameters were not established that would replace the judgment of agency technical experts concerning when changes might need to be made. In other words, based on the data collected, some resource experts may see a need to modify the monitoring and/or a mitigation measure, even though a specific threshold for a parameter has not been reached. Also, resource experts may become concerned about the potential cumulative impacts of several parameters, even though the threshold limits have not been exceeded for any one parameter. Establishing thresholds for individual parameters would remove that flexibility. Based on recent coordination with NMFS, the Corps has agreed to establish expected ranges of predicted values for certain water quality parameters. This discussion has been added to the pre-construction monitoring section of the Monitoring and Adaptive Management Plan (Appendix D).

Decision points about changes in the monitoring plan or mitigation features could be reached at any time during the post-construction monitoring effort. Monitoring data and reports would be made available to the resource agencies as soon as possible. Data from fixed water quality monitoring stations is expected to be available on-line on a real-time basis. Although the plan provides for a meeting between the Corps and the natural resource agencies at the end of each year of monitoring to discuss the data and any changes that need to be made, such a meeting could be held at any time that concerns so dictate. If the monitoring identifies impacts that are well outside of those predicted, consultation with the resource agencies would begin immediately. Corrective actions could range from

a change in the monitoring plan to a cessation of construction activities until a given problem could be rectified.

The current Monitoring and Adaptive Management plan is adequate to address impacts of the project and its associated mitigation features. The species that would be monitored after construction are ones identified by the Fisheries Interagency Coordination Team as being critical to understanding the impacts of a harbor deepening project on the estuary. Other species – such as shrimp and crabs -- were considered by the Interagency Coordination Team, but the Team (and the Cooperating Agencies) recognized that those species generally accept a range of salinity conditions and believed they would not be particularly susceptible to changes from harbor deepening. However, at the request of NMFS, crabs and shrimp will be added to the fish surveys as proposed at no additional cost to the project.

National Marine Fisheries Service (NMFS) Comments on:
Draft Tier II Environmental Impact Statement for the Savannah Harbor Expansion Project, Chatham County, Georgia and Jasper County, South Carolina (DEIS) and Draft General Re-evaluation Report for the Savannah Harbor Expansion Project, Chatham County, Georgia and Jasper County, South Carolina (DGRR)

January 25, 2010

As indicated in our letter dated November 24, 2010, NMFS is conducting a joint consultation pursuant to the essential fish habitat (EFH) provisions of the Magnuson-Stevens Fishery Conservation and Management Act and section 7 of the Endangered Species Act of 1973, as amended, on the Savannah Harbor Expansion Project (SHEP).

Section 7 of the Endangered Species Act (ESA)

NMFS Protected Resources Division has reviewed information included in the DEIS, the DGRR, and subsequent information that has been provided by the Savannah District Army Corps of Engineers (COE). The following comments on the protection of endangered species under NMFS' authority are based on the current information available. We will be providing additional comments with the issuance of the upcoming Biological Opinion.

Affected Species

Sea Turtles

Deepening of the Savannah Harbor Entrance Channel and construction of the Channel Extension will require dredging to be conducted over a long project period. The COE has proposed the use of hopper dredges for the offshore dredging in the project area. NMFS believes the use of hopper dredges over an extended time period greatly increases the chances of impact with sea turtles and may make it necessary to use relocation trawling as an aid in their protection. The revision of the new South Atlantic Regional Biological Opinion (SARBO) is underway and may contain additional measures to be implemented. Regardless of whether or not the SARBO is completed by the time the project dredging is to begin; the COE should be pro-active in its commitment to protect sea turtles. The Biological Opinion to be issued in conjunction with our review of SHEP is likely to provide additional recommendations and estimates on turtle take.

North Atlantic Right Whales

NMFS has strong concerns about the proposed use of hopper dredges and the adherence to speed limits in the project area. The COE provided project-specific information regarding their proposal to adhere to the 10-knot speed restriction and provided a statement that can be found in Appendix B, page 99 of the DEIS. The information states that the COE will adhere to the 10-knot speed restriction for hopper dredges during calving season and adhere to the new South Atlantic Regional Biological Opinion (which addresses vessel speeds), once it is finalized.

NMFS acknowledges the COE's commitment to adhere to the 10-knot speed restriction. However, we note that on page 181 of Appendix B of the DEIS it states: "...hopper dredges will be restricted to 10 knots when loaded with material transiting to disposal areas and to 12 knots when light-loaded returning from disposal areas during the calving season." Subsequent personal communication with staff within the COE's South Atlantic Division confirmed that the vessel speed when loaded and when light-loaded will be 10 knots. The information should be correctly stated in the FEIS to reflect the COE's commitment to adhere to the 10-knot speed restriction.

Recent Proposed Listing of Atlantic Sturgeon

The Atlantic sturgeon was recently proposed for listing. If the listing becomes final before section 7 consultation is concluded, a discussion of the project effects on the species will be included in the Biological Opinion. If a decision has not been reached, Atlantic sturgeon will be included by Conference under section 7 of the ESA.

Since so very little information is known about Atlantic sturgeon in the Savannah River, we will need to make some basic assumptions based on the best available data. It is known that adult Atlantic sturgeon can tolerate high salinities and are often found in the ocean, so we can assume that they would also be found utilizing the entire lengths of the Front, Middle, and Back Rivers. Project effects could impact Atlantic sturgeon. Low dissolved oxygen could limit the availability of acceptable habitat and the proposed hydrological modifications for flow re-routing (i.e., the closure of Rifle Cut and the filling of the Sediment Basin), may have additional impacts on this species as they may not be able to use the Back River for moving between their upriver spawning habitat and their downstream foraging habitat in the estuary. Some of the measures proposed for mitigating impacts to shortnose sturgeon would also be appropriate for Atlantic sturgeon.

Shortnose Sturgeon

Habitat Suitability Modeling

Through extensive prior coordination NMFS has been working with the COE to develop the best modeling of existing habitat of the shortnose sturgeon, use of the most appropriate habitat criteria, and to evaluate potential project effects associated with the different deepening scenarios. During meetings held in 2001 to discuss SHEP, the Fisheries Interagency Coordination Team provided guidance on fisheries issues and developed a conservative set of parameters for modeling habitat suitability for the shortnose sturgeon. The Fisheries Coordination Team determined the conditions (in Appendix P) which the water quality and hydrodynamic models would use to identify acceptable and unacceptable habitat. River flow rates and time of year were also specified. Average river flows were used to represent long term conditions, but additional models were run to represent drought years.

Overall, the habitat suitability maps produced using the habitat criteria indices for adult shortnose sturgeon showed reasonably good agreement with previous field data collected on shortnose sturgeon, however, the maps produced for juvenile sturgeon did not show good agreement between documented habitat, as determined by field research, and the modeled results. In using a conservative maximum salinity index of <= 4 ppt, as developed by the Fisheries Coordination Team, the output excluded documented habitat for the larger juvenile shortnose sturgeon. It is believed this occurred due to the ability of larger juveniles to tolerate salinities higher than 4 ppt, whereas higher salinities have been proven to be detrimental to small juveniles in lab experiments. In order to generate maps that would include available habitat of the large juveniles, NMFS proposed that the maximum salinity index should be increased to <= 14.9 ppt, which was the maximum salinity measured during research conducted by Collins et al. (2001), where large juveniles (measuring 32.3 cm to 47.6 cm fork length) were located. (It is important to note that sampling of smaller juveniles has not been conducted in the lower Savannah River, although they are presumed to occur there.) The COE acknowledged our request to revise the salinity criteria. Once the new criteria were used in the modeling of habitat, the mapped results showed a more accurate depiction of acceptable habitat, particularly in the area of the lower Middle River, which includes a deep hole (~7.9 meters depth) used by large juvenile and adult sturgeon during the winter, and also within the Front River at the confluence with the lower Middle River to above Steamboat Creek.

Ground-truthing of the habitat suitability maps was based on field research conducted in the lower Savannah River, which indicated that large juvenile shortnose sturgeon prefer the Front River from just above the deeper Kings Island Turning Basin to the mouth of Abercorn Creek (located near Interstate 95). During the winter, they also heavily utilize the deep hole located in the lower Middle River and adjacent portions of the Middle River. They have not been documented in the Back River. Within the project area, adult shortnose sturgeon have been found to utilize the entire length of the Front River, the entire length of the Middle River, the uppermost reaches of the Back River, and the Sediment Basin/Tide Gate area within the lower Back River. They migrate upriver to the base of the New Savannah Bluff Lock and Dam for spawning. They have not been shown to use the full length of the Back River and recent tracking data, conducted by The Nature Conservancy, indicates adult sturgeon may enter the Sediment Basin from the lower end of the Back River or access it by traveling through Rifle Cut, which connects the Middle and Back Rivers. According to personal accounts from biologists conducting research in the Back River and a bathymetry map of the project area produced by the COE, there are portions of the middle section of the Back River above Rifle Cut that have depths that may be too shallow for the passage of sturgeon during certain tide stages. Firsthand accounts by these same biologists also report that portions of the Sediment Basin have become too shallow to navigate.

The COE performed analyses using the habitat criteria for the existing conditions (-42 feet) and for the five deepening scenarios (-44, -45, -46, -47, and -48 feet). The models predicted outcomes with and without the proposed flow re-routing and dissolved oxygen injection. (Flow re-routing mitigation was proposed to offset potential impacts to the adjacent Savannah National Wildlife Refuge. It is important to note that over 160 different flow re-routing models were conducted to evaluate the effects of each mitigation plan. The proposed injection of dissolved oxygen as mitigation is addressed later in this document.)

In addition to the modeling runs shown in the DEIS, the COE performed other analyses that included parameters such as high dissolved oxygen loading superimposed on the habitat parameters for adult shortnose sturgeon during the summer and winter and also for large juvenile shortnose sturgeon during winter conditions. Other scenarios included project effects with the deepening only, deepening plus hydrological modifications, and deepening with the hydrological modifications and dissolved oxygen injection. While NMFS appreciates the time and effort by the COE to produce the modeled outputs, there is much uncertainty in the results and maps depicting suitable habitat have conflicting information. This is probably due to the highly complex nature of the modeling design. NMFS remains hopeful that the COE will be able to deliver model outputs that provide accurate predictions of the project effects, but at this time we do not have these products. A preliminary assessment based on information in the tables provided in the DEIS (although they may not be entirely accurate) show that the 47-foot (National Economic Development Plan)and 48-foot (Maximum Authorized Plan) deepening alternatives would result in significant habitat loss for adult shortnose sturgeon during January conditions (439 acres lost) and August conditions (113 acres lost). There would also be loss of juvenile shortnose sturgeon habitat during January conditions (21.6 acres lost). Specific measures to address the predicted loss of foraging habitat for shortnose sturgeon within the project area were not identified in the DEIS.

Some of the proposed flow re-routing modifications include closing Rifle Cut and allowing the Sediment Basin to fill-in. The COE's assessment of the habitat suitability models with the flow re-routing modifications indicate that areas above the Sediment Basin within the Back River will become "suitable habitat" for shortnose sturgeon. However, NMFS is concerned that this is an inaccurate assessment as the elimination of Rifle Cut, which connects the Middle and Back Rivers, coupled with the shallow depth of the Sediment Basin, could result in the Back River becoming a dead end for adult sturgeon trying to migrate between their upriver spawning habitat and downstream foraging habitat. Juvenile shortnose sturgeon already cannot enter through the lower end of the Back River due to the high salinities found there. We have concerns that what the COE is showing as habitat gained in some areas of the Back River (and we are still evaluating usage of the area) would produce an inaccurate assessment of the mitigation effects. While more habitat may be created, that could be classed as "suitable" when based on salinity and dissolved oxygen parameters, it may be located in areas not used by sturgeon or in areas that

will become inaccessible to sturgeon after the flow re-routing modifications have been completed. Therefore, the "gain" would have no value to sturgeon.

COE-Proposed Measures to Address Impacts to Shortnose Sturgeon

Dissolved Oxygen Injection

Measures to address impacts to water quality associated with the project deepening have been proposed. Project impacts include a decrease in dissolved oxygen (DO) levels associated with the increase in channel depth, the increase in the volume of water over the project area, and the decrease in average river velocity, which will reduce mixing of oxygen throughout the water column. With the decrease in DO, the ability of the river system to handle introduced point source and non-point source loads of pollutants will also be decreased. DO typically drops during the summer months in the Savannah River associated with a lower oxygen diffusion rate and a higher uptake from biological organisms.

The area the COE identified as of primary concern for low DO is located between Fort Pulaski and the Seaboard Coastline Railroad Bridge, a length of approximately 27 river miles. This also includes the primary areas identified as important foraging habitat for the shortnose sturgeon within the lower Savannah River. According to the DEIS, model predictions from the SHEP studies indicate that further deepening will have additional impacts on the dissolved oxygen regime in the Savannah Harbor. Using guidance provided by the Water Quality Interagency Coordination Team, the analyses conducted were based on average drought river flow conditions (August 1999). Other sensitivity analyses included average river flows (August 1997) and 2004 point source loads. Project impacts to DO were found to be higher during drought conditions than during average flow conditions. Supplemental model runs provided to NMFS after the publication of the DEIS have shown that when the 2004 point source loads are added to average river flows, there is an additional loss of acceptable habitat in the Front River adjacent to and upriver from the confluence with the lower Middle River. While this is a preliminary assessment and may not be completely based on accurate data, it may show that compounded effects of high point source loads and deepening of the harbor may result in additional loss of habitat for shortnose sturgeon. To offset the decrease in DO associated with the project, the injection of DO using Speece cones is proposed. The injection systems would be located along the banks of the Savannah River at three sites: the Georgia Pacific facility, located above the project area; and at International Paper within the project area on the West and East sides of Hutchinson Island along the Front River and Back River. The systems would be operated during July through September to provide the needed amount of oxygen. The cost to operate the systems would use a large portion of the mitigation budget. NMFS has previously expressed a concern to the COE about whether the on-going cost to operate the systems can be maintained in perpetuity. In its response, the COE stated that funding for any portion or feature of the project, whether

mitigation or navigation, is subject to the normal budgetary process and appropriation by the US Congress. The COE stated they cannot predict or speculate on the amount of appropriations that a future Administration or Congress may provide to operate the Savannah Harbor Navigation Project. Without funds to operate the Navigation Project, the COE said they would have no funds to operate the project's mitigation features. They further stated that failure to operate all aspects of the project as described in the EIS and the Record of Decision (including its mitigation features) would subject the COE to legal challenges that it is operating the project outside its NEPA clearances. NMFS is concerned that the environmental impacts will continue in perpetuity, while the mitigation measures will only be operational as long as funding is available. The COE's record of not providing adequate maintenance of the mitigation features within the Savannah National Wildlife Refuge partially substantiates this concern.

NMFS also questions the efficacy of the injection systems to actually increase DO in the areas of concern. It is critical for the continued existence of shortnose sturgeon that DO remains at levels acceptable to shortnose sturgeon, particularly for juveniles which cannot tolerate low DO, even for short duration. The DEIS states that the injection system has been designed to remove the incremental effect of a deeper channel in 97 percent of the bottom half of the water column. Using the bottom half instead of the deepest layer of the water column for the modeling design may not benefit shortnose sturgeon since they are bottom feeders and they would encounter the lowest DO along the deepest portions of the river. If the current design and placement of the injection system does not provide any benefit for the foraging shortnose sturgeon, its use as a measure to offset impacts to shortnose sturgeon is negated. **NMFS continues to be concerned that this is a very risky operation with a high degree of uncertainty.**

Proposed Sill at Lower Middle River

Recent discussion with the COE has raised concern about the proposed construction of a higher sill within the lower Middle River. A low sill currently exists, but as a measure to block the salt wedge from entering the lower Middle River after the deepening, construction of a higher sill is proposed. It is important to protect the deep hole, which is heavily utilized by shortnose sturgeon, and located just beyond the existing sill, from receiving the higher salinities that will occur with the deepening in the Front River. It was thought that by raising the height of the sill, the heavier, more saline water would be prevented from entering the area surrounding the deep hole. While NMFS believes that construction of the sill could benefit the shortnose sturgeon, **NMFS is also concerned that the maintenance requirements needed to keep the sill functioning properly have not been included in the COE's budget. Monitoring of the sill should also be included in the Monitoring and Adaptive Management Plan.**

Fish Passage at New Savannah Bluff Lock and Dam

While NMFS agrees with the COE that there are impacts to shortnose sturgeon associated with the inaccessibility to spawning habitat above the New Savannah Bluff Lock and Dam and that

providing access to this habitat would benefit sturgeon, we disagree with the proposal to construct a fish passage bypass around the dam, as currently designed. The construction of a bypass facility to pass shortnose (or Atlantic) sturgeon at this site may not be successful. Unlike shad and herring which swim high in the water column and orient to surface currents, sturgeon are primarily found on the bottom and have distinctly different swimming behavior. Shortnose sturgeon may not be able to adapt to the currently proposed facility. The construction of the proposed design for the purpose of passing sturgeon could be a failed venture that would require additional mitigation measures as a part of adaptive management.

According to the COE, the construction of a fish bypass at the New Savannah Bluff Lock & Dam would involve the least cost and would be the most environmentally acceptable method of providing a measure to offset impacts to the shortnose sturgeon. Information on page 65 of Appendix C of the DEIS states that the cost of removing the lock and dam would exceed the cost to construct a fishway. However, the COE did not include the total costs associated with providing fish passage at the New Savannah Bluff Lock and Dam in their estimates. The lock and dam also need extensive repairs and rehabilitation, which in 2001 was estimated to cost approximately $6.8 million. According to the Congressional authorization, fish passage construction and rehabilitation of the lock and dam are linked. The rehab cost ($6.8 M at 2001 prices) plus the estimated cost of fish passage construction ($6.3 M), well exceed the cost of dam removal ($7.5 M). Other costs to consider are the monitoring for detection of sturgeon, the monitoring and maintenance of the fishway, and the construction of a mixing tower to aid in temperature adjustment between the mixing bodies of water. Additionally, there is a need to have a greater flow than the proposed 5 percent attraction flow for shortnose sturgeon. Shortnose sturgeon may require an attraction flow of 10 percent of the available flow during all river conditions. Shortnose sturgeon would require a wider and deeper facility than is currently designed. Additionally, with the recent proposed listing of the Atlantic sturgeon, this species would also need to be accommodated and would require a wider and deeper fish passage facility. In addition to the costs associated with the rehabilitation of the lock and dam, and the upfront costs associated with the construction of a fish bypass and its infrastructure, there would be continual maintenance needed for the bypass and for the lock and dam. There are no proven results that indicate that the COE would maintain the lock and dam as it has not had maintenance provided for a long time. There is also no guarantee that funds would be available to provide needed maintenance of the fish passageway in perpetuity. NMFS recommends that the COE re-address the cost estimates to better reflect all of the associated costs involved in construction and maintenance of the fish bypass and lock and dam.

The regional resource agencies were recently contacted (on October 1, 2010) by the COE to provide input on the proposed fish passage design. The responses received from the agencies clearly indicated that there is concern about the design and that the best alternative would be removal of the lock and dam. Comments provided about the design emphasized the lack of its

proven effectiveness to pass sturgeon. Previous comments provided to the COE by NMFS explained how a single miscalculation or any combination of the various attributes of the design could cause it to fail. For example, a lack of adequate water flow, an inadequate attraction flow to direct sturgeon to the bypass, wrong placement of boulders or resting places within the bypass, the wrong slope of the rock ramp, or inadequate depth and width characteristics could contribute to the structure not being successful in passing sturgeon.

From a risk management perspective, NMFS continues to strongly support removal of the lock and dam and believes this is the best and most meaningful mitigation offered that will result in a benefit for the endangered shortnose sturgeon.

Essential Fish Habitat provisions of the Magnuson-Stevens Fishery Conservation and Management Act

The NMFS Habitat Conservation Division has reviewed the DEIS, the DGRR, and information subsequently provided by the COE. With the exceptions noted below, these documents and information provide sufficient information to complete the EFH consultation and to develop appropriate EFH conservation recommendations.

Project Impacts

Entrance Channel (Ocean Bar Channel) Deepening and Extension
In November 2009, the Savannah District first advised NMFS of the need to extend the Ocean Bar Channel seaward of station -60+000B (this station marks the seaward limit of the existing channel). The length and dredging needed for this extension depend on the project depth (DEIS Table 3-1). Under the locally preferred plan (LPP), the channel would be lengthened 38,600 feet and require approximately 4,212,500 cubic yards of dredging (DEIS Table 3-9). This material would be disposed at two locations, referred to as "Site 11" and "Site 12" in the DEIS, and configured in a manner to serve as an artificial reef attractive to fish. Within the footprint of the existing Ocean Bar Channel (i.e., landward of station -60+000B), 9,113,013 cubic yards would be dredged. This material, along with some additional material from near the harbor entrance, would be placed in seven to nine nearshore areas (DEIS Section 3.07 and Section 5.13) near Tybee Island. Currents and waves would separate sandy material from silty material, remove the silty material from the area, and transport the sandy material onto the beach at Tybee Island.

As indicated in past correspondence with the COE (most recently September 9, 2010 and November 24, 2010) NMFS Habitat Conservation Division requests additional information to complete evaluation of this portion of the project as it is currently proposed, including:

- Surveys for hardbottom habitat within and near the Ocean Bar Channel extension, Site 11 and Site 12;
- Designs for the mounds that would be constructed at Sites 11 and 12;
- Projections of the design life of the mounds at Sites 11 and 12 along with descriptions of any maintenance that would occur;

- Monitoring plans for evaluating the success and durability of the mounds at Sites 11 and 12 and descriptions of how monitoring results would inform maintenance of the mounds and determine if corrective actions are needed, should the mounds not perform as designed;
- Clarification on the projected use of Sites 5 and 6, which are shown in figures (e.g., Figure 3-2) describing the nearshore placement areas but which are not discussed in the text;
- Verification that hardbottom habitat does not occur in or near the nearshore placement areas;
- Estimates of the amount of material expected to be transported to the beach from the nearshore mounds near Tybee Island and descriptions of the fate of the remaining material (e.g., will the eroded fine material affect borrow areas used for traditional beach nourishment projects);
- Discussion of the feasibility of placing material during winter months only into the nearshore mounds to avoid impacting benthic communities during periods of peak production and foraging by fishery resources;
- An element of the Adaptive Management Program that focuses on monitoring the nearshore placement of dredge material to evaluate the success of nearshore placement, assesses the impacts from the placement, and describes how monitoring results would inform maintenance and guide corrective actions, should the mounds not perform as designed.

While this additional information is needed for the NMFS Habitat Conservation Division to complete its evaluation, we offer below some general comments. Given the past and previous detrimental effects of the navigation channel on the beaches of Tybee Island, the NMFS Habitat Conservation Division supports plans to ameliorate those impacts. Assuming the dredged material from the extension of the Ocean Bar Channel is beach quality, the surest manner to address the impacts at Tybee Island would be to place the material from the channel extension directly onto the beach at Tybee Island. Dredged material from more landward areas that is not of sufficient quality for direct beach placement could be placed into the offshore dredge material disposal site. If the upcoming surveys of the Ocean Bar Channel extension show hardbottom habitat would be impacted by the project, these impacts could be addressed via options such as the State of Georgia's artificial reef program. However, if the COE is committed to disposing material at Sites 11 and 12 in manners that may provide suitable fish habitat, NMFS will work with the COE on the design of the mounds and the monitoring that will gauge effectiveness and inform maintenance decisions.

Monitoring and Adaptive Management

By letter dated July 31, 2009, NMFS provided the COE with a detailed review of the adaptive management program and the monitoring needed to implement the program. DEIS Appendix D provides a revised plan for the adaptive management program. While the revised plan provides some additional detail on the monitoring and includes an updated budget, principal omissions from the last review remain in the current version of Appendix D:

- The plan does not provide explicit criteria for evaluating the success of mitigation measures or triggers for initiating corrective actions. The plan should include a mechanism that ensures results from monitoring feed into operation of the dredges and the oxygen injection system. Also, the success criteria and triggers would need to take into account expected rates of sea level rise and the new hydrodynamic regime that would be established in the estuary as a result of project construction.

- The plan does not include monitoring of the marshes for use by crabs, shrimp, and other invertebrates that provide the forage base for fishery species. We do note, however, that since our letter from July 2009, the COE has added fish monitoring of the marshes, but only for the post-construction phase of SHEP. Monitoring for fish and invertebrates should be conducted in synchronization with the marsh vegetation monitoring.

National Marine Fisheries Service
Page 1

753-BB-26-EV01
Comment: *Deepening of the Savannah Harbor Entrance Channel and construction of the Channel Extension will require dredging to be conducted over a long project period. The COE has proposed the use of hopper dredges for the offshore dredging in the project area. NMFS believes the use of hopper dredges over an extended time period greatly increases the chances of impact with sea turtles and may make it necessary to use relocation trawling as an aid in their protection. The revision of the new South Atlantic Regional Biological Opinion (SARBO) is underway and may contain additional measures to be implemented. Regardless of whether or not the SARBO is completed by the time the project dredging is to begin; the COE should be pro-active in its commitment to protect sea turtles. The Biological Opinion to be issued in conjunction with our review of SHEP is likely to provide additional recommendations and estimates on turtle take.*

Response: Concur. The Corps is proactive in its commitment to sea turtles. In addition to restricting hopper dredging activities during periods when turtles are known to occur in abundance, installing draghead deflectors and real-time dredging quality management software on all dredges operating under contract, South Atlantic Division encourages 100% (24-hr) observer coverage on hopper dredges, which is more stringent than what is outlined in the 1997 NMFS SARBO. The District has employed 100% observer coverage on all O&M dredging for over ten years. The Corps intends to continue with the 100% observer coverage for the proposed project.

Page 2

753-BB-26-EV02
Comment: *NMFS acknowledges the COE's commitment to adhere to the 10-knot speed restriction. However, we note that on page 181 of Appendix B of the DEIS it states: " ... hopper dredges will be restricted to 10 knots when loaded with material transiting to disposal areas and to 12 knots when light-loaded returning from disposal areas during the calving season." Subsequent personal communication with staff within the COE's South Atlantic Division confirmed that the vessel speed when loaded and when light-loaded will be 10 knots. The information should be correctly stated in the FEIS to reflect the COE's commitment to adhere to the 10-knot speed restriction.*

Response: Concur. Page 181 of Appendix B in the DEIS has been revised to reflect the correct language.

753-BB-26-EV03
Comment: *The Atlantic sturgeon was recently proposed for listing. If the listing becomes final before section 7 consultation is concluded, a discussion of the project effects on the species will be included in the Biological Opinion. If a decision has not been reached, Atlantic sturgeon will be included by Conference under section 7 of the ESA.*

Response: Concur. Even though the listing for the Atlantic Sturgeon is not final, the BATES considers project effects on the species and the NMFS Biological Opinion thoroughly addressed the Atlantic sturgeon.

Page 3

753-BB-26-EV04

Comment: *Overall, the habitat suitability maps produced using the habitat criteria indices for adult shortnose sturgeon showed reasonably good agreement with previous field data collected on shortnose sturgeon, however, the maps produced for juvenile sturgeon did not show good agreement between documented habitat, as determined by field research, and the modeled results. In using a conservative maximum salinity index of <= 4 ppt, as developed by the Fisheries Coordination Team, the output excluded documented habitat for the larger juvenile shortnose sturgeon. It is believed this occurred due to the ability of larger juveniles to tolerate salinities higher than 4 ppt, whereas higher salinities have been proven to be detrimental to small juveniles in lab experiments. In order to generate maps that would include available habitat of the large juveniles, NMFS proposed that the maximum salinity index should be increased to <= 14.9 ppt, which was the maximum salinity measured during research conducted by Collins et al. (2001), where large juveniles (measuring 32.3 cm to 47.6 cm fork length) were located. (It is important to note that sampling of smaller juveniles has not been conducted in the lower Savannah River, although they are presumed to occur there.) The COE acknowledged our request to revise the salinity criteria. Once the new criteria were used in the modeling of habitat, the mapped results showed a more accurate depiction of acceptable habitat, particularly in the area of the lower Middle River, which includes a deep hole (~7.9 meters depth) used by large juvenile and adult sturgeon during the winter, and also within the Front River at the confluence with the lower Middle River to above Steamboat Creek.*

Response: The Corps is pleased that NOAA concurs that the habitat modeling produced a more accurate depiction of acceptable habitat when the revised criteria were included.

753-BB-26-EV05

Comment: *Ground-truthing of the habitat suitability maps was based on field research conducted in the lower Savannah River, which indicated that large juvenile shortnose sturgeon prefer the Front River from just above the deeper Kings Island Turning Basin to the mouth of Abercorn Creek (located near Interstate 95). During the winter, they also heavily utilize the deep hole located in the lower Middle River and adjacent portions of the Middle River. They have not been documented in the Back River. Within the project area, adult shortnose sturgeon have been found to utilize the entire length of the Front River, the entire length of the Middle River, the uppermost reaches of the Back River, and the Sediment Basin/Tide Gate area within the lower Back River. They migrate upriver to the base of the New Savannah Bluff Lock and Dam for spawning. They have not been shown to use the full length of the Back River and recent tracking data, conducted by The Nature Conservancy, indicates adult sturgeon may enter the Sediment Basin from the lower end of the Back River or access it by traveling through Rifle Cut, which connects the Middle and Back Rivers. According to personal accounts from biologists conducting research in the Back River and a bathymetry map of the project area produced by the COE, there are portions of the middle section of the Back River above Rifle Cut that have depths that may be too shallow for the passage of sturgeon during certain tide stages. Firsthand accounts by these same biologists also report that portions of the Sediment Basin have become too shallow to navigate.*

Response: The Corps conducted studies in conjunction with the Fisheries Interagency Coordination Team, and the results of those studies did not indicate a lack of depth as problematic in the areas suggested. That Interagency Team did not identify river depth as a limiting factor in what would be considered acceptable habitat for Shortnose sturgeon. The model bathymetry map represents average depths from a 2004 USGS survey. The channel cells do not go dry during model simulations or experience instabilities due to wetting and drying. The actual survey data indicates the presence of deep holes along this stretch of river.

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753-BB-26-EV06

Comment: *The COE performed analyses using the habitat criteria for the existing conditions (-42 feet) and for the five deepening scenarios (-44, -45, -46, -47, and -48 feet). The models predicted outcomes with and without the proposed flow re-routing and dissolved oxygen injection. (Flow re-routing mitigation was proposed to offset potential impacts to the adjacent Savannah National Wildlife Refuge. It is important to note that over 160 different flow re-routing models were conducted to evaluate the effects of each mitigation plan. The proposed injection of dissolved oxygen as mitigation is addressed later in this document.)*

Response: Concur. The analyses performed to evaluate impacts of the various proposed mitigation plans at each depth alternative were extensive, allowing the Cooperating Agencies and Fisheries Interagency Coordination Team to review a comprehensive assessment when examining impacts of the various project alternatives.

753-BB-26-EV07, 753-BB-26-EV08, 753-BB-26-EV09

Comment: *In addition to the modeling runs shown in the DEIS, the COE performed other analyses that included parameters such as high dissolved oxygen loading superimposed on the habitat parameters for adult shortnose sturgeon during the summer and winter and also for large juvenile shortnose sturgeon during winter conditions. Other scenarios included project effects with the deepening only, deepening plus hydrological modifications, and deepening with the hydrological modifications and dissolved oxygen injection. While NMFS appreciates the time and effort by the COE to produce the modeled outputs, there is much uncertainty in the results and maps depicting suitable habitat have conflicting information. This is probably due to the highly complex nature of the modeling design. NMFS remains hopeful that the COE will be able to deliver model outputs that provide accurate predictions of the project effects, but at this time we do not have these products. A preliminary assessment based on information in the tables provided in the DEIS (although they may not be entirely accurate) show that the 47-foot (National Economic Development Plan)and 48-foot (Maximum Authorized Plan) deepening alternatives would result in significant habitat loss for adult shortnose sturgeon during January conditions (439 acres lost) and August conditions (113 acres lost). There would also be loss of juvenile shortnose sturgeon habitat during January conditions (21.6 acres lost). Specific measures to address the predicted loss of foraging habitat for shortnose sturgeon within the project area were not identified in the DEIS.*

Response: The models employed in the Corps' analysis are complex, but they were developed over a number of years by subject matter experts with integrated input from the Cooperating Agencies and the Fisheries Interagency Coordination Team to ensure the results were meaningful and accurate. While all models have uncertainty, the SHEP hydrodynamic and water quality models are the best prediction tool available to understand future conditions in the harbor under various scenarios and allow stakeholders to make decisions regarding future harbor improvements. Earlier in this letter NOAA stated that

incorporating the revised SNS habitat criteria resulted in the habitat modeling producing more accurate depictions of acceptable habitat.

The Corps provided NMFS the updated modeling scenarios as requested, and the results have been incorporated into the Final EIS.

The habitat suitability criteria used in the model runs were defined and agreed upon by the Cooperating Agencies and the Fisheries Interagency Coordination Team, of which NMFS was a participating member. The criteria used in the model runs include both summer and winter foraging habitat for Shortnose Sturgeon. The Corps believes the criteria, data, and outputs of the models as presented in the DEIS and coordinated with NMFS, are sufficient to evaluate impacts from the different project alternatives. To specifically address Shortnose Sturgeon foraging habitat, the Corps funded additional analyses requested by NOAA of the bottom substrates in the upper harbor and in the main river up to I-95 (Dial Cordy, 2010). The investigation found the bottom to consist predominantly of sands, which readily support benthic communities used by sturgeon. As noted in Section 5.3.2 of the EIS, the Cooperating Agencies and the Fisheries Interagency Coordination Team could not identify measures in the estuary that could completely restore Shortnose Sturgeon habitat. As a result, the team agreed in June 2007 that allowing passage around the lowest dam on the river, the New Savannah Bluff Lock and Dam, would provide an additional 20 miles of upstream habitat and would compensate for habitat losses, including foraging habitat, in the estuary due to deepening of the harbor.

753-BB-26-EV10

Comment: *Some of the proposed flow re-routing modifications include closing Rifle Cut and allowing the Sediment Basin to fill-in. The COE's assessment of the habitat .suitability models with the flow re-routing modifications indicate that areas above the Sediment Basin within the Back River will become "suitable habitat" for shortnose sturgeon. However, NMFS is concerned that this is an inaccurate assessment as the elimination of Rifle Cut, which connects the Middle and Back Rivers, coupled with the shallow depth of the Sediment Basin, could result in the Back River becoming a dead end for adult sturgeon trying to migrate between their upriver spawning habitat and downstream foraging habitat. Juvenile shortnose sturgeon already cannot enter through the lower end of the Back River due to the high salinities found there. We have concerns that what the COE is showing as habitat gained in some areas of the Back River (and we are still evaluating usage of the area) would produce an inaccurate assessment of the mitigation effects. While more habitat may be created, that could be classed as "suitable" when based on salinity and dissolved oxygen parameters, it may be located in areas not used by sturgeon or in areas that will become inaccessible to sturgeon after the flow re-routing modifications have been completed. Therefore, the "gain" would have no value to sturgeon.*

Response: The Fisheries Interagency Coordination Team (including NOAA Fisheries) did not identify river depth as a factor in what should be considered acceptable habitat for Shortnose sturgeon. The Corps' studies indicate that depths in Back River are sufficient to support fish populations and fish movement. The closure of Rifle Cut is an integral part of the flow re-routing system that minimizes salinity impacts due to harbor deepening. The Corps does not believe the closure of this feature will constrain Shortnose sturgeon access to Back River, because the Back River will still be accessible via the confluence at Middle and Little Back Rivers. The Corps believes the criteria, data, and outputs of the models are sufficient to evaluate impacts under the different project alternatives.

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753-BB-26-EN01, 753-BB-26-EV11

Comment: *The area the COE identified as of primary cOl1cern for low DO is located between Fort Pulaski and the Seaboard Coastline Railroad Bridge, a length of approximately 27 river miles. This also includes the primary areas identified as important foraging habitat for the shortnose sturgeon within the lower Savannah River. According to the DEIS, model predictions from the SHEP studies indicate that further deepening will have additional impacts on the dissolved oxygen regime in the Savannah Harbor. Using guidance provided by the Water Quality Interagency Coordination Team, the analyses conducted were based on average drought river flow conditions (August 1999). Other sensitivity analyses included average river flows (August 1997) and 2004 point source loads. Project impacts to DO were found to be higher during drought conditions than during average flow conditions. Supplemental model runs provided to NMFS after the publication of the DEIS have shown that when the 2004 point source loads are added to average river flows, there is an additional loss of acceptable habitat in the Front River adjacent to and upriver from the confluence with the lower Middle River. While this is a preliminary assessment and may not be completely based on accurate data, it may show that compounded effects of high point source loads and deepening of the harbor may result in additional loss of habitat for shortnose sturgeon. To offset the decrease in DO associated with the project, the injection of DO using Speece cones is proposed. The injection systems would be located along the banks of the Savannah River at three sites: the Georgia Pacific facility, located above the project area; and at International Paper within the project area on the West and East sides of Hutchinson Island along the Front River and Back River. The systems would be operated during July through September to provide the needed amount of oxygen. The cost to operate the systems would use a large portion of the mitigation budget. NMFS has previously expressed a concern to the COE about whether the on-going cost to operate the systems can be maintained in perpetuity. In its response, the COE stated that funding for any portion or feature of the project, whether mitigation or navigation, is subject to the normal budgetary process and appropriation by the US Congress. The COE stated they cannot predict or speculate on the amount of appropriations that a future Administration or Congress may provide to operate the Savannah Harbor Navigation Project. Without funds to operate the Navigation Project, the COE said they would have no funds to operate the project's mitigation features. They further stated that failure to operate all aspects of the project as described in the EIS and the Record of Decision (including its mitigation features) would subject the COE to legal challenges that it is operating the project outside its NEPA clearances. NMFS is concerned that the environmental impacts will continue in perpetuity, while the mitigation measures will only be operational as long as funding is available. The COE's record of not providing adequate maintenance of the mitigation features within the Savannah National Wildlife Refuge partially substantiates this concern.*

Response: The SHEP water quality impact evaluation was conducted via four model scenarios as specified by the Water Quality Interagency Coordination Team [Section 7.4.3 of the Engineering Appendix]. All model scenarios included an array of point source loadings. The basic evaluation specifies low river flow and 2004 point source loads. There are three sensitivity analyses: (1) average river flow with 2004 point source loads, (2) low river flow with 1999 point source loads, and (3) low river flow and fully permitted point source loads. Details of the water quality analysis are included in the Engineering Appendix Supplemental Materials, specifically; "Water Quality Impacts of the Savannah Harbor Expansion Project" dated Feb 2007.

Installation and operation of the oxygen injection system is a mitigation feature which is an integral part of the project. This mitigation feature is required for the project to be constructed and perform as

planned. Consequently, the inclusion of the oxygen injection system in the project is fully described in the EIS, and the Corps will document in the project Record of Decision its binding commitment to install, operate, and maintain the dissolved oxygen injection system in accordance with the project mitigation plan subject to Congressional appropriation of funds for the project, and will make the dissolved oxygen injection system a top priority for annual operation and maintenance (O&M) funds appropriated and received for the project, above normal maintenance requirements.

As for the existing freshwater control system located partially within the Savannah National Wildlife Refuge, the Corps has recently funded and completed rehabilitation of those structures.

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753-BB-26-EV12, 753-BB-26-EV13

Comment: *NMFS also questions the efficacy of the injection systems to actually increase DO in the areas of concern. It is critical for the continued existence of shortnose sturgeon that DO remains "at levels acceptable to shortnose sturgeon, particularly for juveniles which cannot tolerate low DO, even for short duration. The DEIS states that the injection system has been designed to remove the incremental effect of a deeper channel in 97 percent of the bottom half of the water column. Using the bottom half instead of the deepest layer of the water column for the modeling design may not benefit shortnose sturgeon since they are bottom feeders and they would encounter the lowest DO along the deepest portions of the river. If the current design and placement of the injection system does not provide any benefit for the foraging shortnose sturgeon, its use as a measure to offset impacts to shortnose sturgeon is negated. NMFS continues to be concerned that this is a very" risky operation with a high degree of uncertainty.*

Response: The Corps, in partnership with Georgia Ports Authority, conducted extensive analyses, including performing a demonstration project that demonstrated the capability of the Speece Cones to add oxygen to the system without adversely affecting fishery resources. The results are summarized in the *Oxygen Injection Design Report Savannah Harbor Expansion Project*, dated October 2010. The report, prepared for GPA by Tetra Tech, is included as part of the Engineering Appendix supplemental materials in the GRR. The State and Federal natural resource agencies approved the Corps' use of the EFDC and WASP computer models to evaluate potential water quality impacts from harbor deepening. The models that the agencies determined were suitable to predict impacts are the same ones that the Corps' contractors used to design the D.O. systems. The suitability of those models to simulate flow, mixing, and dispersion within the estuary under impact scenarios should be the same as for scenarios that evaluate impacts plus D.O. mitigation.

In February 2010, the Corps met with the Cooperating Agencies, including NMFS, and resource agencies to discuss refinement of the oxygen injection system. At that time, the agencies agreed that the water quality analyses could examine effects in the lower half of the water column (3 bottom layers of model grid), rather than just the bottom grid layer. It was agreed that, to refine the D.O. system design, analysis of the bottom half of the water column would be more representative and still somewhat conservative of average conditions throughout the water column. Impacts to sturgeon habitat, however, were evaluated using solely the bottom grid layer of the model. The outputs presented in the EIS are representative of bottom conditions and are not averaged over the bottom half of the water column.

7S3-BB-26-EV14, 7S3-BB-26-EV15

Comment: *Recent discussion with the COE has raised concern about the proposed construction of a higher sill within the lower Middle River. A low sill currently exists, but as a measure to block the salt wedge from entering the lower Middle River after the deepening, construction of a higher sill is proposed. It is important to protect the deep hole, which is heavily utilized by shortnose sturgeon, and located just beyond the existing sill, from receiving the higher salinities that will occur with the deepening in the Front River. It was thought that by raising the height of the sill, the heavier, more saline water would be prevented from entering the area surrounding the deep hole. While NMFS believes that construction of the sill could benefit the shortnose sturgeon, NMFS is also concerned that the maintenance requirements needed to keep the sill functioning properly have not been included in the COE's budget. Monitoring of the sill should also be included in the Monitoring and Adaptive Management Plan.*

Response: As a result of recent coordination with NOAA-NMFS, the Corps no longer proposes to raise the height of the Middle River Sill as part of the project mitigation plan.

7S3-BB-26-EV16

Comment: *While NMFS agrees with the COE that there are impacts to shortnose sturgeon associated with the inaccessibility to spawning habitat above the New Savannah Bluff Lock and Dam and that providing access to this habitat would benefit sturgeon, we disagree with the proposal to construct a fish passage bypass around the dam, as currently designed. The construction of a bypass facility to pass shortnose (or Atlantic) sturgeon at this site may not be successful. Unlike shad and herring which swim high in the water column and orient to surface currents, sturgeon are primarily found on the bottom and have distinctly different swimming behavior. Shortnose sturgeon may not be able to adapt to the currently proposed facility. The construction of the proposed design for the purpose of passing sturgeon could be a failed venture that would require additional mitigation measures as a part of adaptive management.*

Response: As noted in Section 5.3.2 of the EIS, the Cooperating Agencies and the Fisheries Interagency Coordination Team did not identify measures in the estuary that could completely restore winter Shortnose Sturgeon habitat. Therefore, the team agreed in June 2007 that allowing passage around the lowest dam on the river, the New Savannah Bluff Lock and Dam, would provide an additional 20 miles of upstream habitat and compensate for losses in the estuary due to harbor deepening. In 2010, the Corps and the Cooperating Agencies again considered other mitigation alternatives and concluded that the fish passage as designed was still the most viable solution. At that time, NMFS expressed concern over the design of the passage as noted in the comment. Following release of the DEIS, the Corps held a fish passage workshop in April of 2011, and the fish passage criteria were revised. In coordination with NMFS and other resource agencies, the fish bypass design has been altered to allow a larger percentage of flow as well as more accessible entry and exit for Shortnose sturgeon. On November 4, 2011, NMFS issued its Biological Opinion (BO) for the project, which addresses fish passage design and contains reasonable and prudent measures/terms and conditions requiring that the design ensure safe and effective passage for sturgeon (Shortnose and Atlantic). As the design process progresses, the District would coordinate with the natural resource agencies to ensure that the fish passage structure is easily available to, and usable by, all anadromous/catadromous species in the river and that the design will comply with all other applicable requirements of the BO.

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753-BB-26-EV17, 753-BB-26-EV18, 753-BB-26-EV19

Comment: *According to the COE, the construction of a fish bypass at the New Savannah Bluff Lock & Dam would involve the least cost and would be the most environmentally acceptable method of providing a measure to offset impacts to the shortnose sturgeon. Information on page 65 of Appendix C of the DEIS states that the cost of removing the lock and dam would exceed the cost to construct a fishway. However, the COE did not include the total costs associated with providing fish passage at the New Savannah Bluff Lock and Dam in their estimates. The lock and dam also need extensive repairs and rehabilitation, which in 2001 was estimated to cost approximately $6.8 million. According to the Congressional authorization, fish passage construction and rehabilitation of the lock and dam are linked. The rehab cost ($6.8 M at 2001 prices) plus the estimated cost of fish passage construction ($6.3 M), well exceed the cost of dam removal ($7.5 M). Other costs to consider are the monitoring for detection of sturgeon, the monitoring and maintenance of the fishway, and the construction of a mixing tower to aid in temperature adjustment between the mixing bodies of water. Additionally, there is a need to have a greater flow than the proposed 5 percent attraction flow for shortnose sturgeon. Shortnose sturgeon may require an attraction flow of 10 percent of the available flow during all river conditions. Shortnose sturgeon would require a wider and deeper facility than is currently designed. Additionally, with the recent proposed listing of the Atlantic sturgeon, this species would also need to be accommodated and would require a wider and deeper fish passage facility. In addition to the costs associated with the rehabilitation of the lock and dam, and the upfront costs associated with the construction of a fish bypass and its infrastructure, there would be continual maintenance needed for the bypass and for the lock and dam. There are no proven results that indicate that the COE would maintain the lock and dam as it has not had maintenance provided for a long time. There is also no guarantee that funds would be available to provide needed maintenance of the fish passageway in perpetuity. NMFS recommends that the COE readdress the cost estimates to better reflect all of the associated costs involved in construction and maintenance of the fish bypass and lock and dam.*

Response: In coordination with NMFS and the resource agencies, the Corps has updated the fish bypass design to allow a larger percentage of flow as well as more accessible entry and exit for Shortnose sturgeon. The Corps believes the current design is sufficient to allow passage of Shortnose sturgeon and allowed within the authorizations under which the NSBL&D is maintained. To ensure that the passage functions as intended, the Corps will coordinate with the natural resource agencies during development of plans and specifications to identify whether any revisions to the current design are warranted. The Corps will continue to seek input from the resource agencies of literature documentation of passage criteria for Shortnose sturgeon. See also previous response.

If the Atlantic sturgeon is formally listed, the Corps will coordinate with the NMFS to determine if any additional measures are required to protect this species.

The Corps believes the cost estimates presented in the report are accurate. Costs for maintenance of the fish passage structure and any potential modifications as a result of adaptive management practices have been included in the project costs as described in Appendix D of the DEIS. Installation and operation of the fish passage is a mitigation feature which is an integral part of the project. This mitigation feature is required for the project to be constructed and perform as planned. Consequently, the inclusion of the fish passage in the project is fully described in the EIS, and the Corps will document in the project Record of Decision its binding commitment to install, operate, and maintain the fish passage in accordance with the project mitigation plan subject to Congressional appropriation of funds for the project.

753-BB-26-EV20

Comment: *The regional resource agencies were recently contacted (on October 1, 2010) by the COE to provide input on the proposed fish passage design. The responses received from the agencies clearly indicated that there is concern about the design and that the best alternative would be removal of the lock and dam. Comments provided about the design emphasized the lack of its proven effectiveness to pass sturgeon. Previous comments provided to the COE by NMFS explained how a single miscalculation or any combination of the various attributes of the design could cause it to fail. For example, a lack of adequate water flow, an inadequate attraction flow to direct sturgeon to the bypass, wrong placement of boulders or resting places within the bypass, the wrong slope of the rock ramp, or inadequate depth and width characteristics could contribute to the structure not being successful in passing sturgeon.*

Response: The best alternative for fish would be removal of the dam. However, there are other factors to consider (please see next response). In 2010, the Corps requested comments of the natural resource agencies on the proposed horseshoe bypass design for the fish passage. In response, NMFS expressed concern over the design similar to that stated in this comment letter. However, fishery experts in the regional natural resource agencies did not identify any specific change to the proposed design that needed to be made as a result of recent documented fish passage research. In April 2011, the Corps convened a fish passage workshop to review the design of the fish bypass. As a result of that meeting, fish passage criteria were revised. In coordination with NMFS and other resource agencies, the fish bypass design has been updated to allow a larger percentage of flow as well as more accessible entry and exit for Shortnose sturgeon. On November 4, 2011, NMFS issued its Biological Opinion (BO) for the project, which addresses fish passage design and contains reasonable and prudent measures/terms and conditions requiring that the design ensure safe and effective passage for sturgeon (Shortnose and Atlantic). As the design process progresses, the District would coordinate with the natural resource agencies to ensure that the fish passage structure is easily available to, and usable by, all anadromous/catadromous species in the river and that the design will comply with all other applicable requirements of the BO. The Corps would also monitor the passage of Shortnose sturgeon through the structure to ensure it performs as intended.

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753-BB-26-EV21

Comment: *From a risk management perspective, NMFS continues to strongly support removal of the lock and dam and believes this is the best and most meaningful mitigation offered that will result in a benefit for the endangered shortnose sturgeon.*

Response: The Corps acknowledges that removal of the lock and dam is NMFS' preferred method to allow sturgeon access to upstream habitat. The Corps also acknowledges that removal of the lock and dam would benefit the ecosystem. However, removal of the New Savannah Bluff Lock and Dam is not a feasible mitigation alternative for the following reasons:

1) The lock and dam is a Congressionally-authorized project maintained by the Corps; therefore, we are obligated to maintain the project as Congress provides funding.
2) The current authorization language (WRDA 2000, amended in Omnibus Act 2001) calls for repair and rehabilitation of the structure, construction of a fish passage, and conveyance of Lock and Dam to the City of North Augusta.
3) The Corps must maintain a pool elevation so as not to impact current users.
4) Removal of the structure would adversely impacts freshwater supply for eight major users.

753-BB-26-EV22

Comment: *As indicated in past correspondence with the COE (most recently September 9, 2010 and November 24, 2010) NMFS Habitat Conservation Division requests additional information to complete evaluation of this portion of the project as it is currently proposed, including:*

Response: After coordination with GADNR-CRD, the dredged material placement plan has been revised and now calls for placement of all entrance channel sediments into previously-approved areas: either the Offshore Dredged Material Disposal Site or an upland confined disposal site. The Final EIS has been revised to reflect this change. The Corps will perform additional surveys prior to construction of the entrance channel extension to ascertain any potential impacts to hardbottom habitat.

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753-BB-26-EV23, 753-BB-26-EV24

Comment: *While this additional information is needed for the NMFS Habitat Conservation Division to complete its evaluation, we offer below some general comments. Given the past and previous detrimental effects of the navigation channel on the beaches of Tybee Island, the NMFS Habitat Conservation Division supports plans to ameliorate those impacts. Assuming the dredged material from the extension of the Ocean Bar Channel is beach quality, the surest manner to address the impacts at Tybee Island would be to place the material from the channel extension directly onto the beach at Tybee Island. Dredged material from more landward areas that is not of sufficient quality for direct beach placement could be placed into the offshore dredge material disposal site. If the upcoming surveys of the Ocean Bar Channel extension show hardbottom habitat would be impacted by the project, these impacts could be addressed via options such as the State of Georgia's artificial reef program. However, if the COE is committed to disposing material at Sites 11 and 12 in manners that may provide suitable fish habitat, NMFS will work with the COE on the design of the mounds and the monitoring that will gauge effectiveness and inform maintenance decisions.*

Response: The Final EIS was updated to show placement of new sediment from the entrance channel in either the ODMDS or an upland confined disposal site. Sites 11 and 12 have been removed from project plans.

If surveys of the area of the bar channel extension indicate the project may potentially impact hardbottom habitats, then mitigation for such impacts will be evaluated at that time.

753-BB-26-EV25

Comment: *By letter dated July 31, 2009, NMFS provided the COE with a detailed review of the adaptive management program and the monitoring needed to implement the program. DEIS Appendix D provides a revised plan for the adaptive management program. While the revised plan provides some additional detail on the monitoring and includes an updated budget, principal omissions from the last review remain in the current version of Appendix D:*

Response: The Monitoring and Adaptive Management Plan (Appendix D of the EIS) provide a discussion of post-construction monitoring and the decision making process that would determine if additional monitoring and/or mitigation measures are warranted. The plan does not identify specific acceptability criteria for water quality or biological parameters that would trigger the need for action to implement additional monitoring or modify the various mitigation measures. Specific parameters were not established so as not to limit the judgment of experts with respect to when changes might need to be made. In other words, based on the data collected, some resource experts may see the need to modify monitoring and/or a mitigation measure, even though a specific threshold for a parameter has not been reached. Also, resource experts may become concerned about the potential cumulative impacts of several parameters even though the threshold limits have not been exceeded for any one parameter. Establishing thresholds for individual parameters would remove that flexibility. Based on recent coordination with NMFS, the Corps has agreed to establish expected ranges of predicted values for certain water quality parameters. This discussion has been added to the pre-construction monitoring section of the Monitoring and Adaptive Management Plan.

Decision points about changes in the monitoring plan or mitigation features could be reached at any time during the post-construction monitoring effort. Monitoring data and reports would be made available to the resource agencies as soon as possible. Although the plan provides for a meeting between the Corps and the resource agencies at the end of each year of monitoring to discuss the data and any changes that need to be made, such a meeting could be required at any time if concerns so dictate. If the monitoring identifies impacts that are well outside of those predicted, consultation with the resource agencies would begin immediately. Corrective actions could range from a change in the monitoring plan to a cessation of construction activities until a given problem could be rectified.

The Corps believes the current Monitoring and Adaptive Management plan is adequate to address impacts of the project and its associated mitigation features.

From: Hector.L.Schmidt@uscg.mil on behalf of Schmidt, Hector LTJG
To: CESAS-PD, SAS
Cc: Embres, Joseph
Subject: DEIS Savnah Dredge Project
Date: Friday, December 10, 2010 11:01:56 AM
Attachments: 10-170 Signed-Response letter to ACOE Draft EIS Savannah Dredge Project.pdf

Mr. Bailey,

Please see the attached letter for the Seventh Coast Guard District's response to your request for comments regarding the Savannah Dredge Project DEIS. Thank you very much for including us in your preliminary discussions and scoping process. Our office does plan to send Mr. Joe Embres to the Evaluation Group meeting at 9 AM, Tuesday, December 14, 2010 and the Expansion Project Workshop for the public at 4-8 PM, Wednesday, December 15, 2010. If you should have any questions regarding our letter or if there is anything else that we can help with please let him know. He can be reached at Joseph.B.Embres@uscg.mil or 305-415-6750.

Thank you,

LTJG Hector Schmidt
U.S. Coast Guard District Seven
Waterway Management
PH# 305-415-6748
FAX# 305-415-6757

U.S. Department of Homeland Security
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16518
Serial: 10-170
08 Dec 2010

William G. Bailey
Chief, Planning Division
Department of the Army
Savannah, District
100 W. Oglethorpe Ave
Savannah, GA 31401-3640

Dear Mr. Bailey,

This letter responds to your November 15, 2010, letter informing the Seventh Coast Guard District that the Savannah District, Army Corps of Engineers has prepared a Draft Tier II Environmental Impact Statement (DEIS) and General Reevaluation Report to incrementally evaluate deepening the Savannah Harbor Federal Navigation Project to a maximum depth of -48 feet Mean Lower Low Water as authorized by the Water Resource Development Act of 1999. Please accept this letter as our official response to that request.

The proposed project includes: channel deepening from the sea through the Harbor Entrance Channel to the Garden City Terminal; channel widening to create meeting areas at Long Island and Oglethorpe Ranges; widening and deepening of the Kings Island Turning Basin; and channel widening at three bends.

At this time, we have identified two issues of concern that are not included in your DEIS. We recommend both of our below concerns be addressed in your Tier II Environmental Impact Statement.

1. The proposed change in direction, widening, deepening and lengthening of the Harbor Entrance Channel, meeting areas, Kings Island Turning Basin and widening at three bends will create a need for the Coast Guard to reposition, establish and disestablish Navigational Aids, to include the construction of a new lighted channel entrance Range. The lighted entrance Range will require the installation of submerged electrical cable on the sea floor from the shoreline out to approximately six miles offshore. The addition of multiple buoys marking the extended entrance channel and the construction of a new Range will cost an estimated $4,000,000.00 for this project, which has not been identified nor forecasted.

2. The proposed change in lengthening the Harbor Entrance Channel will create a need to relocate the sea buoy further offshore. This change will impact Coast Guard Regulation 33 CFR 165.756 – Regulated Navigation Area (RNA); Savannah River, Georgia. The proposed change may add longer delays to incoming and outgoing vessels when the specific conditions are met within the RNA.

Please note that this response is based on your DEIS and that there may be additional concerns if there are changes with the proposed project. We look forward to continued cooperation with you during the planning phase of this project. If you have any questions, please feel free to contact me at 305-415-6750.

Sincerely,

J. B. EMBRES
Chief, Planning and Marine Information Section
Aids to Navigation and
Waterways Management Branch
Seventh Coast Guard District

Copy: USCG MSU Savannah
USCG Sector Charleston
USCG CG-553
USCG CEU Miami

U.S. Department of Homeland Security, United States Coast Guard

Page 2

187-MR-02-EC01

Comment: *The proposed change in direction, widening, deepening and lengthening of the Harbor Entrance Channel, meeting areas, Kings Island Turning Basin and widening at three bends will create a need for the Coast Guard to reposition, establish and disestablish Navigational Aids, to include the construction of a new lighted channel entrance Range. The lighted entrance Range will require the installation of submerged electrical cable on the sea floor from the shoreline out to approximately six miles offshore. The addition of multiple buoys marking the extended entrance channel and the construction of a new Range will cost an estimated $4,000,000.00 for this project, which has not been identified nor forecasted.*

Response: Costs for the new navigation range were identified in the project reports [see Table 13 of the Engineering Appendix] and included in the economic analysis of the project. The Coast Guard is responsible for funding and implementing the needed navigation aids. The length of time it typically takes between a draft feasibility report and a constructed deep-draft navigation project provide the Coast Guard with time to budget for these expenses. Savannah District will coordinate with the Aids To Navigation and Waterways Management Branch of the Seventh Coast Guard District as this project moves forward.

187-MR-02-EN01

Comment: *The proposed change in lengthening the Harbor Entrance Channel will create a need to relocate the sea buoy further offshore. This change will impact Coast Guard Regulation 33 CFR 165.756 - Regulated Navigation Area (RNA); Savannah River, Georgia. The proposed change may add longer delays to incoming and outgoing vessels when the specific conditions are met within the RNA.*

Response: Concur that with the sea buoy relocated / entrance channel extended farther offshore, the time to transit the port would be lengthened. The longer entrance channel was included in the HarborSym analysis, which determined that total vessel delays (compared to the no-action alternative) would decrease with the proposed harbor deepening.

From: Catsambis, Alexis CIV NHHC
To: CESAS-PD, SAS
Cc: Neyland, Robert NAVHISTCEN; Schwarz, George R CIV NHHC
Subject: Savannah District Draft EIS Comments
Date: Monday, January 10, 2011 5:05:43 PM

Dear Mr. Bailey,

Thank you for allowing the Naval History & Heritage Command (NHHC) the opportunity to comment on your extensive and well-prepared DEIS and GPR pertaining to the Savannah Harbor Federal Navigation Project.

Whereas we still need some time to put together an official hard-copy response, pending informal discussions with partner SHPOs, we wanted to formally convey some key thoughts while the extended comment period is still in effect. These relate to the primary point of interest to NHHC, the data recovery effort from CSS Georgia.

Overall, a good general plan has been laid out for the CSS Georgia site and we are grateful for the demonstrated concern and efforts of the USACE, as well as the Georgia and South Carolina SHPOs, in properly addressing this resource. However, and in view of the Navy's role as managers of the resource under the Sunken Military Craft Act, we would like to express the following comments:

-The Sunken Military Craft Act (H.R. 4200, Title XIV) is not included in the list of Federal Laws and Policies that USACE must consider in its proposed actions (Table 1-2, page 1-9). As you are aware, CSS Georgia falls under the protection of the Sunken Military Craft Act.

-The CSS Georgia Programmatic Agreement does not include the Naval History and Heritage Command (NHHC) as a consulting party. The US Navy maintains
ownership of CSS Georgia and is responsible for its preservation, therefore NHHC should be included as a partner in all planning, excavation, and conservation phases affecting the site. Consulting party status should be a consideration.

-USACE has not expressly identified funding for conservation of CSS Georgia artifacts, although a $5 million estimate is listed as a ceiling for recovery costs and a $20,000/yr is put aside for curation of the recovered material. We would like to ensure that USACE factors in conservation costs. These may be reflected on pg. 179 of the GPR, but we could not locate a related textual reference in either document.

-There is mention in the DEIS, but not in the Programmatic Agreement, that USACE must file an Archaeological Research Permit Application For Ship and Aircraft Wrecks under the Jurisdiction of the Department of the Navy prior to any intrusive archaeological investigation of the CSS Georgia site. We would like to ensure that this requirement is clear.

Thank you again for the opportunity to comment and for your continuing efforts. Congratulations on your work thus far; we look forward to working with you on this project in the future. If we can be of further assistance or for any clarifications, please do not hesitate to contact Dr. Robert Neyland, Head of the NHHC's Underwater Archaeology Branch at (robert.neyland@navy.mil) or (202)-758 3850.

Kind Regards,

Alexis Catsambis

Alexis Catsambis
Underwater Archaeologist & Cultural Resource Manager
Underwater Archaeology Branch,
Naval History & Heritage Command, Dept. of the Navy

Washington Navy Yard

805 Kidder Breese St, SE, Washington, D.C. 20374-5060
voice: (202) 433-9787 | fax: (202) 433-2729
email: alexis.catsambis@navy.mil

Naval History & Heritage Command

1119-MR-04-EV01
Comment: *"The Sunken Military Craft Act (H.R. 4200, Title XIV) is not included in the list of Federal Laws and Policies that USACE must consider in its proposed actions (Table 1-2, page 1-9). As you are aware, CSS Georgia falls under the protection of the Sunken Military Craft Act."*

Response: The Sunken Military Craft Act (H.R. 4200, Title XIV) has been added to Table 1-2 of the FEIS.

1119-MR-04-EV02
Comment: *"The CSS Georgia Programmatic Agreement does not include the Naval History and Heritage Command (NHHC) as a consulting party. The US Navy maintains ownership of CSS Georgia and is responsible for its preservation, therefore NHHC should be included as a partner in all planning, excavation, and conservation phases affecting the site. Consulting party status should be a consideration."*

Response: The NHHC is listed as a consulting party in the CSS Georgia Mitigation Phase and Task Description that is included in Appendix F; however, NHHC was not named as a consulting party in the Programmatic Agreement. This will be remedied by modifying the Programmatic Agreement to include the NHHC as a consulting party for the CSS Georgia portion of the project.

1119-MR-04-EV03
Comment: *"USACE has not expressly identified funding for conservation of CSS Georgia artifacts, although a $5 million estimate is listed as a ceiling for recovery costs and a $20,000/yr is put aside for curation of the recovered material. We would like to ensure that USACE factors in conservation costs. These may be reflected on pg. 179 of the GPR, but we could not locate a related textual reference in either document."*

Response: Approximately $4,500,000 has been set aside for conservation of the CSS Georgia.

1119-MR-04-EV04
Comment: *"There is mention in the DEIS, but not in the Programmatic Agreement, that USACE must file an Archaeological Research Permit Application For Ship and Aircraft Wrecks under the Jurisdiction of the Department of the Navy prior to any intrusive archaeological investigation of the CSS Georgia site. We would like to ensure that this requirement is clear."*

Response: The District will file an Archaeological Research Permit Application for ship and aircraft wrecks prior to any intrusive archaeological investigation of the CSS Georgia site.

GEORGIA STATE CLEARINGHOUSE MEMORANDUM
EXECUTIVE ORDER 12372 REVIEW PROCESS

TO: William Bailey (ATTN:PD)
U.S. Army COE, Savannah District
100 W. Oglethorpe Avenue
Savannah, GA 31401-3640

FROM: Barbara Jackson

DATE: 11/17/2010

APPLICANT: Dept. of the Army - Savannah District, COE

PROJECT: Draft Tier II Environmental Impact Statement and Draft General Re-Evaluation Report for the Savannah Harbor Expansion Project (located in Chatham County, GA and Jasper County, SC)
[Note: copy of Joint Public Notice (JPN) also included]

STATE ID: GA101117002

FEDERAL ID:

Material related to the above project was received by the Georgia State Clearinghouse on 11/16/2010. The review has been initiated and every effort is being made to ensure prompt action. The project will be reviewed for its consistency with goals, policies, plans, objectives, programs, environmental impact, criteria for Developments of Regional Impact (DRI) or inconsistencies with federal executive orders, acts and/or rules and regulations, and if applicable, with budgetary restraints.

The initial review process should be completed by 12/18/2010 (*approximately*). If the Clearinghouse has not contacted you by that date, please call (404) 656-3855, and we will check into the delay. We appreciate your cooperation on this matter.

When emailing or calling about this project, please reference the State Application Identifier number shown above. If you have any questions regarding this project, please contact us at the above number.

Form SC-1
Aug. 2010

Vance C. Smith, Jr., Commissioner

GEORGIA DEPARTMENT OF TRANSPORTATION
One Georgia Center, 600 West Peachtree Street, NW
Atlanta, Georgia 30308
Telephone: (404) 631-1000

February 11, 2011

Colonel Jeffrey M. Hall
District Commander
U.S. Army Corps of Engineers
P. O. Box 889
Savannah, GA 31402

Dear Colonel Hall:

I would like to provide written comments from the Georgia Department of Transportation (GDOT) concerning the Savannah Harbor Expansion Project (SHEP) General Reevaluation Report (GRR) and Environmental Impact Statement (EIS) that was released in November 2010. My previous letters dated July 22 and August 18, 2010 stated our commitment to the SHEP, including our willingness to fund the Locally Preferred Plan (LPP) to a depth from 47 to 48 feet. It is still our hope that you will re-evaluate the information and agree with us that the 48 foot plan should be the National Economic Development Plan (NED). Please be assured that our commitment continues for this vital project. Our comments below are provided in the spirit of partnership.

1. Please revisit the impact of salinity change on ship buoyancy and the need for additional depth at the upper end of the harbor. The report mentions there are no effects. While the water at Garden City is not purely fresh, it does have less salinity than ocean sea water. The change in salinity may be enough to justify a third of a foot or so for additional draft and can be added to the other factors to contribute to make the NED a 48 foot rather than a 47 foot plan.
2. Since the release of the report in November, Egypt has experienced political unrest. As owners of the Suez Canal, there may be changes that could influence shippers to more heavily use the Panama Canal. This could increase the use of Savannah beyond what the report shows and require a 48 foot channel.
3. The project includes removing approximately 217,263 cubic yards of new work material between stations 4+000 and 6+375. This material is planned to be placed in Jones Oysterbed Island disposal area. Could that material be placed at the eroded area between Long and Bird Island near station 10+000? This would save capacity in the disposal areas.
4. Have you double checked to make sure the ships that will be used for rapid deployment of the military from Savannah will not need a 48 foot channel during the next 50 years?

We look forward to our continued partnership with the U.S. Army Corps of Engineers to improve transportation in our state. Please do not hesitate to contact me or Mr. John Phillips, Waterways Program Manager, at (404) 631-1230, if additional information is needed.

Sincerely,

Vance C. Smith, Jr.
Commissioner

VCS:HDK:jsp

cc: Gerald M. Ross, P.E., Chief Engineer/Deputy Commissioner
Todd Long, P.E., GDOT Director of Planning
Erik Steavens, GDOT Director of Intermodal Services
John Phillips, Waterways Program Manager

Georgia Department of Transportation

1149-MM-06-EC01

Comment: *I would like to provide written comments from the Georgia Department of Transportation (GDOT) concerning the Savannah Harbor Expansion Project (SHEP) General Reevaluation Report (GRR) and Environmental Impact Statement (EIS) that was released in November 2010. My previous letters dated July 22 and August 18, 2010 stated our commitment to the SHEP, including our willingness to fund the Locally Preferred Plan (LPP) to a depth from 47 to 48 feet. It is still our hope that you will re-evaluate the information and agree with us that the 48 foot plan should be the National Economic Development Plan (NED). Please be assured that our commitment continues for this vital project. Our comments below are provided in the spirit of partnership.*

Response: It is important to recall that the NED plan is the alternative that fulfills the Federal objective and maximizes the net economic benefits to the [entire] nation while taking into account environmental, societal, and other considerations. After a very thorough analysis and rigorous review, the NED Plan was found to be the -47 feet deepening alternative. In fact, benefits do increase beyond -47-feet; however, it is just that the *net* benefits (difference between benefits and costs) are maximized at -47-foot depth. The NED plan serves as the basis for cost-sharing, which in turn sets the limit for Federal government financing. If other alternatives are economically viable, the non-Federal sponsor has the option of recommending a plan other than the NED, i.e., a Locally-Preferred Plan. In this instance, the -48-foot alternative represents the Locally-Preferred Plan for the SHEP. In light of subsequent discussions held between Savannah District and the State, the Corps will not select the 48-foot depth alternative for implementation.

1149-MM-06-EN01, 1149-MM-06-EC02

Comment: *Please revisit the impact of salinity change on ship buoyancy and the need for additional depth at the upper end of the harbor. The report mentions there are no effects. While the water at Garden City is not purely fresh, it does have less salinity than ocean sea water. The change in salinity may be enough to justify a third of a foot or so for additional draft and can be added to the other factors to contribute to make the NED a 48 foot rather than a 47 foot plan.*

Response: The Savannah Harbor Pilots Association confirmed the difference in draft resulting from salinity differences between the entrance channel and Garden City is 20 cm or 0.66 ft. All drafts reported by the SHPA are referenced to a fresh water datum. Therefore, the presence of salinity would only serve to reduce the underkeel requirement as it would make the ship more buoyant.

The underkeel clearances stated in the Economics Appendix- Section 2.6 account for dynamic conditions, viz., squat, trim, and freshwater sinkage. Once these factors are netted out, the underkeel clearance requirements are represent the standard practice in the Port, which happen to be comparable to those of other ports. This issue will be clarified in the final GRR-Economics Appendix.

1149-MM-06-EC03

Comment: *Since the release of the report in November, Egypt has experienced political unrest. As owners of the Suez Canal, there may be changes that could influence shippers to more heavily use the Panama Canal. This could increase the use of Savannah beyond what the report shows and require a 48 foot channel.*

Response: The Corps of Engineers guidance on deep-draft navigation projects emphasizes using empirical data [whenever possible] and to make forecasts over a 50-year period of analysis. This is a prudent approach because data on past and present problems help shape the future without-project condition scenario. This, in turn, serves as a baseline for project formulation and evaluation [comparisons]. As expected, a 50-year forecast contains uncertainty; therefore, several sensitivity analyses were performed using lower growth rates, no growth, and increased packaging densities. For the most part, the results show project improvements [deepening] are economically justified.

Economic conditions can change markedly from year to year. For example, in 2009 there were dramatic declines in worldwide cargo volumes and shipbuilding [economic downturn], whereas more recently external events such as Middle East unrest and the tsunami in Japan have likewise affected the shipping industry. Therefore, application of a longer [50-year] period of analysis helps to reduce short-term volatility and provides a more accurate economic picture [smoothing the curve].

1149-MM-06-EV01

Comment: *The project includes removing approximately 217,263 cubic yards of new work material between stations 4+000 and 6+375. This material is planned to be placed in Jones Oysterbed Island disposal area. Could that material be placed at the eroded area between Long and Bird Island near station 10+000? This would save capacity in the disposal areas.*

Response: The subject area experiences erosion due to high current velocities. Without detailed engineering studies, it does not appear appropriate to place unconsolidated dredged material into such a dynamic area. Also, additional environmental clearances would have to be obtained to permit discharge of dredged material into open water at that location.

1149-MM-06-EC04

Comment: *Have you double checked to make sure the ships that will be used for rapid deployment of the military from Savannah will not need a 48 foot channel during the next 50 years?*

Response: Only commercial vessels were examined in the fleet analysis. Vessels used in deployment operations [civilian/military] generally require lesser drafts [33 feet]. Therefore, the existing channel should be able to address those needs.

#613

Georgia Ports Authority

P. O. Box 2406, Savannah, Georgia 31402
(912) 964-3811, Toll Free: (800) 342-8012

Paul A. Yarborough, Sr.
Manager Contracts / Planning

December 11, 2010

Re: SHEP

Dear Mr. William Bailey,

This letter is to manifestate my personal commitment and support for this project of national interest to the U.S Army Corps of Engineers, Secretary of the Army, Department of Commerce, Department of the Interior, Department of the Army and the Environmental Protection Agency for the deepening of the Savannah Harbor to 48 ft. at mean low water.

As you know, the U.S. Army Corps of Engineers is funded and tasked by Congress to provide information to our Senators and House of Representatives offering detailed analysis of such opportunities in the Corp's General Evaluation Reports; therefore, ensuring that international commerce has a safe and adequate access to ports throughout North America. In a decade long, $40 million dollar study and with extensive communication and collaboration with all mandatory agencies, the U.S. Army Corps of Engineers economic and environmental model has undoubtedly confirmed the need to fund and complete this project with immediate financial insistence from Congress and the President.

At this occasion, we must prepare to accommodate the larger vessels navigating the Panama Canal in 2014. This project, if correctly implemented, will assist the nation in successfully meeting the National Export Initiative created by Executive Order of President Obama, as well as secure the current and future Statewide employment base in Georgia.

Respectfully submitted,

Paul A. Yarborough, Sr.

Paul A. Yarborough, Sr.

Georgia Ports Authority

Comment: *This letter is to manifest my personal commitment and support for this project of national interest to the U.S. Army Corps of Engineers, Secretary of the Army, Department of Commerce, Department of the Interior, Department of the Army and the Environmental Protection Agency for the deepening of the Savannah Harbor to 48 ft. at mean low water.*

Response: Comment noted.

Georgia Ports Authority

Telephone: 912.964.3811
Toll Free (in U.S.): 800.342.8012

P.O. Box 2406
Savannah, GA 31402
USA

Curtis J. Foltz
Executive Director

Email: cfoltz@gaports.com
Call Direct: 912.964.3878
Fax: 912.966.3615

January 25, 2011

Mr. William Bailey
Attn: PD, U.S. Army Corps of Engineers
Savannah District
100 West Oglethorpe Avenue
Savannah, Georgia 31401-3640

Dear Mr. Bailey,

Please find enclosed herewith the comments of the Georgia Ports Authority regarding the Draft Environmental Impact Statement (DEIS) and General Reevaluation Report (GRR) for the Savannah Harbor Expansion Project (SHEP).

Regards,

Curtis J. Foltz
Executive Director

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+ Port of Savannah
+ Port of Brunswick

UNITED STATES ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT
DRAFT TIER II ENVIRONMENTAL IMPACT STATEMENT
AND
DRAFT GENERAL RE-EVALUATION REPORT
FOR
SAVANNAH HARBOR EXPANSION
CHATHAM COUNTY, GEORGIA
JASPER COUNTY, SOUTH CAROLINA (NOVEMBER 2010)

COMMENTS SUBMITTED BY
GEORGIA PORTS AUTHORITY
JANUARY 25, 2011

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LIST OF ACRONYMS

CDFs	confined disposal facilities
CEER	Corps Center for Expertise for Ecosystem Restoration
CEQ	Council on Environmental Quality
Corps	United States Army Corps of Engineers
DEIS	Draft Environmental Impact Statement
Draft GRR	Draft General Reevaluation Report
EFDC	Environmental Dynamics Code
EPA	United States Environmental Protection Agency
FWS	United States Fish & Wildlife Service
GADNR	Georgia Department of Natural Resources
GAEPD	Georgia Environmental Protection Division
GDP	Gross Domestic Product
GPA	Georgia Ports Authority
ICTF	Intermodal container transfer facilities
MACTEC	MACTEC Engineering and Consulting, Inc.
MLW	Mean Low Water
MPC	Maximum Practicable Capacity
NED	National Economic Development
NMFS	National Marine Fisheries Services
P&G	Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies
SCDHEC	South Carolina Department of Health & Environmental Control
SCDNR	South Carolina Department of Natural Resources
SEG	Stakeholders Evaluation Group
SHEP	Savannah Harbor Expansion Project
SNWR	Savannah National Wildlife Refuge
SOP	Standard Operating Procedures
TCSM	Total Transportation Cost Savings Model
TEUs	twenty-foot equivalent units
TMDL	Total Maximum Daily Load
WASP7	Water Quality Analysis Simulation Program Version 7.0
WRDA	Water Resources Development Act

INTRODUCTION

The Georgia Ports Authority (the "GPA") submits these comments in support of the Savannah Harbor Expansion Project (the "SHEP") and specifically in support of deepening the Savannah Harbor and Savannah River to a Mean Low Water ("MLW") depth of forty-eight (48) feet.

The GPA takes note of the fact that the SHEP analysis documents are by necessity of imposing quantity and detail. At the same time, GPA believes it is useful for all parties to begin their analysis in the context of the expansive structure of the SHEP review, as it has set a new and very high standard for environmental and economic study of port infrastructure development. The GPA believes that the SHEP draft Environmental Impact Statement ("DEIS") and the Draft General Reevaluation Report ("Draft GRR") reflect the most transparent, inclusive, and detailed review of any comparable harbor deepening project anywhere in the United States. This process was formalized through the unique Stakeholders Evaluation Group (the "SEG"). The SHEP has been studied over the course of 14 years, and under the detailed review of the SEG for ten years.

In an unprecedented way, the legislative authorization for SHEP and the SEG allowed more than a half dozen federal and state resource agencies, as well as environmental and public interest groups and the general public, to participate directly in the formulation of the SHEP studies and to periodically review the unfolding results of the scientific and other empirical data.

From the GPA perspective, these facts are worthy of special consideration:

- The benefit-cost ratio of 4.3 to 1, and the annual transportation savings of $150 million, is extraordinarily high. It is demonstrably and precisely the kind of high

value investment that our nation urgently needs to expand employment opportunities and tax revenue. Indeed, as noted in our comments, the GPA believes the United States Corps of Engineers (the "Corps") analysis may significantly understate the benefits and should revise its report accordingly.

- Savannah's ability to stimulate export and import trade and job development would be profoundly impeded by its existing 42 foot channel as the new generation of deep-draft vessels begins to dominate world trade. Even now, these larger vessels are replacing older, smaller and less-efficient ships world-wide. Failing to implement the SHEP, and to do so quickly, would have long-term negative consequences for the nation as a whole and the 44 percent of the U.S. population served through Savannah and major adverse impacts to the economies of both Georgia and South Carolina.
- The Corps' Multi-Port Analysis and Regional Port Analysis considered and evaluated the SHEP's impact on the proposed and existing regional ports and concluded that the SHEP will not divert containerized cargo from those other ports. The report shows that there is a requirement for a network of East Coast facilities that can accommodate deeper draft vessels, and that this network complements all ports. In fact, meeting the President's export goals for the nation will require channel deepening work at Savannah and a number of other ports as well.
- The Corps has designed an expansion project that avoids, minimizes, or mitigates all impacts to the environment. Multi-year data sampling provided the most

comprehensive and accurate base line and analysis of the Savannah River in history, and extensive and practical testing of technical solutions and equipment verified the effectiveness of mitigation alternatives. Some critics have argued that the SHEP should provide less than 48 feet in new depth in order to reduce environmental impact/mitigation requirements. However, the Corps analysis shows that all depth alternatives have essentially the same net environmental impacts, but that a depth less than 48 feet would eliminate significant economic and navigation benefits.

SUMMARY OF CONTENTS

The Georgia Ports Authority ("GPA") submits these comments in support of Savannah Harbor Expansion Project (the "SHEP") and specifically in support of deepening the Savannah Harbor and Savannah River to a Mean Low Water ("MLW") depth of forty-eight (48) feet.

Over the past 12 years, the United States Army Corps of Engineers (the "Corps") leadership, staff and consultants have conducted a thorough investigation and analysis of economic and environmental issues, and have designed the project accordingly. Documentation of the SHEP in the Draft Environmental Impact Statement ("DEIS") and the Draft General Reevaluation Report ("Draft GRR") satisfies the letter and spirit of the President's Council on Environmental Quality ("CEQ") regulatory admonition that the Environmental Impact Statement "shall be concise, clear and to the point and shall be supported by evidence that the agency has made the necessary environmental analysis." The GPA's comments summarize and clarify that information as necessary to provide context for

addressing questions and to correct misunderstandings that emerged during the planning process.

The Overview (Part I) summarizes the economics of the project and states why the SHEP should be approved, considering the strong economic benefits and full mitigation of unavoidable environmental impacts. In Part II, the GPA reviews and supplements details on the importance of the project and how the economic benefits support its approval. Part III addresses several environmental issues, including the extensive mitigation for adverse environmental effects that could not be avoided.

I. OVERVIEW

The Savannah Harbor is an important East Coast port that warrants continued federal, state and local investment based on the economic value of the project, including the following:

1. The Corps estimates that transportation cost savings alone will average more than $150 million annually over the fifty-year life of the 48-foot channel and harbor. Net average annual national benefits of $115 million provide a benefit to cost ratio of 4.3 to 1, which strongly justifies approval of the full 48-foot channel that the GPA has recommended.
2. According to the GPA's careful analysis, the ample net transportation benefits are understated. Adjustment of even a few of the overly conservative assumptions used by the Corps results in maximization of net benefits with a 48-foot channel, qualifying it as the National Economic Development ("NED") plan that the GPA recommended.

[illegible]

3. Savannah Harbor has exhibited robust growth with throughput of container cargo rising in 2010 to 2.6 million TEUs (twenty-foot equivalent units). Over the past ten year period, Savannah's share of East Coast container traffic grew from 11.2% to 18.6%, due to its favorable geographic location combined with service efficiencies that have resulted from major investments in cargo handling facilities and equipment.
4. As a consequence of its success, and in addition to the significant national benefits it offers, the port is a major contributor to the economies of Georgia and South Carolina. The GPA was responsible for $61.7 billion in sales in Georgia and $4.3 billion in South Carolina, even during the recession year of 2009, including approximately 315,000 jobs directly and indirectly in those two states alone.

In short, Savannah Harbor is a critical link in the nation's port system as it provides a crucial import/export gateway to more than 44% of the U.S. population and serves approximately 21,000 companies located in all 50 states.

Continued growth of the contributions to national and international commerce requires deepening the federal project channel from 42 feet to 48 feet. The world fleet is shifting rapidly to the larger, deeper draft post–Panamax vessels that are already arriving through the Suez Canal, and soon will transit a deeper Panama Canal. This is already occurring in Savannah. In calendar year 2010, 252 post-Panamax Gen I vessels and 5 post-Panamax Gen II vessels called on the Garden City Terminal. Failing to invest federal resources as recommended by the Corps is not a rational option. The SHEP deserves full support and approval.

5

The record supporting the DEIS and Draft GRR satisfies the letter and spirit of the various federal laws and regulations that affect navigation projects. These laws and regulations include among, numerous other federal provisions, the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (the P&G), President's Council on Environmental Quality ("CEQ") regulations to Implement the National Environmental Policy Act, Section 404(b)(1) of the Clean Water Act. We commend the Corps for fulfilling the CEQ regulatory admonition that the EIS "shall be concise, clear and to the point and shall be supported by evidence that the agency has made the necessary environmental analysis."

Environmental impacts have been identified and thoroughly characterized based on existing information and several new studies conducted at the direction of the Corps' Project Delivery Team. Potentially adverse effects are being addressed through an extensive process of avoidance, minimization and mitigation.[1] Scientific support for the project is strong.

A full range of alternatives was evaluated, including foregoing improvements at the Savannah Harbor in favor of expansion at other East Coast ports. The Corps considered several locations for expansion within the Savannah River, and considered alternative depths ranging from no expansion to deepening the harbor down to a MLW depth of 48 feet. An extensive and effective mitigation process was developed to avoid impacts and to minimize and mitigate impacts where avoidance was not feasible.

Studies and deliberations were coordinated with other federal and state agencies including the United States Environmental Protection Agency ("EPA"), the United States

[1] Mitigation Planning Appendix C to the DEIS.

Fish and Wildlife Service ("FWS"), the National Marine Fisheries Services ("NMFS"), the Georgia Department of Natural Resources ("GADNR"), including the Environmental Protection Division ("GAEPD"), the South Carolina Department of Natural Resources ("SCDNR"), the South Carolina Department of Health and Environmental Control ("SCDHEC"), and the federal and state historic preservation agencies.

The agencies and the many public and private participants in the Stakeholders Evaluation Group ("SEG") have participated steadfastly over the last ten years in offering insights into potential impacts and advice on strategies for mitigating adverse effects on the environment. The SEG has proved an extremely successful experiment enhancing opportunities for interested stakeholders to participate in the study and analysis of the SHEP. The full SEG held approximately seventy meetings, and its subcommittees held many more. Federal and state officials have participated in SEG meetings, as well as convened their own public forums. The dialogue with stakeholders has resulted in a better project.

The SHEP has been under study for 14 years. Now is the time to approve the SHEP so the Savannah Harbor can more efficiently accommodate the post-Panamax ships currently calling the port and projected to increase in the future. As a result of the active and continuing involvement of state and federal agencies and the public through the SEG, it is highly unlikely that additional study would reveal issues overlooked in the last decade, or would eliminate the need for the project. The only result would be to jeopardize fundamental benefits to the United States and its economy.

II. PROJECT ECONOMICS CONFIRM THE NEED FOR SHEP

The economics confirm that investing in the SHEP will benefit the United States and the region. The Corps analyzed the national economic benefits by focusing primarily on transportation cost savings. The Corps has concluded the 48-foot SHEP will generate $150 million in annual average transportation cost savings over the life of the project. The net transportation benefit is estimated as $115 million, providing a net benefit to cost ratio of 4.3 to 1. The GPA agrees with the Corps analysis to the extent it shows the SHEP will generate substantial economic benefits for transportation throughout the life of the project. The GPA, however, believes the Corps' economic analysis relied on excessively conservative assumptions and, as a result, substantially understates the project's economic benefits, especially in the 47- and 48-feet channel depth increments.

This Section summarizes the economic reasons for the 48-foot SHEP, which include the following:

(1) Using alternate reasonable assumptions that the GPA believes more accurately reflects the most likely future vessel fleet and utilization supported by extensive empirical data of industry operating practices would result in an NED plan of 48 feet;

(2) The transportation cost savings will exceed an annual average of $150 million and an average net benefit to the nation of $115 million annually over the life of the project;

(3) The Savannah Harbor is a significant employer for the Savannah region, creating jobs and economic activity for Georgia and South Carolina;

(4) The Savannah Harbor is the fastest growing port in the United States, already handling over 8 percent of the containerized traffic;

[illegible]

(5) The Savannah Harbor has made substantial investments in essential landside infrastructure to accommodate additional container cargo and has easy access to rail and roads;

(6) The Savannah Harbor is the only East Coast port where exports exceed imports; and

(7) The SHEP will not divert traffic from other East Coast ports because industry trade projections for the East Coast appear to require essentially all East Coast ports to operate at capacity in the reasonably foreseeable future.

A. The Corps Should Approve A 48-Feet Project

Whether the Corps should recommend expansion to a MLW depth of 47 feet or a MLW depth of 48 feet is an open issue. The GPA supports expansion to a MLW depth of 48 feet and asks that the final agency action adopt the 48-foot depth. The Corps calculated that a 48-foot SHEP would save more than $150 million in transportation costs annually, and that net economic benefits should average $115 million a year over the next 50 years. The resulting benefits to cost ratio of 4.3:1 satisfies Water Resources Development Act ("WRDA") criteria for supporting the project.

Transportation cost-savings is the primary focus of the Corps' cost-benefit studies under its policies and procedures. This allows the Corps to evaluate navigation projections based on navigation-focused benefits and not other economic benefits. The Corps has developed economic forecasting models to calculate the net economic benefits predicted to occur from water resources navigation projects such as the SHEP. The Corps employed two models, a Total Transportation Cost Savings Model ("TCSM") and a Harbor Sym model.

The TCSM was used to calculate the waterborne transit costs to and from other world locations to the Savannah Bar Channel. The Harbor Sym model used Savannah Harbor data to estimate the costs, delays and transportation savings within the harbor channel itself at different depths. The results of the two models were then used to estimate the costs, delays and transportation savings attributable to the Savannah channel depths ranging down to 48 feet below MLW.

The GPA agrees the SHEP will generate substantial transportation savings that easily justify project approval. However, the Corps analysis significantly understates the economic benefits the SHEP will generate, particularly in the 47 to 48 feet channel depth range, for several reasons. The Corps analysis relies on unrealistic conservative assumptions of the vessel fleet utilization and of the loading drafts of the vessels expected to call on the Savannah Harbor.

Table 165 (page 185) of the Economic Analysis summarizes the projected economic benefits from expansion of the Savannah Harbor to depths ranging from the current 42 feet to 48 feet. The Corps studies indicate modest additional or incremental benefits between expansion to 47 feet and expansion to 48 feet. The GPA disagrees and believes the Corps analyses were too conservative with respect to several assumptions incorporated into its transportation cost models. If the Corps incorporates the most likely regarding the several factors below based on actual industry practice, the benefits justify the 48-foot alternative.

First, the Corps assumes a certain percentage of post-Panamax ships calling on the Savannah Harbor will take advantage of favorable tidal conditions and adjust their loads accordingly. In fact, the Corps assigns maximum practicable capacity of vessels using 5-feet

of usable tide as one of the considerations. This assumption is unrealistic, and the Corps provides no explicit rationale for assuming that vessel assignments will be made on the basis of using five feet of tide.

There are several statements in the Corps report that appear to contradict use of five feet of tide in vessel assignments.

In the Main Report at Section 4.6:

> *"Operating draft data for 3,372 inbound and outbound container ship transits of Savannah Harbor, in 2007, confirms that carriers are typically averse to waiting for tidal advantage. Less than 12% of all container ship transits were at drafts greater than -38.00 feet. Container ship operating drafts cluster at the threshold of unrestricted access. Nearly 42% of all container ship transits (41.9%) were at drafts ranging from -35.00 to -37.99 feet."*

On Page 56 of the Main Report the effect of tide on vessel utilization is discussed:

> *"Waiting for the tide is a costly operational inefficiency for schedule-driven liner service carriers for two reasons. The first reason is that, for inbound vessels, waiting adds to the operational cost of the voyage by increasing the vessel's time at sea. Outbound vessels waiting for the tide must spend more time at the dock and may delay the arrival of a vessel scheduled to use the same berth. Vessels may increase speed between ports to make up time lost waiting for the tide, which also adds to the cost of the voyage. The second reason that carriers are averse to waiting for the tide is that the additional time spent getting into or out of Savannah Harbor disrupts the vessel's scheduled arrival time at the next and following ports. Vessels may be subject to penalty fees for missing their scheduled time slot at the Panama Canal or may need to pay overtime fees due to a late port arrival."*

At page 23 in the Economic Appendix the Corps states:

> *"Most container vessels calling at Savannah Harbor are part of scheduled liner services that call at multiple East Coast ports in conjunction with Savannah Harbor. Consequently, shippers engage in the practice of "just in time" deliveries of cargo and avoid schedule disruptions whenever possible."*

The concern about "just in time" arrivals would indicate that use of five feet of tide is not a predominant factor in vessel deployment decisions or operating practices. It was also

[illegible]

clear from industry representatives and confirmed by empirical field data that a critically important factor in deployment of container vessels is maintaining the schedule. Waiting for five feet of tide does not comport with the need for dependable scheduling. By examining actual vessel calls at various ports, as noted below, design drafts are generally two to three feet greater than the channel design depth. To wait for five feet of tide is not "likely" according to operators and empirical data as described previously. Figure 19 on Page 25 of the Economic Appendix indicates very few vessels ride the tide more than a few feet. Assuming a tide utilization of two to three feet as reflected in the empirical data rather five feet as the Corps assumed would most likely increase the NED depth, probably by two or three feet.

Second, even if vessels would plan to use the tides, they could not plan to use five feet of tide. The trip from the ocean to the Garden City Terminal is over 30 miles and could take five hours to travel. Tidal influences typically do not last that long. So, there does not appear to be sufficient time to travel the length of the channel and reach the terminal before vessels could be grounded. Also, the number of vessels projected to be using the tide in the future is too many to be able to force through the tidal windows. Assuming this extreme use of tides for vessel navigation decreases the benefits of the project.

Additionally, it was not evident that the Corps included the costs of landside delays within its analysis of the costs resulting from tidal delays. In shipping, if a vessel is delayed from either arriving to or departing from the berth due to tide, significant direct and indirect costs are incurred with respect to landside activities including stand-by fees for labor, trucker wait time and fuel costs, rail administration from rebooking cargo, staffing times at

distribution and deconsolidation centers and, with just-in-time deliveries, production delays at manufacturing facilities. The costs of landside delays need to be factored into the evaluations of benefits of deepening.

Third, the projected vessel fleet distribution projections do not seem to match extensive empirical data from other ports that are supported by industry studies, trade publications and academic studies. Data from Savannah and from other ports show that vessel fleets are comprised of a distribution of incremental vessel design drafts generally growing gradually from the smaller vessels then peaking at a design draft two or three feet greater than the channel design depth and then dropping off rapidly. This fleet distribution pattern is referred to in the Corps report as a "cluster" distribution. On occasion, vessels with design drafts more than two to three feet greater than the channel design depth call at ports, but that does not appear to happen on a regular basis.

The Corps reports on New York Harbor (1999), Miami Harbor (2004), Norfolk Harbor (2008), and Oakland Harbor (2000) show existing fleet distributions that follow the cluster effect and predict future fleets on that basis.

Page 16 of the Economic Appendix refers to Figure 10 on Page 17 and states that the existing fleet in Savannah has drafts that exceed Savannah's current channel design depth by up to three feet, similar to the cluster distribution described above. The report attributes the difference to vessels tide-riding. However, Figure 19 on Page 25 of the report also contains data on operating drafts for an overlapping time period that show vessels for the most part are traveling light, not riding tide as the report hypothesizes. The carriers will light-load to avoid the costs associated with delays due to tide.

The projected fleet in the Corps report does not reflect this distribution. In the absence of some compelling definitive reason to change the long-term data of fleet distributions, i.e., vessel design drafts cluster at two to three feet greater than the channel design depth it seems the "most likely" future would follow the distribution pattern established by long-term real data.

Additionally, the Corps defines "Maximum Practicable Capacity" (MPC) as follows:

> *"The highest reasonable practicable capacity based on weight and volume that a given vessel can hold assuming a fixed average import and export cargo weight (based on all cargo for a given service), a minimal rate of empty containers for all routes, bunkerage and ballast requirements, 5-feet of usable tide and other considerations. The TCSM does include some calls in which vessels exceeded its MPC, but never more than 15% of the time."*

The MPC calculation is critical to the analysis and identification of the NED Plan because it controls how much cargo would be carried on each vessel. While the GPA understands that vessels rarely sail at maximum design draft, vessels do regularly sail at drafts beyond the MPC assigned by the Corps in the report. The sensitivity analysis shows that if the MPC is adjusted for efficient vessel loading without the constraints assigned to the draft through the MPC, then the 48 foot depth has the maximum average annual benefits. The practice of limiting vessel drafts with an assigned MPC for vessel classes restricts the full benefits of the project from being identified.

Finally, the report mentions the use of the Suez Canal as an alternate route for Far East – East Coast US trade but apparently does not include using the Suez Canal as a reasonable alternate assumption to using the Panama Canal. At least two Corps reports, Miami and Norfolk, identified the Suez Canal as a reasonable alternate assumption for trade

with Asia. There are also data to support that the Suez alternative is currently being used for Far East-ECUS trade. Whether that use will continue after the Panama Canal is expanded is unknown. While the assumption of a competitive Suez Canal may not have been reasonable in the past, it appears to be reasonable now. With the economies of scale in the current and most likely future world fleet as well as shifting points of origin of manufacturing in Asia from China to the sub-continent, as is happening, it would actually be more economical to ship FE-ECUS via Suez rather than Panama. This does not suggest the analysis should be revised, but only to recognize in the risk and uncertainty analysis that delay of an expanded Panama Canal would not affect the justification for channel deepening. Whether the NED benefits might be greater or less using the Suez route, the channel increment of depth maximizing net benefits would not likely change. That is to say, selection of the NED Plan is not dependent on or sensitive to completion of the Panama Canal expansion.

Another item that needs to be addressed with respect to the NED plan is the project cost analysis. While not a part of the economics analysis, the cost impacts NED plan identification. A 25% contingency factor is placed on essentially every element which seems excessive for many elements of the cost estimate. An explanation would be helpful to understand the 25% contingency factor particularly for dredging costs. The Corps dredges millions of cubic yards every year from the Savannah River Channel and has been doing so for many years. Data on the annual costs for each of the past 10 years might be helpful in judging whether the 25% contingency is appropriate. Regardless of whether 25 % is the appropriate contingency factor according to Corps regulations, those regulations describe maximum, most likely, and minimum levels of risk in the estimating process. It seems that

the contingency factors for this report are reported at the maximum level of risk. In order to compare costs and benefits on an equal basis, it seems appropriate to use both costs and benefits at their "most likely" level in order to get appropriate comparison.

With respect to the Sensitivity Analysis of the Economics Analysis, the scenarios should be based on reasonable alternate assumptions as required by the Principles and Guidelines. Beginning at page 88 of the Economics Appendix, it notes:

"The Principles & Guidelines and subsequent ER1105-2-100 recognize the inherent variability to water resources planning. Navigation projects and container studies in particular are fraught with uncertainty about future conditions. A sensitivity analysis is a useful technique that addresses uncertainty by systematically adjusting parameters in a model to determine the effects of such changes."

Each of the individual sensitivity tests suggests only one or in a few cases two alternate assumptions. None of the alternate assumptions standing alone or in twos cause the outcome of the analysis to change. Examination of the sensitivity analysis shows the alternate assumptions used for sensitivity testing themselves do not reflect a reasonable range of assumptions. The two most critical assumption sensitivities are not addressed at all, i.e., use of five feet of tide in the loading calculations and recognizing and testing the sensitivity of the cluster effect of fleet distribution. The GPA believes these two assumptions should be tested with sensitivity analyses.

B. <u>The Savannah Harbor Is a Critical Economic Center</u>

The Corps' transportation cost-focused analysis overlooks other economic benefits the SHEP will generate. The full economic benefits from the SHEP will be more substantial for nearby Georgia and South Carolina populations that constitute the metro-Savannah region as well as for Georgia generally than the Corps analysis takes into account. The Corps does not

consider investments made by port users, nor does it consider indirect multiplier impacts for the region.

The Savannah Harbor is a destination port for imports and exports of United States products. Investment in Savannah Harbor has supported and will continue to advance national economic and navigation interests because Savannah Harbor has unique advantages among other East Coast ports and particularly other southeastern ports. The port's location in the Georgia Bight provides a natural geographic advantage as the westernmost East Coast port able to offer substantially reduced travel distances and times to much of its hinterland. The Garden City Terminal location upriver and west of Savannah avoids surface transportation conflicts in the urban area, and facilitates rapid transfer of cargo to and from the nearby north-south and east-west Interstate highways and rail systems. Capitalizing on its favorable location, the GPA already has built the crucial infrastructure to load and unload cargo from larger vessels, and has provided efficient access to the extensive rail and road network that accommodates moving exports to the port and imports to commercial distribution hubs throughout the Southeast and Midwest.

The location and up-to-date efficiencies of its land-based facilities and infrastructure are why the Savannah Harbor is the port of choice for exports and imports. This is illustrated by the fact that it is the only East Coast port where exports exceed imports, with the port handling 12 percent of the nation's containerized exports in FY 2010. With 8.3 percent of the total containerized trade in the United States moving through the Garden City Terminal in FY 2010, Savannah Harbor is the second largest East Coast container port, the fourth largest container port in the United States and is among the fastest growing ports in the

United States. The Savannah Harbor moved over 2.6 million TEUs in fiscal year 2010. This volume of cargo is an increase of 9.4 percent over 2009, 25 percent over the last five years and 160 percent over the past decade.

Given the volume of containers serviced, it is no surprise the Savannah Harbor is a major jobs creator for the metro-Savannah region, including counties in Georgia and South Carolina. In order to obtain objective data, GPA commissioned Jeffrey Humphreys of the Terry College of Business at the University of Georgia to study the economic impacts Georgia's deepwater ports had on the economies of Georgia and South Carolina during fiscal year 2009.[2] Dr. Humphrey analyzed three distinct economic impacts attributable to the Savannah Harbor: (1) direct spending by the GPA and the ports industry on port investment and transportation of waterborne cargo; (2) direct spending by port users such as manufacturers, wholesalers, distributors and warehousing firms; and (3) secondary or indirect economic impacts.

The Humphrey Report estimates that the Savannah and Brunswick ports contributed $26.8 billion of value added or gross domestic product to the Georgia economy in fiscal year 2009. The contribution when measured as income is $15.5 billion. The employment impact is equally important. Overall, the Georgia ports account for over 295,000 full and part-time jobs, which equal 6.7 percent of Georgia's total employment. The two ports account for approximately 10 percent of this total and the Savannah Harbor, itself, directly employs over

[2] Dr. Humphreys is the Director of the Selig Center for Economic Growth. The study included data for the Savannah Harbor and the port at Brunswick, Georgia. The studies are attached to these comments as Exhibits A and B. The GPA requests that the Corps include these studies as part of the administrative record.

21,000 employees. The Savannah Harbor generates over $1.1 billion in state tax revenues, $850 million of local tax revenues and $2.7 billion in federal tax revenue.

The Savannah Harbor also contributes substantially to the South Carolina economy, particularly Jasper and Hampton Counties. Dr. Humphrey analyzed the economic activity of imports and exports that have South Carolina as the point of origination or destination and the port used was either Savannah or Brunswick. (Dr. Humphrey's study did not calculate the contributions solely from the Savannah Harbor. Nonetheless, the level of economic activity is substantial.)

Additionally, Georgia ports contribute $4.3 billion in sales to the South Carolina economy, and $1.5 billion to South Carolina's Gross Domestic Product ("GDP"). Georgia ports account for 19,700 full-time and part-time employees in the state of South Carolina. Federal, state and local taxes generated from Georgia ports exceed $330 million annually in South Carolina according to Dr. Humphrey's analysis.

In the Economic Appendix of the Draft GRR, the Corps analyzes the Regional Economic Development Benefits of several counties surrounding Savannah Harbor including Chatham, Effingham, Bryan and Liberty Counties in the inner ring, and Screven, Bulloch, Candler, Evans, Tattnall, Long and McIntosh Counties in the outer ring. The counties in South Carolina bordering Savannah Harbor were not included in the analysis, and certainly the GPA believes that the Corps should include the South Carolina counties. Numerous South Carolinians are employed directly by the GPA and by companies doing business at or through the GPA facilities. The GPA believes the project will have a positive benefit on

these neighboring counties in South Carolina, particularly on bordering Jasper and Hampton Counties, two of the most economically depressed counties in the state.

The GPA has demonstrated an ability to grow the business of Savannah Harbor even during difficult economic times. The United States and the region will continue to benefit from having the Savannah Harbor expanded to service new generations of container ships as the world fleet continues its shift to larger, more efficient post-Panamax vessels.

C. The GPA Has Invested In Landside Infrastructure

The GPA has made extensive investments in landside infrastructure to improve harbor operations, and has plans for additional investments. These investments have contributed to the success and growth of the Savannah Harbor over the past decade and will continue to contribute to future growth.

The GPA has invested over $80 million to expand and improve operations at the Garden City Terminal. It has improved several berths and added cranes to service post-Panamax ships. The current master plan calls for of completion of improvements and expansion in 2020. The Garden City Terminal will become the largest single facility handling containers in the United States. The Terminal will have more than 1,200 acres of storage space and nearly 9,700 feet of berth. The Terminal now has 23 post-Panamax size cranes and will have 33 such cranes.

The Garden City Terminal is a gateway to extensive rail and road networks that enables shipment of goods to and from the Midwest and Southeast. As a result, the port services approximately 44 percent of the United States population. The Terminal is served by two Class I railroads, Norfolk Southern and CSX, and has two on-site intermodal

container transfer facilities ("ICTF") that ship goods to Atlanta and the Midwest in a matter of days. Currently, about 20 percent of the cargo that the port handles moves by rail and this is expected to grow to as much as 25 percent over the next five to 10 years. The Norfolk Southern ICTF includes 12,500 feet of working tracks and 7,500 feet of storage tracks on approximately 25 acres. The CSX ICTF houses 6,435 feet of working tracks and 12,406 feet of storage tracks. These two facilities allow overnight delivery to Atlanta and other southeastern gateways, and two to four-day service to distribution centers including Charlotte, North Carolina; Dallas, Texas; Chicago, Illinois; and Memphis, Tennessee.

The Garden City Terminal has three separate gates and 37 lanes. Due to implementation of large and smaller improvements, the Terminal regularly accommodates more than 8,000 truck movements through the gates daily. The Corps analyzed the incremental cost differences of inbound shipment of goods to the hinterlands (see, e.g., summary in Table 37 of the Multi-Port Study). The Corps found that the Savannah Harbor was the least cost alternative among East Coast ports for shipping goods inland to Memphis, Tennessee; St. Louis, Missouri; Jackson, Mississippi; Birmingham, Alabama; Nashville, Tennessee; and Atlanta, Georgia.

In addition to the GPA-owned facilities, shippers and industry have established facilities at the Savannah Harbor within close proximity to the Garden City Terminal to accommodate containerized cargo, including large-scale warehouse sites, retail distribution centers, and construction-ready sites. Close proximity of such operations to a port terminal shrinks drayage costs and helps optimize equipment and freight turn-around. The GPA has developed an on-line tool that identifies port-dependent sites and warehouses along the major

corridors to its terminals. More than 19 million square feet of retail distribution centers have been established near Savannah by the nation's largest retailers. Approximately 600,000 TEUs are handled by Savannah-area import distribution center activity.

The GPA has pursued a program of investment in comprehensive improvements necessary to accommodate the growth in traffic predicted from time to time over the last 20 years, and reconfirmed in the Draft GRR. The expansion project allows the Savannah Harbor to better service current traffic and to accommodate post-Panamax ships so that containerized and other cargo will be exported from or distributed within the United States efficiently. The Savannah Harbor is already an important link to the existing landside rail and road network that easily services the Midwest and Southeast. Approval and construction of the SHEP would assure optimal use of those networks.

D. <u>The Savannah Harbor Exports More Than It Imports</u>

The Savannah Harbor exports more goods than it imports handling12 percent of all US containerized cargo exports. This fact distinguishes the Savannah Harbor from other East Coast ports and even from most ports in the United States. The high volume of exports provides further justification for continued investment in the Savannah Harbor through approval of SHEP.

In fiscal year 2010, exports accounted for 54 percent of the traffic (as measured by TEUs) through the Savannah Harbor, while 46 percent of the traffic was imports. The opposite is true at most ports where imported goods traffic exceeds exports. The national average at ports is that 39 percent of the traffic is exports while 71 percent of traffic is imports.

The top five exports shipped from the Garden City Terminal are (1) wood pulp, (2) paper and paperboard, (3) food, (4) clay, and (5) chemicals. Food exports include refrigerated cargo and agricultural products. The Garden City Terminal is among the largest facilities for refrigerated cargo. The top five refrigerated exports are (1) poultry, (2) meats, (3) oranges, (4) citrus juices and concentrates, and (5) grapefruit and lemons. The exports are destined for markets throughout the world; mostly in Asia, and also in Europe, the Middle East, the Mediterranean, and Latin America.

The Savannah Harbor is a critical component in the East Coast ports system for handling exports efficiently and cost-effectively. Exports will become diffused, less efficient and more expensive if the SHEP is not approved.

E. The SHEP Will Not Divert Traffic From Other Ports

The Corps analysis also evaluated industry shipping trends. The Corps conducted a regional port analysis and a multi-port study, which are part of the Draft GRR. The Corps concluded that the SHEP will not divert containerized cargo from other East Coast ports. Rather, several East Coast ports will need expansion to handle the increased cargo expected at East Coast ports when Panama Canal improvements are completed and shippers add more post-Panamax ships to their respective fleets.

Cargo traffic diversion thus is not a factor as to whether the SHEP should be approved. Thus, decision makers and the public should discount comments focused on concerns that SHEP approval will harm the business of other East Coast ports. The Multi-Port Analysis and Regional Port Analysis dispel those concerns. These analyses demonstrate

that the immediate and longer term growth in traffic requires servicing by a system of East Coast ports due to economic realities and environmental constraints.

The GPA supports the SHEP because it is in the national interest and will improve navigation. The economics fully support the SHEP and fully support continued investment in this vital East Coast port.

III. ENVIRONMENTAL ISSUES

The Corps conducted a thorough examination of all practicable alternatives as defined by the Section 404(b)(1) Guidelines. Environmental impacts were identified and thoroughly characterized based on existing information and the several new studies that were conducted at the direction of the Project Delivery Team. Potentially adverse effects were addressed through an extensive process of avoidance, minimization and mitigation.[3] The project and mitigation strategy fulfills the letter and spirit of the term "practicable" which means "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes."[4]

A. Alternatives Analyses

The full range of alternatives has been evaluated, including foregoing improvements at the Savannah Harbor in favor of expansion at other East Coast ports. The Corps also considered several locations for expansion within the Savannah River, and considered alternatives ranging from no expansion to deepening the harbor to a MLW depth of 48 feet.[5]

[3] Mitigation Planning Appendix C to the DEIS.
[4] 40CFR § 230.3(q).
[5] Appendix O of the DEIS.

An extensive mitigation process was pursued to identify alternatives for avoiding impacts, as well as to minimize and mitigate impacts where avoidance was not feasible.

Information used to evaluate alternatives to the currently proposed SHEP included the environmental resources constraints inventory developed for the Regional Port Study. The information collected allowed evaluation and comparison of the economic and environmental impacts of harbor expansions at Savannah with proposed expansion projects at other southeastern ports. See the Environmental Issues Survey, including table 9, in Section II of the Final Study.

The study and inventory confirmed that there are no practicable alternatives to deepening the Savannah River channel in order to achieve the harbor's need to accommodate traffic growth. The Regional Port Analysis compared environmental impacts caused by expansion projects at several southeastern ports, including a proposed port at Jasper, and the ports of Jacksonville, Savannah, Charleston, Wilmington and Norfolk. See Table 9 (page 13), entitled "Constraint Determination and Anticipated Impact Levels for Regional Port Expansion ROI [Region of Impact]" which identifies several environmental constraints for expansion projects at each port, and tentatively characterize them from Substantial to Minor.

Table 9 of the Regional Port Study allows analysis in several respects to compare the total number of parameters showing potential impacts, or to compare the magnitude of the impacts through some weighted average, or to focus on a few parameters deemed to be critical. These analyses show that expansion projects at all southeastern ports face substantial environmental constraints that may require mitigation. No one port appears to have substantially fewer, or greater, environmental constraints than any or all others. Thus,

even if another port could expand to absorb all the additional traffic projected for the future, none stand out as clearly less environmentally constrained than Savannah.

B. The Corps Completed Extensive Study of the Savannah River Basin

1. Extensive Studies

The Corps has analyzed expansion alternatives from no expansion to expansion to MLW depths ranging from 44 to 48 feet using well-recognized models and engineering data to determine and to compare the impacts on the environment for each alternative and the appropriate measures to mitigate them. Based on extensive study during the past 14 years, the Corps has designed an expansion project that mitigates all impacts to the environment.

The Corps worked closely in identifying and developing mitigation plans with federal agencies, state agencies, local governments and other non-government stakeholder groups throughout, including through the SEG process, for the past ten years. Each participant had opportunities to identify issues, develop and propose studies and demonstration projects, and critique the quality and quantity of data upon which the DEIS and Draft GRR are based. After considering all available information, the Corps has recommended expanding the Savannah Harbor because the project is in the national interest.

The Corps also has found that expansion to a MLW depth of any increment of channel depth, with appropriate mitigation, does not cause significantly less damage than would occur if the port is expanded to a MLW of 48 feet with mitigation. As a result, all alternatives have essentially the same net environmental impacts. A depth less than 48 feet would eliminate economic and navigation benefits provided by a deeper port with no commensurate benefit to the environment.

The following describes the framework employed by the Corps to evaluate environmental impacts and to develop plans to mitigate those impacts, and then describes several key environmental impacts and how the SHEP will mitigate those impacts.

2. Evaluation of Environmental Impacts Generally

The Corps carefully and deliberately examined each alternative considered to identify potential environmental impacts. The Corps coordinated its examination with sister federal agencies (EPA, FWS, NMFS), state agencies of Georgia and South Carolina (GADNR, GAEPD, Georgia Department of Transportation ("GADOT"), SCDHEC, SCDNR), and with a broad range of other non-government stakeholders. The coordination efforts have ensured the SHEP Project Development Team: (1) conducted necessary evaluations; (2) used acceptable and recognized evaluation tools; (3) evaluated alternatives under conditions determined by the agencies to be appropriate; and (4) developed information each agency needs to reach a final decision on project approval.

3. Development of Mitigation Plans Generally

The mitigation plans developed for the SHEP are consistent with the policies and regulations for developing mitigation plans adopted by the Corps and other federal agencies. Applying a process common for civil works projects, the Corps' plan for the SHEP will avoid and minimize environmental impacts to the maximum extent possible, and otherwise address natural resources impacted by the SHEP. The specific measures to address, avoid, and minimize environmental impacts include channel design (*i.e.*, maintaining the existing side slopes), placement of dredged material in existing confined disposal facilities ("CDFs"), depositing and capping dredged material containing elevated levels of naturally occurring

cadmium in one CDF, and designing a broad berm in the sediment basin to restrict upstream salinity movement.

The SHEP's mitigation measures include, but are not limited to, flow re-routing plans, an oxygen injection system that ensures the SHEP will not further depress dissolved oxygen levels in the Savannah River or the Savannah Harbor, and installing a fishway.

The last component of environmental impact planning concerns strategies to replace or compensate for resources adversely impacted when avoidance or mitigation are not feasible. Relative to replacement or compensation, the Corps' strategy in order of preference is as follows: restoration, enhancement, creation, preservation and compensation. Thus, prior to relying on preservation, the Corps intends to avoid and minimize project impacts and restore or enhance existing environmental functions where feasible.

C. Wetlands

1. Savannah River Wildlife Refuge and Freshwater Wetlands

The Corps and other agencies have made a thorough evaluation of potential impacts to tidal freshwater wetlands and for its development of mitigation plans designed to minimize the impacts. They collectively identified sites where freshwater wetlands might be restored, enhanced or created. For example, the wetlands mitigation plan is consistent with policy of Georgia resource agencies. The wetlands restoration and improvement component, through flow-altering features, is more than fifty percent of the mitigation plan recommended for each depth alternative considered. The Corps was vigilant in designing the SHEP so as to avoid and minimize impacts to wetlands. Only after exhausting those strategies has the Corps focused on additional strategies. The GPA supports the need for and agrees the Corps

should acquire and preserve 2,683 acres to offset changes in wetland salinities associated with the 48-foot alternative.

The proposed magnitude of acquisition and preservation of existing wetlands is significant and meets all legal requirements. At the recommendation of EPA Region 4, the Corps used its Standard Operating Procedures ("SOP"), which have been adopted by the natural resource agencies in Georgia, to evaluate impacts and calculate compensatory mitigation necessary to offset remaining project impacts for the 45, 46, 47, and 48-foot alternatives. Preservation of lands and existing wetlands bordering the refuge is necessary to offset remaining impacts for each of these depth alternatives. The Savannah District consulted with the Corps Center for Expertise for Ecosystem Restoration (the "CEER") which confirmed the SOP was technically sound for use to determine the acreage needed for preservation to offset remaining project impacts. The proposed project mitigation plan also conforms to the new mitigation rule, jointly established by EPA and the Corps (published in the Federal Register on April 10, 2008), and meets the requirements of 33 C.F.R. Part 332.[6]

The 2,683 acres of buffers and wetlands identified for acquisition and preservation are among properties FWS and the Savannah National Wildlife Refuge ("SNWR") have identified within the estuary as ecologically valuable. They will provide positive contributions to the goals of SNWR and will enhance the area's fish and wildlife resources.

[6] Although the proposed mitigation ratio for preservation (8:1) is below the ratio recommended by the EPA Region 4, Compensatory Mitigation Policy (2001) (10:1), the lower ratio for this project is not a reason to reject the mitigation plan for the SHEP. The EPA Region 4 Compensatory Mitigation Policy recognizes that its recommended ratios are "guides" and that "[d]etermination of the appropriate type of mitigation should be made on a case-by-base basis, based upon the condition and needs of the watershed in which the impacts are proposed and the nature of the impacts." EPA Region 4 Compensatory Mitigation Policy at 1 and 4. With respect to the SHEP, the Corps obtained substantial information about the quality and functions of the impacted wetlands and made a functional assessment of the project area using its professional judgment.

The proposed properties to be acquired and preserved are predominantly a mixture of tidal freshwater wetlands, bottomland hardwoods, and uplands bordering the SNWR. While the mitigation has been criticized as not being "in kind" mitigation, the locations of the properties proposed for mitigation are critical in buffering the refuge from encroaching residential development, generally found to be the most polluting type of development on neighboring wetlands. FWS has wanted to add these properties to the SNWR, but has lacked the funds to do so. The opportunity to have the SHEP fund these acquisitions is one reason why FWS supports preserving properties as mitigation for the project's impacts to tidal freshwater wetlands. One further point is worth noting and supporting.[7]

2. Fringe Brackish/Saltwater Marshes

Six locations will be directly impacted by the dredging of the shoreline of the navigation channel. In total, approximately 14 acres of brackish to saltwater marsh is expected to be impacted. Neither the area impacted nor the magnitude of impacts will vary due to the depth of the project. State and federal natural resource agencies have requested in-kind mitigation within the Savannah River Basin for these direct impacts. The GPA and the Corps agree. Thus, the Corps has proposed to restore a previously used sediment placement facility (CDF 1S) to a salt and brackish marsh system. This area is approximately 42 acres and is located adjacent to the confluence of Front River and Middle River and within the boundaries of SNWR. Natural resource agencies have approved the concept of restoring the site to a marsh.

[7] The proposed plan also includes an "escalator." In the event the impacts to wetlands exceed what the Corps predicts, the Corps is committed to acquire and preserve an additional five percent of wetlands.

Applying the SOP, the Corps found the acreage required for adequate compensation of direct excavation impacts is approximately 25.8 acres of restored salt marsh, or slightly less than 2:1 for the 14 acres to be impacted. Conversion of CDF 1S will fully compensate for direct impacts associated with dredging the channel at each depth alternative, and the excess acres of restored salt marsh will be credited to the SHEP as advance mitigation for possible offset of future maintenance activities.

D. Endangered Species – Shortnose Sturgeon

The evaluation of impacts to endangered species and their habitat is an excellent example of how the Corps coordinated its study and mitigation plan development with all key stakeholders, including federal agencies, state natural resource agencies, and the SEG. These efforts yielded a comprehensive study of potential impacts to shortnose sturgeon and measures to mitigate and offset them. Flow re-routing systems and the dissolved oxygen injection system (discussed in Part G) are the principle strategies for avoiding impacts to the shortnose sturgeon.

Other than construction of a sill in Middle River to protect important nursery habitat for juveniles, neither the Corps nor the other federal and state agencies has identified measures that would restore shortnose sturgeon habitat or enhance existing habitat located within the estuary. Therefore, the Corps proposes to construct a fishway around the New Savannah Bluff Lock & Dam designed specifically for shortnose sturgeon, which would allow fish to move by the lowest dam on the river and increase sturgeon habitat available. The fishway would open an additional 20 miles of habitat upstream of the dam and provide access to reaches of the river that shortnose sturgeon have used in the past. The design of the

fishway would also allow fish to move downstream and ensure that young fish spawned upriver could access other habitat needed in later life stages. While potential adverse impacts to shortnose sturgeon habitat are expected to occur at each project depth analyzed even after flow re-routing and dissolved oxygen injection are completed, the federal and state natural resource agencies have confirmed the proposed mitigation measures, including the fishway, effectively will compensate for these potential impacts.

E. Fisheries – Striped Bass

The evaluation of potential impacts to the habitat, and directly to striped bass habitat, is similar to the evaluation for shortnose sturgeon. The Corps has acted in coordination with federal agencies, state agencies, and the SEG to identify, evaluate and mitigate potential impacts to striped bass habitat. The plans to address shortnose sturgeon habitat will also reduce impacts to striped bass habitat. The mitigation strategies include flow re-routing plans and an oxygen injection system.

The Corps and natural resource agencies have concluded the best additional measures to offset impacts caused by the SHEP is to participate in and expand the Georgia program for restocking striped bass. The Corps coordinated with GADNR and other natural resource agencies and confirmed that expanding the ongoing stocking program would compensate for the remaining impacts to striped bass habitat. The GPA fully supports the plan to expand the striped bass restocking program. The Corps has proposed to fund the stocking program in proportion to the extent of impacts expected to striped bass habitat. Thus, similar to other potential environmental impacts, the proposed mitigation plan will fully compensate for

potential impacts to striped bass habitat at each depth alternative considered, including the 48-foot alternative.

F. Energy Efficiency And Air Quality

Energy efficiency and conservation is a significant component of the GPA's capital expenditure program for its terminal facilities. These green programs have reduced and will continue to reduce diesel fuel consumption, reduce air and noise pollution, and support minimization and reduction of potentially adverse effects on the human and natural environment.

The current elements of the energy efficiency program include several elements that combine to reduce the annual use of diesel fuel by 4.5 million gallons. For example, the GPA deploys electrified ship-to-shore cranes and not diesel fuel-operated cranes. The electric cranes consume less energy to operate than diesel powered cranes and generate less noise. Thus, crane operations have significantly reduced potential effects on air quality in nearby neighborhoods. By switching to electric ship-to-shore cranes, the GPA annually avoids the use of 1.9 million gallons of diesel fuel. The GPA has added refrigerated container racks, which annually will eliminate combustion of an additional 2.4 million gallons of diesel fuel. Two other projects of consequence, which together reduce annual diesel fuel consumption by over 200,000 gallons, are the repower of the rubber tire gantry cranes and the use of a diesel fuel additive in yard equipment including rubber tire gantry cranes and jockey trucks.

The positive impacts from these investments are apparent to any one who has toured the Garden City Terminal. The terminal is relatively quiet and the air quality is improved.

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Such benefits are enjoyed by the thousands who work at the Savannah Harbor, the neighborhoods around the port and the metro-Savannah region.

Also, larger ships will carry more cargo and will result in fewer trips. This will generate less pollution on a per ton basis and will improve air quality.

G. Dissolved Oxygen

While the SHEP, if it were to be completed without mitigation, would impact dissolved oxygen levels, the Corps and the GPA have developed a comprehensive mitigation plan to address the predicted impacts. As a result, the SHEP is not expected to cause adverse impacts on dissolved oxygen levels throughout the estuary either under existing water quality standards or under the proposed Total Maximum Daily Load ("TMDL"), expected to be finalized later this year.

The central feature of this mitigation plan is injection of hyper-oxygenated water into the estuary. The system adds oxygen to the estuary at key points to offset deficits caused by having a deeper channel. The GPA has conducted a full-scale demonstration of the injection system technology, which confirms the system will achieve the expected results. Moreover, the Corps will ensure the dissolved oxygen injection system functions properly and will conduct extensive water quality monitoring to ensure the system is performing as modeled.

1. Savannah Harbor TMDL and Water Quality Standards for Dissolved Oxygen[8]

Today, the dissolved oxygen levels in the Savannah River estuary fall below regulatory requirements during summer months and during periods of low tide. These

[8] Documents attached to and referenced in the Draft EIS and Draft GRR should be updated to cite or refer to the most recent water quality standard and the 2010 TMDL for the Savannah Harbor.

conditions reduce dissolved oxygen concentrations in the river and estuary.[9] EPA and GAEPD issued a dissolved-oxygen TMDL for the Savannah River in 2006,[10] which imposed a zero-discharge requirement on oxygen-demanding pollutants. The 2006 TMDL is set to be superseded by new TMDL – the 2010 TMDL, which EPA has approved.[11] The 2010 TMDL, allows use of a "TMDL Calculator" – a system for evaluating discharge scenarios and for developing pollution reduction strategies. EPA and EPD expect dissolved oxygen conditions in the Savannah estuary to improve through the TMDL Calculator strategy.[12]

Georgia and South Carolina have adopted identical dissolved oxygen water quality standards – daily average of 5.0 mg/L and no less then 4.0 mg/L maintained in the waterbody.[13]

2. Studies of Impact of SHEP on Dissolved Oxygen in the Savannah River Estuary

The Corps has overseen several studies, which apply well-established models, of the impacts the SHEP may have on dissolved oxygen levels within the Savannah River at depths

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[9] The Savannah River between Fort Pulaski (River Mile 0.0) and the Seaboard Coastline Railroad Bridge (Mile 37.4) is predicted to be impacted.

[10] The 2006 TMDL was based on Georgia's dissolved oxygen standard that it had adopted, but that EPA never approved. Georgia adopted a new dissolved oxygen standard in 2009, which in turn, prompted development of a new TMDL.

[11] A copy of the 2010 TMDL is attached as Exhibit C.

[12] GRR Section 5.7.3.

[13] Both the Georgia and South Carolina standards provide flexibility when the dissolved oxygen levels are below the water quality standard because of the "natural condition" in a waterbody. Compare *Georgia Rules and Regulations for Water Quality Control*, Chapter 391-3-6-.03, Water Use Classifications and Water Quality Standards (If it is determined that the "natural condition" in the water body is less than the values stated above, then the criteria will revert to the "natural condition" and the water quality standard will allow for a 0.1 mg/L deficit from the "natural" dissolved oxygen value. Up to a 10% deficit will be allowed if it is demonstrated that resident aquatic species shall not be adversely affected.); and *South Carolina Water Quality Standards*, Section 48-1-83, et seq., 1976 Code of Laws (For a naturally low dissolved oxygen water body, the quality of the surface waters shall not be cumulatively lowered more than 0.10 mg/L for dissolved oxygen from point sources and other activities)

ranging from 45 feet to 48 feet.[14] Federal and state agencies participated in the evaluation and selection of these models. The primary models are the Environmental Fluids Dynamics Code ("EFDC") model, which was used to develop the hydrodynamic data, and then was linked to the Water Quality Analysis Simulation Program Version 7.0 ("WASP7").[15] The models analyzed twenty-six spatial zones, extending from 61 miles above Fort Pulaski to the Atlantic Ocean, under both average and drought-river flow, and compared expected dissolved oxygen levels to the pertinent water quality standards. The Corps then determined the mitigation needed to offset predicted impacts on dissolved oxygen levels.

i Mitigation of Dissolved Oxygen Impacts

While modeling has predicted adverse impacts at all depths if the SHEP were completed without any mitigation, the Corps has developed reasonable and appropriate mitigation plans. First, the Corps retained MACTEC Engineering and Consulting, Inc. ("MACTEC"), a well respected environmental firm, to examine 25 mitigation strategies.[16] A dissolved oxygen injection system was found to be the best option for elevating depressed dissolved oxygen levels in the Savannah Harbor that would result from the SHEP. MACTEC further recommended Speece Cones as the appropriate land-based technology for such oxygen injection, which would super-oxygenate a portion of the river water for reintroduction.

[14] DEIS, Section 5.2.1; DEIS Appendix C (Mitigation Planning) at VI.B and Appendix L (Cumulative Impacts Analysis) at 10.

[15] Additional detail regarding development and approval of the models in described in the Engineering Appendix to the GRR, including Engineering Supplemental Studies, I.1.5; I.1.8; and I.1.18.

[16] DEIS, Appendix C, Mitigation Planning.

The GPA retained MACTEC to conduct a full-scale demonstration project of the dissolved oxygen injection system recommended to the Corps during the summer of 2007. MACTEC issued a report of the demonstration project in January 2008.[17] This was followed by additional analysis and modeling requested by the resource agencies and another report by Tetra Tech, Inc. in 2010, all of which confirmed the dissolved oxygen injection technology "can effectively add the required DO mitigation amount to the harbor and reduce in-stream DO deficits during critical summer months."[18] The demonstration project also confirms that the injected oxygen is dispersed quickly in the water column so there is no risk of harm to fishery resources from exposure to highly concentrated oxygenated waters. The Corps has refined the dissolved oxygen mitigation plan based on the real-world experiences of the demonstration project.[19]

To ensure that the full mitigation project performs as predicted, the Corps will implement the Monitoring & Adaptive Management Plan, included as Appendix D to the DEIS. Under this plan, the Corps will monitor the performance of the injection system and dissolved oxygen levels and make further enhancements to the mitigation process should the project fail to perform as predicted.

ii Conclusion

[17] MACTEC, 2008. Savannah Harbor Reoxygenation Demonstration Project, prepared for the Georgia Ports Authority. (January 8, 2008) (Attached hereto as Exhibit D).

[18] Tetra Tech. Inc. Oxygen Injection Design Report, Savannah Harbor Expansion Project, Savannah, Georgia prepared for USACE Savannah District (October 15, 2010). This may be found in the GRR's Engineering Supplemental Studies at 1.1.4.

[19] *Id.*

The proposed mitigation measure of oxygen injection in the Savannah Harbor has been demonstrated to be the most efficient and feasible means to mitigate the incremental adverse effects of the SHEP on the Savannah Harbor's dissolved oxygen regime and satisfy Georgia and South Carolina dissolved oxygen water quality standards at the 48-foot depth. This has been confirmed through hydrodynamic and water-quality predictive modeling and the full-scale demonstration project, as well as numerous other studies as presented in the DEIS and draft GRR. The appropriate technology, amount of oxygen to be injected and the locations of the systems have been determined. The Monitoring & Adaptive Management Plan will implement an extensive monitoring system throughout the SHEP to verify model predictions and allow modifications as needed based on the results of the monitoring.

H. Protection of Drinking Water Resources

The SEG and others requested that the Corps analyze whether the SHEP might cause saltwater intrusion or chloride levels to rise in areas used as potable water sources for the City of Savannah, other South Georgia communities. The Corps conducted the requested studies that confirmed the SHEP should not cause adverse impacts to the drinking water resources. The City of Savannah requested collection of additional data and modeling. The additional analysis and subsequent determinations will be included in the Final Environmental Impact Statement. The Corps will also continue to monitor saltwater and chloride levels during construction and thereafter as part of the Monitoring & Adaptive Management Plan.

1. Upper Floridan Aquifer

The Upper Floridan Aquifer is an extensive source of underground water that provides the primary water supply for much of South Georgia. Among other uses, the Upper Floridan Aquifer provides thirty percent of the total water supply to Chatham County.

The Corps performed six tasks to study the geologic and hydro geologic framework and to refine a regional United States Geological Service model of the aquifer.[20] Then, dredging scenarios were run assuming an additional three feet of sediment removal beyond the dredged depth and other factors were applied to produce best-case and worst-case scenarios under both dredging and no dredging conditions.

The studies and models confirm the SHEP would have minimal adverse impacts on groundwater.[21] Water withdrawals from the Aquifer, unrelated to dredging and the SHEP, would be the dominant cause of any saltwater encroachment. Reduced thickness of the confining layer due to the SHEP at 48 feet MLW also would not significantly affect chloride levels along the navigation channel. Further, the SHEP would have minimal impacts on the water quality in production wells that obtain raw water supply from the Aquifer.

2. Abercorn Creek

The City of Savannah has a water intake on Abercorn Creek to obtain source water for its water supply treatment plant. The City of Savannah asked the Corps to conduct studies to confirm the SHEP would not cause elevations in chlorides at the Abercorn Creek

[20] For additional discussion of evaluation of impacts to the Upper Floridan Aquifer, see DEIS, Section 5.5, DEIS App. L (Cumulative Impacts) at 11 and GRR Section 8.2.1 for additional discussion. These tasks included (1) Subbottom Seismic Survey; (2) marine drilling; (3) land drilling; (4) GIS; (5) 3-D Numerical Hydraulic Model; and (6) Aquitard Test Feasibility.

[21] US Army Corps of Engineers, Savannah District. Supplemental Studies to Determine Potential Groundwater Impacts on the Upper Floridan Aquifer, Savannah Harbor Expansion Project, Final Report, June 2007, found in GRR Engineering Supplemental Studies 1.1.36.

water intake. The Corps conducted the requested studies and those studies confirm the SHEP will not have an adverse impact on water quality at the Abercorn Creek water intake.[22]

The worst case scenario predicted an increase of chloride concentration by 3 percent.[23] Although the worst-case scenario is not a risk to the City of Savannah, the City has disagreed with the methodology and modeling. As noted, the Corps continues to collect data and is conducting additional modeling and analysis at the request of the City of Savannah. These results and any further recommendations will be included in the Final Environmental Impact Statement. The Corps will monitor chloride levels in Abercorn Creek as part on the monitoring plan to determine if chloride levels rise beyond the model predictions.[24]

I. Adaptive Management And Monitoring

The Corps has included an extensive adaptive management program and monitoring plan as part of the SHEP. The adaptive management program, one of the first ever implemented on a harbor project, is designed to evaluate if the project mitigation is performing as predicted, and then to change the mitigation if needed. The costs for such potential changes are included as part of the project cost, and factored into the net benefits determination. The adaptive management is a critical component of the project.

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[22] Industrial users require chloride concentrations below 12 mg/L; Georgia's secondary drinking water standard for chloride is 250 mg/L.

[23] Tetra Tech, Inc. Savannah Harbor Expansion Project – Chloride Data Analysis and Model Development, prepared for USACE – Savannah District (November 15, 2008), found at GRR, Engineering Supplemental Studies, Item 1.1.7. For additional discussion of the modeling and development of the mitigation alternative, see DEIS, Section 5.2.3; DEIS App. C at VI.E; DEIS App. L at 11 and GRR 8.2.4.

[24] A detailed discussion of the evaluation and selection of mitigation alternatives can be found in the DEIS, Section 5.2.3; GRR Section 9.8; and DEIS, Appendix C (Mitigation Planning), Section V.C.3.

Some agencies are concerned that the funds will not be available for adaptive management should changes in the project be necessary. The GPA has committed to set aside the local sponsor share for the program in a separate account so the funds are available if needed. The Corps will request the federal share of funds as needed during its routine budgeting process. However, since Congress directed the Corps to employ adaptive management on water resource projects, the GPA submits that federal funds should also be budgeted and set aside during construction to make changes in mitigation for the ecologically sensitive areas within the Savannah Harbor.

The Corps has also developed an extensive monitoring plan for the Savannah Harbor to be conducted prior to, during and post construction. The components of the plan have been coordinated with the federal and state resource agencies to provide comprehensive information that could be used in updating models and evaluating mitigation performance. The Corps proposes to communicate the results of the monitoring throughout the program including posting the results on their public web site and providing an annual report to the agencies and public.

The Corps proposes that post construction monitoring would continue for five years after the completion of construction. The GPA, however, requests extension of that monitoring program to a length more appropriate to determine estuarine trends, but within the limits prescribed by Congress as part of the Water Resources Development Act of 2007.

EXHIBIT A

The Economic Impact of Georgia's Deepwater Ports On South Carolina's Economy in FY 2009

April 2010

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This study was supported by a grant from the Georgia Ports Authority.

Executive Summary

This summary highlights some of the findings regarding the economic impact of Georgia's deepwater ports on South Carolina's economy in fiscal year 2009. The ensuing sections contain the comprehensive technical report.

The statewide economic impact of Georgia's deepwater ports on South Carolina's economy in fiscal year 2009 includes:

- **$4.3 billion in sales (1.3 percent of South Carolina's total sales);**
- **$1.5 billion in state GDP (1 percent of South Carolina's total GDP);**
- **$959 million in income (0.7 percent of South Carolina's total personal income);**
- **19,704 full- and part-time jobs (1.1 percent of South Carolina's total employment);**
- **$190 million in federal taxes;**
- **$84 million in state taxes; and**
- **$63 million in local taxes.**

These economic impacts demonstrate that imports and exports through Georgia's deepwater ports translate into jobs, higher incomes, greater production of goods and services, and revenue collections for South Carolina. Ports operations in Georgia help to preserve South Carolina's manufacturing base, and foster growth of the state's logistics, distribution, and warehousing cluster. In addition, South Carolina benefits from the sizable economic impact that Georgia's deepwater ports have on Georgia's economy as multiplier effects of direct spending in Georgia spill over the state line into South Carolina.

Output Impacts

Measured in the simplest and broadest terms, the total economic impact of Georgia's deepwater ports on South Carolina's economy is $4.3 billion, which is 1.3 percent of South Carolina's output in 2009.

State GDP (Value Added) Impacts

Measured in terms of GDP or value added, deepwater ports located in Georgia contributed $1.5 billion to South Carolina's economy in 2009, which is 1 percent of South Carolina's total GDP.

Income Impacts

Measured in terms of income, deepwater ports located in Georgia contributed $959 million to South Carolina's economy in 2009, which is 0.7 percent of South Carolina's total personal income.

Employment Impacts

The economic impact of Georgia's deepwater ports on South Carolina's economy probably is most easily understood in terms of its effects on employment. Measured in these terms, Georgia's deepwater ports support 19,704 full- and part-time jobs in South Carolina, which is 1.1 percent of the state's total employment (household survey definition). This means that one job out of every 94 depends in some way on deepwater ports located in Georgia.

Federal Tax Impacts

The total economic impact of Georgia's deepwater ports on tax collections by the federal government in South Carolina in 2009 is $190 million.

State and Local Tax Impact

The total economic impact of Georgia's deepwater ports on tax collections by state and local governments in South Carolina is $84 million and $63 million, respectively.

Georgia's deepwater ports are important engines of South Carolina's economy, fostering the development of virtually every industry. Georgia's ports are especially supportive of South Carolina's manufacturing and wholesale/ distribution businesses, but nearly all industries benefit from indirect and induced spending. As the state and national economies gain momentum, deepwater ports located in Georgia will generate even more substantial economic impacts in South Carolina. Indeed, the resurgence of both imports and exports in 2010 are good signs for South Carolina's economy, especially manufacturing and wholesale businesses.

Introduction

Although it is widely known that Georgia's deepwater ports create substantial economic impacts in Georgia, the positive impacts of these ports on South Carolina's economy are rarely discussed and heretofore have not been estimated. This study provides the first quantitative estimates of the changes in overall economic activity in South Carolina as a result of the presence and operations of deepwater ports in Georgia. The 2009 impacts are estimated in terms of output (sales), state GDP, income, employment, and tax revenues for the federal government as well as state and local government.

Three types of economic impacts are estimated: (1) the economic impact of exporters in South Carolina who use Georgia's deepwater ports; (2) the economic impact of importers in South Carolina who use Georgia's deepwater ports; and (3) the indirect and induced economic impacts (multiplier impacts) generated in South Carolina due to the direct spending that Georgia's ports generate for Georgia's economy.

Georgia's deepwater ports industry consists of public marine terminals in Savannah and Brunswick owned by the Georgia Ports Authority as well as private marine terminals. Please note that the dollar amounts expressed in this report are reported in current dollars (2009).

Economic Impact Highlights

The fundamental finding of this study is that deepwater ports located in Georgia contribute substantially to South Carolina's economy. The statewide economic impact includes:

- $4.3 billion in sales (1.3 percent of South Carolina's total sales);
- $1.5 billion in state GDP (1.0 percent of South Carolina's total GDP);
- $959 million in income (0.7 percent of South Carolina's total personal income);
- 19,704 full- and part-time jobs (1.1 percent of South Carolina's total employment);
- $190 million in federal taxes;
- $84 million in state taxes; and
- $63 million in local taxes.

Measured in the simplest and broadest possible terms, the total economic impact of Georgia's deepwater ports on South Carolina's economy is $4.3 billion. This amount represents the impact on output, which can be thought of as the equivalent of business revenue, sales, or gross receipts. The $4.3 billion output impact accounts for 1.3 percent of South Carolina's total output in 2009. Out of the $4.3 billion, $2.4 billion (57 percent) comes from exports, $251 million (6 percent) is from imports, and $1.6 billion (37 percent) represents the multiplier effects in South Carolina resulting from the economic impact of Georgia's ports on Georgia's economy.

Expressed in other dimensions, deepwater ports located in Georgia support $1.5 billion in South Carolina's GDP and $959 million in personal income, which account for 1 percent and 0.7 percent of the state's GDP and total personal income, respectively. The total economic impact on employment is 19,704 full- and part-time jobs. The impact of deepwater ports located in Georgia on South Carolina's state tax collections is $84 million; the impact on tax collections by local governments is $63 million; and the impact on federal tax collections is $190 million.

The Concept of Port Economic Impact

Many businesses physically located in South Carolina use Georgia's deepwater ports to export their products or to import finished products and/or raw materials. Thus, exporters and importers located in South Carolina that use Georgia's deepwater ports create two types of economic benefits for South Carolina: (1) direct spending by ports users, and (2) the secondary or indirect and induced spending – often referred to as the multiplier effects – created as direct expenditures by ports users are re-spent in South Carolina. The ports users are mainly manufacturers, wholesalers, distributors, and warehousing and storage firms that use the ports to transport materials and/or products. All of the economic activity (spending) generated by ports users whose decision to locate, remain, and/or expand in South Carolina because of Georgia's deepwater ports can be counted as direct economic impact. But since most ports users are only partially dependent on the presence of Georgia's deepwater ports, only a small portion of their total economic activity is counted as direct economic impact. For example, South Carolina firms that use Georgia's deepwater ports due to cost advantages over other ports or other modes of transportation are only partially dependent on Georgia's ports. Users that only ship a portion of their production and materials through Georgia's deepwater ports are only partially dependent on the ports. Therefore, this study estimates the economically dependent activity based on the value of the cargo exported or imported via Georgia's ports.

In addition, South Carolina's economy benefits from the large economic impacts that Georgia's deepwater ports generate in Georgia. A stronger (larger) neighboring economy conveys significant secondary economic benefits to South Carolina. These include indirect and induced spending—often referred to as the multiplier effects—that result when direct expenditures by Georgia's ports industry or ports users are re-spent in South Carolina. [Note that there are no direct impacts in South Carolina because all of the direct spending included in the economic impact estimates for Georgia takes place in Georgia.]

Secondary spending is frequently referred to as the multiplier effect of direct spending. There are two types of secondary spending: indirect spending and induced spending. Indirect spending refers to the changes in inter-industry purchases as the region's industries respond to the additional demands triggered by spending by either the ports industry or ports users. It consists of the ripples of activity that are created when the ports industry or ports users purchase goods or services from other industries located in the state. Induced spending refers to the additional demands triggered by spending by households as their income increases due to changes in production. Basically, the induced impact captures the ripples of activity that are created when households spend more due to the increases in their earnings that were generated by the direct and indirect spending.

The sum of the direct, indirect, and induced economic impacts is the total economic impact, which is expressed in terms of output (sales), state GDP, income, or employment. Output is gross receipts or sales, plus or minus inventory. Total output impacts are the most inclusive, largest, measure of economic impact. Because of their size, output impacts typically are emphasized in economic impact studies and receive much media attention. One problem with output as a measure of economic impact, however, is that it includes the value of inputs produced by other industries, which means that there inevitably is some double counting of economic activity. The other measures of economic impact (GDP, income, and employment) are free from double counting and provide a much more realistic measure of the true economic impact of Georgia's deepwater ports.

State GDP is value added, which consists of employee compensation, proprietor income, other property income, and indirect business taxes. It is equivalent to gross output (sales or receipts and other operating income, commodity taxes, and inventory change) minus intermediate inputs (consumption of goods and services purchased from other industries or imported). It is often referred to as the state-level counterpart of the nation's gross domestic product (GDP). Income is all forms of employment income, including wages, salaries, and proprietors' incomes. It does not include non-wage compensation (e.g., pensions and health insurance), transfer payments (e.g., welfare or social security benefits), or unearned income (e.g., dividends, interest, and rent). Employment includes total wage and salary employees as well as self-employed individuals. It includes both full- and part-time jobs and is measured in annual average jobs.

Methodology

Estimating the Economic Impact of South Carolina's Exports via Georgia's Ports

Data extracted from the U.S. Census Bureau's Foreign Trade Statistics, State Exports/Port Database indicates that the vessel value of exports originating in South Carolina and a U.S. Customs Port of Exportation Code of either Savannah or Brunswick was $1,601 million in 2009. The vessel value of exports reflects the value of the goods at the U.S. port of export, which is the selling price, or the cost if the goods are not sold. This amount was allocated to the industry sectors supported by the IMPLAN Version 3.0 economic impact assessment software system in a two step process. First, the i-PIERS Port Import Export Reporting Service provided 2009 data regarding vessel value (and tonnage) by 4-digit harmonized tariff code. According to i-PIERS, the vessel value of exports where the origin was South Carolina and the port of export was either Savannah or Brunswick was $1,564 million, which is only 2.3 percent lower than the total obtained from the State Exports/Port Database. A detailed discussion of i-PIERS, including a users' guide can be found at www.piers.com. Second, vessel values by 4-digit harmonized tariff codes reporting at least $1 million were allocated to industry sectors recognized by the IMPLAN Version 3.0 modeling system. The 121 harmonized tariff codes with at least $1 million in vessel value represented 87 percent of the total vessel value of the South Carolina's exports via Georgia's ports as reported by Foreign Trade Statistics. The Foreign Trade Statistics amount ($1,601 billion) was used as a control total, with the difference proportionally allocated to IMPLAN industries based on the methods described above.

The allocated vessel values constitute $1,601 million in direct economic impact on South Carolina's industries (primarily manufacturers). The IMPLAN system was used to estimate the indirect and induced economic impacts of these direct amounts. A detailed discussion of the IMPLAN modeling system, including its structure, methods, and use, can be found at www.implan.com.

Estimating the Economic Impact of South Carolina's Imports via Georgia's Ports

Although the process used to estimate the economic impact related to imported goods entering South Carolina via Georgia's ports is similar to that used to estimate the economic impact of exports, there were some differences. As is the case for exports, the i-PIERS Port Import Export Reporting Service provided 2009 data regarding vessel value (and tonnage) by 4-digit harmonized tariff code. According to i-PIERS, the vessel value of imports where the state of destination was South Carolina and the port of importation was either Savannah or Brunswick was $1,132 million. A comparable import total was not available from the U.S. Census Bureau, Foreign Trade Statistics, however.

The vessel values (by 4-digit harmonized tariff codes) were allocated to sectors recognized by IMPLAN, but only those shipments that reflected imports to wholesale trade businesses were considered to create net economic impacts in South Carolina. For example, shipments of goods likely to go directly to manufacturers as inputs in production were not included in the impact estimates. Consequently, only $439 million out of the $1,132 million reported by i-PIERS could be allocated to wholesale trade businesses.

One problem complicating the analysis of imports is that vessel values are typically expressed in customs value, which is defined as the price actually paid or payable for merchandise when sold for exportation to the U.S. The customs value therefore does not include either the wholesale or the retail margins (markups). IMPLAN requires that the value be entered in the event field for wholesale businesses as either a retail value (which is then margined) or as a wholesale value (which does not need to be margined). The approach used was to take the customs value reported by i-PIERS and impute the retail value by using the IMPLAN generated wholesale margin for South Carolina (18.9 percent) and the general merchandise retail margin (27.8 percent). Consequently, $439 million reported by i-PIERS equals $816 million when expressed as retail sales. The IMPLAN system was used to estimate the indirect and induced economic impacts of $816 million for South Carolina's wholesale businesses.

Estimating the Economic Impact of Spillover Impacts from Georgia

South Carolina's economy benefits from the large economic impacts that Georgia's deepwater ports generate in Georgia. These impacts consist of secondary, or indirect and induced, spending—the multiplier effects—created as direct expenditures by Georgia's ports industry or ports users are re-spent in South Carolina.

The multiplier effects of the direct impacts generated by Georgia's deepwater ports in Georgia on South Carolina's economy were estimated using a multi-regional analysis, which is a new feature available with IMPLAN 3.0. Multi-regional analysis makes it possible to track how a direct impact on any of the industries in one study area (e.g., Georgia) affects the production in any other region (e.g., South Carolina). A detailed discussion of the methods used to estimate direct spending that creates the spillover impacts can be found in the report titled *The Economic Impact of Georgia's Deepwater Ports on Georgia's Economy in FY 2009*, which was produced by the Selig Center and can be obtained from the Georgia Ports Authority. Direct spending in Georgia by Georgia's ports industry and Georgia's port users was $2,069 million and $34,461 million, respectively. These amounts were allocated to IMPLAN sectors and analyzed using a multi-regional analysis of the economies of Georgia and South Carolina.

The Results

The total economic impact of Georgia's deepwater ports on South Carolina's output, GDP, income, and employment is summarized in Table 1. The direct, indirect plus induced, and the total economic impacts in terms of output, income, and state GDP are reported in Table 2. Similarly, Table 3 and Table 4 report the employment and tax impacts, respectively.

■ Output Impacts ■

Measured in the simplest and broadest terms, the total economic impact of the Port of Savannah and the Port of Brunswick on South Carolina is $4.3 billion, which is 1.3 percent of South Carolina's output in 2009. Of the total output impact, $1.8 billion represents initial spending, or direct economic impact; $2.5 billion is indirect and induced spending, or the re-spending (multiplier) impact. Out of the $4.3 billion, $2.4 billion (57 percent) represents the results from exports, $251 million (6 percent) represent the results from imports, and $1.6 billion (37 percent) represents the multiplier effects in South Carolina resulting from the direct economic impact of Georgia's ports on Georgia's economy.

■ GDP (Value Added) Impacts ■

Measured in terms of GDP or value added, Georgia's deepwater ports contributed $1.5 billion to South Carolina's economy in 2009, which is 1 percent of South Carolina's total GDP. Of the total GDP impact, $499 million represents the direct effects of initial spending, or the direct economic impact; $1,045 million is indirect and induced spending, or the re-spending (multiplier) impact. Out of the $1.5 billion GDP impact, $831 million (54 percent) represents the results from exports, $155 million (10 percent) represent the results from imports, and $558 million (36 percent) represents the multiplier effects in South Carolina resulting from the direct economic impact of Georgia's ports on Georgia's economy.

■ Income Impacts ■

Measured in terms of income, Georgia's deepwater ports contributed $959 million to South Carolina's economy in 2009, which is 0.7 percent of South Carolina's total personal income. Of the total income impact, $341 million represents the direct effects of initial spending, or the direct economic impact; $618 million is indirect and induced spending, or the re-spending (multiplier) impact. Out of the $959 million income impact, $532 million (55 percent) represents the results from exports, $90 million (9 percent) represent the results from imports, and $337 million (35 percent) represents the multiplier effects in South Carolina resulting from the direct economic impact of Georgia's ports on Georgia's economy.

■ Employment Impacts ■

The economic impact of Georgia's deepwater ports on South Carolina's economy probably is most easily understood in terms of its effects on employment. Measured in these terms, Georgia's deepwater ports support 19,704 full- and part-time jobs in South Carolina, which equal 1.1 percent of South Carolina's total employment – based on the household survey definition of employment.

This means that one job out of every ninety-four that exist in South Carolina depends in some way on the deepwater ports located in Georgia. Of the total employment impact, 5,394 jobs represent the direct effects of initial spending, or the direct economic impact; 14,310 jobs reflect indirect and induced spending, or the re-spending (multiplier) impact. Out of the 19,704 full- and part-time job employment impact, 10,640 jobs (54 percent) represents the results from exports, 1,762 jobs (9 percent) represent the results from imports, and 7,302 jobs (37 percent) represents the multiplier effects in South Carolina resulting from the direct economic impact of Georgia's ports on Georgia's economy.

■ Tax Impacts ■

The total economic impact of Georgia's deepwater ports on tax collections by the federal government in South Carolina in 2009 is $190 million. The total economic impact of Georgia's deepwater ports on tax collections by state government is $84 million, and $63 million for local governments.

Closing Comment

This study investigates the economic impact of deepwater ports located in Georgia on South Carolina's economy, and finds substantial economic impacts in terms of output (gross receipts or sales), state GDP, income, employment, state and local tax revenues, and federal tax revenues. The findings are based on analytical methods that are standard in regional economics and economic consulting.

Table 1

Summary of the 2009 Economic Impact
of Georgia's Deepwater Ports on South Carolina
(millions of 2009 dollars)

	Total economic impact on:			
	Output	State GDP	Income	Employment (jobs)
SC exports via Georgia's ports	2,443	831	532	10,640
SC imports via Georgia's ports	251	155	90	1,762
Spillover impacts from Georgia	1,583	558	337	7,302
Georgia's ports industry	43	21	13	291
Georgia's ports users	1,540	537	324	7,011
Total output/revenue impact	4,277	1,544	959	19,704

Note: SC exports via Georgia's ports refers to exports where the state of origin is South Carolina and the port of export is either Savannah or Brunswick. SC imports via Georgia's ports refers to imports where the state of destination is South Carolina and the port of import is either Savannah or Brunswick. Spillover impacts from Georgia refer to the indirect plus induced economic impacts in South Carolina of the direct spending associated with Georgia's ports industry and ports users located in Georgia.

Source: Estimated by the Selig Center for Economic Growth, Terry College of Business, The University of Georgia (www.selig.uga.edu), 2010.

Table 2

2009 Economic Impact of Georgia's Deepwater Ports
on Output (Revenue), Income, and State GDP in South Carolina
(millions of 2009 dollars)

	Direct Economic Impact on Output/Revenue	Indirect & Induced Economic Impact on Output/Revenue	Total Economic Impact on Output/Revenue
SC exports via Georgia's ports	1,601	842	2,443
SC imports via Georgia's ports	154	96	251
Spillover impacts from Georgia	0	1,583	1,583
Georgia's ports industry	0	43	43
Georgia's ports users	0	1,540	1,540
Total output/revenue impact	1,755	2,521	4,277

	Direct Economic Impact on Income	Indirect & Induced Economic Impact on Income	Total Economic Impact on Income
SC exports via Georgia's ports	283	249	532
SC imports via Georgia's ports	58	32	90
Spillover impacts from Georgia	0	337	337
Georgia's ports industry	0	13	13
Georgia's ports users	0	324	324
Total income impact	341	618	959

	Direct Economic Impact on Gross State Product	Indirect & Induced Economic Impact on Gross State Product	Total Economic Impact on State GDP
SC exports via Georgia's ports	400	431	831
SC imports via Georgia's ports	99	56	155
Spillover impacts from Georgia	0	558	558
Georgia's ports industry	0	21	21
Georgia's ports users	0	537	537
Total state GDP	499	1,045	1,544

Note: SC exports via Georgia's ports refers to exports where the state of origin is South Carolina and the port of export is either Savannah or Brunswick. SC imports via Georgia's ports refers to imports where the state of destination is South Carolina and the port of import is either Savannah or Brunswick. Spillover impacts from Georgia refer to the indirect plus induced economic impacts in South Carolina of the direct spending associated with Georgia's ports industry and ports users located in Georgia.

Source: Estimated by the Selig Center for Economic Growth, Terry College of Business, The University of Georgia (www.selig.uga.edu), 2010.

Table 3

2009 Economic Impact of Georgia's Deepwater Ports
on Employment in South Carolina
(full- and part-time jobs)

	Direct Economic Impact on Employment (full- and part-time jobs)	Indirect & Induced Economic Impact on Employment (full- and part-time jobs)	Total Economic Impact on Employment (full- and part-time jobs)
SC exports via Georgia's ports	4,510	6,130	10,640
SC imports via Georgia's ports	884	878	1,762
Spillover impacts from Georgia	0	7,302	7,302
Georgia's ports industry	0	291	291
Georgia's ports users	0	7,011	7,011
Total employment impact	5,394	14,310	19,704

Note: SC exports via Georgia's ports refers to exports where the state of origin is South Carolina and the port of export is either Savannah or Brunswick. SC imports via Georgia's ports refers to the imports where the state of destination is South Carolina and the port of import is either Savannah or Brunswick. Spillover impacts from Georgia refer to the indirect plus induced economic impacts in South Carolina of the direct spending associated with Georgia's ports industry and ports users in Georgia.

Source: Estimated by the Selig Center for Economic Growth, Terry College of Business, The University of Georgia (www.selig.uga.edu), 2010.

Table 4

2009 Economic Impact of Georgia's Deepwater Ports on Tax Collections in South Carolina (millions of 2009 dollars)

	Federal Taxes	State Taxes	Local Taxes
SC exports via Georgia's ports	103.4	40.9	30.9
SC imports via Georgia's ports	19.5	15.2	11.4
Spillover impacts from Georgia	66.8	27.7	20.9
Georgia's ports industry	2.5	1.1	0.8
Georgia's ports users	64.3	26.6	20.1
Total	189.7	83.8	63.2

Note: SC exports via Georgia's ports refers to exports where the state of origin is South Carolina and the port of export is either Savannah or Brunswick. SC imports via Georgia's ports refers to the imports where the state of destination is South Carolina and the port of import is either Savannah or Brunswick. Spillover impacts from Georgia refer to the indirect plus induced economic impacts in South Carolina of the direct spending associated with Georgia's ports industry and ports users in Georgia.

Source: Estimated by the Selig Center for Economic Growth, Terry College of Business, The University of Georgia (www.selig.uga.edu), 2010.

EXHIBIT B

The Economic Impact of Georgia's Deepwater Ports on Georgia's Economy in FY 2009

April 2010

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This study was supported by a grant from the Georgia Ports Authority.

Executive Summary: The Economic Impact of Georgia's Deepwater Ports on Georgia's Economy in FY 2009

This summary highlights some of the findings regarding the economic impact of Georgia's deepwater ports on Georgia's economy in fiscal year 2009. The ensuing chapters contain the comprehensive technical report.

The statewide economic impact of Georgia's deepwater ports in fiscal year 2009 includes:

- **$61.7 billion in sales (8.6 percent of Georgia's total sales);**
- **$26.8 billion in state GDP (6.8 percent of Georgia's total GDP);**
- **$15.5 billion in income (4.6 percent of Georgia's total personal income);**
- **295,443 full- and part-time jobs (6.7 percent of Georgia's total employment);**
- **$3.5 billion in federal taxes;**
- **$1.5 billion in state taxes; and**
- **$1.1 billion in local taxes.**

These economic impacts demonstrate that continued emphasis on imports and exports through Georgia's deepwater ports translates into jobs, higher incomes, greater production of goods and services, and revenue collections for government. Ports operations help to preserve Georgia's manufacturing base, and foster growth of the state's massive logistics, distribution, and warehousing cluster.

■ Output Impacts

Measured in the simplest and broadest terms, the total economic impact of Georgia's deepwater ports on Georgia's economy is $61.7 billion, which is 8.6 percent of Georgia's output in FY 2009. Out of the total, $36.5 billion represents initial spending, or direct economic impact; $25.1 billion is indirect and induced spending, or the re-spending (multiplier) impact. Dividing the FY 2009 total output impact ($61.7 billion) by initial spending ($36.5 billion) yields an average multiplier value of 1.688. On average, therefore, every dollar initially spent by the ports industry and ports users generates an additional 69 cents for the state's economy.

■ State GDP (Value Added) Impacts

Measured in terms of GDP or value added, Georgia's deepwater ports contribute $26.8 billion to the state's economy in fiscal year 2009, which is 6.8 percent of Georgia's total GDP. Out of the total, $13.2 billion represents the direct effects of initial spending, or the direct economic impact; $13.6 billion is indirect and induced spending, or the re-spending (multiplier) impact.

- **Income Impacts**

Measured in terms of income, Georgia's deepwater ports contributed $15.5 billion to the state's economy in fiscal year 2009, which is 4.6 percent of Georgia's total personal income. Of the total, $7.8 billion represents the direct effects of initial spending, or the direct economic impact; $7.7 billion is indirect and induced spending, or the re-spending (multiplier) impact.

- **Employment Impacts**

The economic impact of Georgia's deepwater ports probably is most easily understood in terms of its effects on employment. Measured in these terms, Georgia's deepwater ports support 295,443 full- and part-time jobs, which is 6.7 percent of Georgia's total employment (as defined by a survey of households). This means that one job out of every fifteen is in some way dependent on the ports. Of the FY 2009 total employment impact, 128,733 jobs represent the direct effects of initial spending, or the direct economic impact; 166,710 jobs constitute the indirect and induced effect of spending, or the re-spending impact.

- **State Tax Impact**

The total economic impact of Georgia's deepwater ports on tax collections by state government in fiscal year 2009 is $1.5 billion.

- **Local Tax Impact**

The total economic impact of Georgia's deepwater ports on tax collections by local governments in fiscal year 2009 is $1.1 billion.

- **Federal Tax Impacts**

The total economic impact of Georgia's deepwater ports on tax collections by the federal government in fiscal year 2009 is $3.5 billion.

Deepwater ports are one of Georgia's strongest economic engines, fostering the development of virtually every industry. The ports are especially supportive of other forms of transportation, manufacturing, wholesale/distribution centers, and agriculture. The outstanding performance of Georgia's deepwater ports relative to other American ports reflects strong competitive advantages that allowed Georgia's ports to expand their share of activities. These advantages are largely the result of strategic investments in port facilities by the State of Georgia over many years. As the state and national economies gain momentum, Georgia's deepwater ports will thrive, generating even more substantial economic impacts in future fiscal years.

Chapter 1: Introduction

Georgia's deepwater ports industry consists of public marine terminals in Savannah and Brunswick owned by the Georgia Ports Authority as well as private marine terminals. Georgia's deepwater ports are thriving, and Savannah's port is one of the fastest growing container ports in the world. The superb performance of Georgia's ports relative to other ports reflects strong comparative advantages that allowed them to expand their shares of regional and national waterborne cargo traffic. These comparative advantages are the result of a series of strategic expansions over many years.

It is obvious that Georgia's deepwater ports create substantial economic impacts on the state in terms of output (sales), state GDP, income, employment, and tax revenues for federal, state, and local governments. Nonetheless, this study provides a quantitative assessment of the changes in overall economic activity as a result of the presence and operations of Georgia's deepwater ports in fiscal year 2009.

The facilities owned by the Georgia Ports Authority in Savannah and Brunswick will be referred to as the Port of Savannah and the Port of Brunswick, respectively; and cargo volumes, expenditures, and impact estimates for these facilities will be reported separately from those for private facilities/docks. The amounts expressed in this report (including the executive summary and appendices) are reported in current dollars (2009).

Chapter 2: Economic Impact Highlights

The fundamental finding of this study is that the strategic decisions by state government to invest public resources in the two deepwater ports have contributed to substantial economic activity in Georgia. The statewide economic impact of the deepwater ports in fiscal year 2009 includes:

- $61.7 billion in sales (8.6 percent of Georgia's total sales);
- $26.8 billion in state GDP (6.8 percent of Georgia's total GDP);
- $15.5 billion in income (4.6 percent of Georgia's total personal income);
- 295,443 full- and part-time jobs (6.7 percent of Georgia's total employment);
- $3.5 billion in federal taxes;
- $1.5 billion in state taxes; and
- $1.1 billion in local taxes.

Measured in the simplest and broadest possible terms, the total economic impact of Georgia's deepwater ports on Georgia's economy is $61.7 billion. This amount represents the combined impact of the ports industry and ports users on output, which can be thought of as the equivalent of business revenue, sales, or gross receipts. The $61.7 billion output impact accounts for 8.6 percent of Georgia's total output in FY 2009. Out of the $61.7 billion, $3.2 billion (5 percent) represents the results from the ports industry and $58.5 billion (95 percent) represents the results from ports users.

Of the FY 2009 total output impact, $36.5 billion represents initial spending, or direct economic impact; and $25.1 billion is indirect and induced spending, or the re-spending (multiplier) impact. Dividing the FY 2009 total output impact ($61.7 billion) by initial spending ($36.5 billion) yields an average multiplier value of 1.688. On average, therefore, every dollar initially spent by either the ports industry and ports users generates an additional 69 cents for the economy.

Expressed in other dimensions, the ports industry and port users together support $26.8 billion in state GDP and $15.5 billion in income, which account for 6.8 percent and 4.6 percent of Georgia's GDP and total personal income, respectively. The total economic impact on employment is 295,443 full- and part-time jobs. The combined

impact of the ports industry and ports users on state tax collections is $1.5 billion. The combined impact of the ports industry and ports users on local tax collections is $1.1 billion. The combined impact on federal tax collections is $3.5 billion.

The distribution of total economic impacts of cargo-based activity at the Georgia Ports Authority's facilities in Savannah and Brunswick by mode of cargo indicates that containerized cargo accounts for 91 percent of the reported economic impacts. Breakbulk cargo accounts for 4 percent of the reported impacts, and auto/vehicle cargo accounts for 3 percent of the reported impacts. Liquid bulk and dry bulk cargoes each account for about 1 percent of reported impacts.

Chapter 3: The Concept of Port Economic Impact

The total economic impact of Georgia's deepwater ports consists of (1) direct spending by the ports industry, (2) direct spending by ports users, and (3) the secondary or indirect and induced spending – often referred to as the multiplier effects – created as direct expenditures by either the ports industry or ports users are re-spent.

The ports industry is defined to include economic activity (spending) that involves the transportation of waterborne cargo and ports services, including the ports themselves, the companies engaged in deepwater transportation as well as companies that provide ship services, and companies that provide inland transportation of waterborne cargo. Ports investment (capital expenditures) for additions and/or improvements to Georgia's deepwater ports also are included as part of the ports industry. This definition of the ports industry is identical to the definition used by the U.S. Department of Transportation, Maritime Administration in the MARAD Port Economic Impact Kit. Thus, the ports industry includes activities that take place on the vessel, at the terminal, and during the inland movement of cargo. Since the firms and enterprises that provide these activities locate in Georgia because of the existence of the ports, all of their activity (spending) can be counted as direct economic impact.

Ports users are mainly manufacturers, wholesalers, distributors, and warehousing and storage firms that use the ports to transport materials and/or products. Although most users are importers and exporters, some ship materials or products to and/or from domestic locations. All of the economic activity (spending) generated by ports users whose decision to locate, remain, and/or expand in Georgia hinges on the presence of these deepwater ports can be counted as direct economic impact. But since most ports users are only partially dependent on the presence of Georgia's deepwater ports, only a portion of their total economic activity is counted as direct economic impact. For example, firms that use Georgia's deepwater ports due to cost advantages over other ports or other modes of transportation are only partially dependent on Georgia's ports. Also, users that only ship a portion of their production and materials through Georgia's deepwater ports are only partially dependent on the ports. To avoid double counting,

ports users' activity is defined to exclude their transportation expenditures associated with the waterborne cargo that is handled by Georgia's ports industry.

Secondary spending often is referred to as the multiplier effect of direct spending. There are two types of secondary spending: indirect spending and induced spending. Indirect spending refers to the changes in inter-industry purchases as Georgia's industries respond to the additional demands triggered by spending by either the ports industry or ports users. It consists of the ripples of activity that are created when the ports industry or ports users purchase goods or services from other industries located in the state. Induced spending refers to the additional demands triggered by spending by households as their income increases due to changes in production. Basically, the induced impact captures the ripples of activity that are created when households spend more due to the increases in their earnings that were generated by the direct and indirect spending.

The sum of the direct, indirect, and induced economic impacts is the total economic impact, which often is expressed in terms of output (sales), state GDP, income, or employment. Output is gross receipts or sales, plus or minus inventory. Total output impacts are the most inclusive, largest, measure of economic impact. Because of their size, output impacts typically are emphasized in economic impact studies and receive much media attention. One problem with output as a measure of economic impact, however, is that it includes the value of inputs produced by other industries, which means that there inevitably is some double counting of economic activity. The other measures of economic impact (GDP, income, and employment) are free from double counting and provide a much more realistic measure of the true economic impact of Georgia's deepwater ports.

State GDP is value added, which consists of employee compensation, proprietor income, other property income, and indirect business taxes. Value added is equivalent to gross output (sales or receipts and other operating income, commodity taxes, and inventory change) minus intermediate inputs (consumption of goods and services purchased from other industries or imported). It is often referred to as the state-level counterpart of the nation's gross domestic product (GDP). Income is all forms of employment income, including wages, salaries, and proprietors' incomes. It does not include non-wage compensation (e.g., pensions and health insurance), transfer payments

(e.g., welfare or social security benefits), or unearned income (e.g., dividends, interest, and rent). Employment includes total wage and salary employees as well as self-employed individuals. It encompasses both full- and part-time jobs and is measured in annual average jobs.

Chapter 4: Methodology

Estimating the economic impact of Georgia's deepwater ports involved two distinct steps. First, data regarding tonnage by type and capital expenditures were obtained from the Georgia Ports Authority. The tonnage and capital expenditure data were imported into the U.S. Department of Transportation's MARAD Port Economic Impact Kit to estimate the direct, indirect, induced, and total economic impacts of the ports industry. Second, ports users' spending was estimated. Ports users were surveyed in 2003 to determine the degree to which they depend on Georgia's deepwater ports. To help correct for non-response and/or incomplete responses and to update the analysis, several types of government and administrative data were used to assess the proportion of revenue or sales in various industries that could be attributed to ports usage. The IMPLAN Version 3.0 economic impact assessment software system was used to estimate the indirect and induced economic impacts of the ports-related portion of spending by users.

Estimating the Ports Industry's Economic Impact

A revised version of the U.S. Department of Transportation's MARAD port economic impact model that was built specifically for Georgia was used to estimate the direct, indirect, and induced economic impact of spending by the ports industry. A detailed discussion of the model, including its structure, methods, and use can be found in the two-volume *MARAD Port Economic Impact Kit.*

The Georgia Ports Authority provided the fiscal year 2009 data on cargo volume (import and export) by mode of transportation for the Savannah and Brunswick facilities that the MARAD model required. The cargo volume reported for the Port of Savannah includes data for the Garden City and Ocean terminals. The cargo volume reported for the Port of Brunswick includes data for Colonel's Island, Brunswick East River, Logistec (Marine Port Terminals), and the Mayor's Point Terminal. Table 1 summarizes cargo volume for cars, containerized cargo, breakbulk cargo, dry bulk cargo, and liquid bulk cargo. Cargo volume is expressed on a per-vehicle basis for auto/vehicle cargo; a per-

TEU (Twenty Foot Equivalent Unit) basis for containerized cargo; and a per-short ton (2,000 pounds) for breakbulk, dry bulk, and liquid bulk. In addition, the Georgia Ports Authority provided estimates of cargo volume for the private facilities/docks based on an analysis of data obtained from PIERS, and the estimates are summarized in Table 2. The Georgia Ports Authority also provided capital expenditures (ports investment) in FY 2009 for the facilities that it owns. Capital expenditures by the private facilities/docks are not included in this analysis, however.

Estimating the Ports Users' Economic Impact

A confidential survey of the entire population of current users of the Georgia Ports Authority's facilities was conducted in 2003 to identify the industries that utilize the ports, their sales, and the extent to which they depend on the ports. *The Economic Impact of Georgia's Deepwater Ports on Georgia's Economy in FY 2003* (April 2004) contains both the survey instrument and a brief summary of responses. Secondary sources of information supplemented and updated the information obtained from the survey. These secondary sources include: (1) The U.S. Department of Commerce, Bureau of Economic Analysis' historical data on gross domestic product and output, gross state product, and personal income (estimates for 2009 were prepared by the Selig Center). (2) The U.S. Department of Labor's and the Georgia Department of Labor's historical data on employment by industry. (3) U.S. Department of Transportation, Maritime Administration, Office of Ports and Domestic Shipping on the economic impact of ports users at the national level. (4) A study of the economic impacts of the U.S. Deepwater Port System prepared for the American Association of Port Authorities. (5) The Georgia Department of Community Affairs and the Department of Industry Trade and Tourism's summary information from their survey of manufacturers regarding their international trade activity and current and future exports of their products.

Based on an analysis of both the survey and secondary information sources, it was determined that port-related sales (output) totaled $34.5 billion in Georgia in fiscal year 2009, or about 4.8 percent of Georgia's total output that year. Manufacturers were estimated to account for about 75 percent of port-related sales, while wholesale/

distribution/warehousing/storage activities accounted for about 19 percent of port-related sales, and agriculture, forestry, and mining accounted for the remaining 6 percent.

The IMPLAN Version 3.0 modeling system was used to estimate the indirect and induced economic impact of ports users' direct expenditures. A detailed discussion of the IMPLAN modeling system, including its structure, methods, and use, can be found at www.implan.com.

Chapter 5: The Results

The total economic impact of Georgia's deepwater ports on output, GDP, income, and employment is summarized in Table 3. The direct, indirect plus induced, and the total economic impacts of Georgia's deepwater ports in terms of output, income, and gross state product are reported in Table 4. Similarly, Table 5 and Table 6 report the employment and tax impacts, respectively. Table 7 reports the overall multiplier values for output, employment, income, and GDP. Table 8 reports the total economic impacts of cargo-based activity by mode of cargo at the Georgia Ports Authority's operations in Savannah and Brunswick. Table 9 shows the ports industry's employment impact by occupation. Table 10 details the employment impact of port users by industry. More detailed tabulations of the economic impact of Georgia's deepwater ports are included in Appendix 1.

■ Output Impacts

Measured in the broadest terms, the total economic impact of the Port of Savannah and the Port of Brunswick on Georgia's economy is $61.7 billion, which is 8.6 percent of Georgia's output in FY 2009.

Out of the total, $3.2 billion (5 percent) represents the results from the ports industry, of which the GPA's operations at the Port of Savannah contribute 76 percent. Ports users' total output impact, however, is nineteen times greater than that of the ports industry – $58.5 billion. Indeed, ports users account for almost 95 percent of the total output impact of Georgia's deepwater ports.

Of the FY 2009 total output impact, $36.5 billion represents initial spending, or direct economic impact; $25.1 billion is indirect and induced spending, or the re-spending (multiplier) impact. Dividing the FY 2009 total output impact ($61.7 billion) by initial spending ($36.5 billion) yields an average multiplier value of 1.688. On average, therefore, every dollar initially spent by either the ports industry or ports users generates an additional 69 cents for the state's economy.

■ GDP (Value Added) Impacts

Measured in terms of GDP or value added, Georgia's deepwater ports contributed $26.8 billion to the state's economy in FY 2009, which is 6.8 percent of Georgia's total GDP. Out of the total GDP impact, $1.5 billion (6 percent) represents the results from the ports industry. The GPA's operations at the Port of Savannah contribute 77 percent of this $1.5 billion. But the $25.2 billion GDP impact attributed to ports users is sixteen times greater than that of the port industry, so users account for 94 percent of the total GDP impact of Georgia's deepwater ports.

Of the FY 2009 total GDP impact, $13.2 billion represents the direct effects of initial spending, or the direct economic impact; $13.6 billion is indirect and induced spending, or the re-spending (multiplier) impact. Dividing the FY 2009 total GDP impact ($26.8 billion) by the direct GDP impact ($13.2 billion) yields an average multiplier value of 2.028. On average, therefore, every dollar of direct GDP produced by the ports industry and ports users yields an additional 103 cents for the state's economy.

- **Income Impacts**

Measured in terms of income, Georgia's deepwater ports contributed $15.5 billion to the state's economy in fiscal year 2009, which is 4.6 percent of Georgia's total personal income. Out of the total, $1.1 billion (7 percent) represents the results from the ports industry. The GPA's operations at the Port of Savannah contribute 77 percent of this $1.1 billion, but ports users' $14.4 billion income impact is almost thirteen times greater. Indeed, users account for 93 percent of the total income impact of Georgia's deepwater ports.

Of the FY 2009 total income impact, $7.8 billion represents the direct effects of initial spending, or the direct economic impact; $7.7 billion is indirect and induced spending, or the re-spending (multiplier) impact. Dividing the FY 2009 total income impact ($15.5 billion) by the direct income impact ($7.8 billion) yields an average multiplier value of 1.994. On average, therefore, every dollar of direct income produced by the ports industry and ports users generates an additional 99 cents for the state's economy.

- **Employment Impacts**

The economic impact of Georgia's deepwater ports probably is most easily understood in terms of its effects on employment. Measured in these terms, Georgia's

deepwater ports support 295,443 full- and part-time jobs, which equal 6.7 percent of Georgia's total employment – based on the household survey definition of employment.

This means that one job out of every fifteen is in some way dependent on the ports. Out of the 295,443 jobs, 28,234 (10 percent) represent the results from the ports industry. The GPA's operations at the Port of Savannah contribute 77 percent of these 28,234 jobs, but ports users' 267,209-job impact is nine times greater, so users account for 90 percent of the total employment impact of Georgia's deepwater ports.

Of the FY 2009 total employment impact, 128,733 jobs represent the direct effects of initial spending, or the direct economic impact; 166,710 jobs constitute the indirect and induced effect of spending, or the re-spending (multiplier) impact. Dividing the FY 2009 total job impact (295,422 jobs) by the direct job impact (128,720 jobs) yields an average multiplier value of 2.295. On average, therefore, each job created directly by the ports industry and ports users yields an additional 1.3 jobs in the state.

- **State Tax Impact**

Spending by the ports industry and ports users generate substantial tax revenue for Georgia's state government. The total economic impact of Georgia's deepwater ports on tax collections by state government in fiscal year 2009 is $1.5 billion.

- **Local Tax Impact**

Spending by the ports industry and ports users generate substantial tax revenue for Georgia's local governments. The total economic impact of Georgia's deepwater ports on tax collections by local governments in fiscal year 2009 is $1.1 billion.

- **Federal Tax Impact**

Spending by the ports industry and ports users generate substantial tax revenue for the federal government. The total economic impact of Georgia's deepwater ports on tax collections by the federal government in fiscal year 2009 is $3.5 billion.

Chapter 6: Comparisons to Previous Estimates

In 2007, the Georgia Ports Authority retained the University of Georgia's Terry College of Business to estimate the economic impact of Georgia's deepwater ports on the state's economy. Economic impact estimates for FY 2006 were published in *The Economic Impact of Georgia's Deepwater Ports on Georgia's Economy* (2007). The methods used were very similar to those used in this study. The FY 2006 impact of Georgia's deepwater ports were $55.8 billion in sales, $24.8 billion in state GDP, $14.9 billion in income, and 286,476 full- and part-time jobs.

In 2004, the Georgia Ports Authority retained the University of Georgia's Terry College of Business and Savannah State University to estimate the economic impact of Georgia's deepwater ports on the state's economy. Economic impact estimates for FY 2003 were published in *The Economic Impact of Georgia's Deepwater Ports on Georgia's Economy in FY 2003* (April 2004). The study found that the FY 2003 impact of Georgia's deepwater ports were $35.4 billion in sales, $17.1 billion in gross state product, $10.8 billion in income, and 275,968 full- and part-time jobs.

In 1997, Booz-Allen & Hamilton, Inc. conducted the study and published its results (for 1996) in *Economic Impacts of Georgia's Deepwater Ports of Savannah and Brunswick* (March 20, 1998). Instead of using actual cargo volumes and standard macroeconomic input-output modeling systems (e.g., MARAD Port Economic Impact Kit, IMPLAN, RIMS, or REMI) to measure direct, indirect, and induced economic impacts, Booz-Allen & Hamilton relied primarily on direct survey methods, which they said is "somewhat unique." Due to the unique character of their methods as well as the use of non-conventional definitions of standard economic impact terms, it is very difficult to make meaningful direct comparisons of their results to the results of this study, or to those of any other port economic impact study.

Booz-Allen & Hamilton found that the total economic impact of Georgia's deepwater ports on output (sales) and employment were $22.3 billion and 76,672 jobs, respectively. Their estimates of the economic impact on tax collections by state and local governments was $569 million, and that the economic impact on wages was $1.7 billion. The

estimates produced by the Terry College of Business (based on data for FY 2003) were considerably larger. The order of magnitude of Booz-Allen & Hamilton's output impact ($22.3 billion), however, appears to be somewhat reasonable considering that: (1) the Port of Savannah and the Port of Brunswick both experienced exceptionally rapid growth in cargo volumes from 1996-2003 (implying that direct spending by the ports industry was much smaller in 1996 than it was in 2003); (2) Georgia's overall economy was much smaller in 1996 than it was in 2003 (implying that ports-related impacts were much smaller in 1996 than in 2003); (3) the survey-based approach did not capture all of the direct economic impacts; (4) the survey-based approach is incapable of capturing many of the indirect economic impacts; and (5) the survey-based approach does not capture any of the induced economic impacts.

In 1999, Georgia Southern University applied more conventional input-output modeling techniques to re-estimate the ports' 1996 economic impact. But it appears that they basically relied on Booz-Allen & Hamilton's estimate of direct economic impact. Nonetheless, Georgia Southern's use of the REMI model to re-estimate both the indirect and induced economic impacts more fully captured the indirect and induced economic impacts of the direct spending (as estimated by Booz-Allen & Hamilton). Consequently, their impact estimates were somewhat higher than those produced by Booz-Allen & Hamilton.

Chapter 7: Closing Comment

This study investigates the economic impact of Georgia's deepwater ports, and finds substantial economic impacts in terms of output (gross receipts or sales), state GDP, income, employment, state and local tax revenues, and federal tax revenues. The findings are based on analytical methods that are standard in regional economics and economic consulting.

EXHIBIT C

Draft Revised

TOTAL MAXIMUM DAILY LOAD (TMDL)

For

Dissolved Oxygen

In Savannah Harbor

Savannah River Basin

Chatham and Effingham Counties, Georgia

Jasper County, South Carolina

Region 4 serving the southeast

Savannah Harbor Dissolved Oxygen TMDL

Executive Summary

This report establishes a revised Total Maximum Daily Load (TMDL) for dissolved oxygen (DO) for the Savannah Harbor from Fort Pulaski (River Mile 0) to the Seaboard Coastline Railway Bridge (River Mile 27.4). The Savannah Harbor is located at the mouth of the Savannah River where it discharges to the Atlantic Ocean. The Savannah River, including the Harbor, serves as the boundary between Georgia and South Carolina.

This TMDL is established at a level necessary to implement the applicable water quality standards, which include the newly adopted Georgia DO criteria and the existing South Carolina DO water quality criteria established for the Savannah Harbor. This TMDL identifies the range of loadings of oxygen-demanding substances that may occur in the watershed, from the Thurmond Dam near Augusta, Georgia through the Savannah Harbor, without exceeding the applicable water quality standards. Consistent with 40 CFR §122.44(d)(1)(vii)(B), EPA expects that the wasteload allocations for the oxygen-demanding substances contained in the TMDL, along with any relevant assumptions and requirements, will be implemented through NPDES permits. This TMDL provides the framework for the State permitting authorities to determine a range of appropriate oxygen-demanding substances (e.g., Ultimate Oxygen Demand [UOD], 5-day Carbonaceous Biochemical Oxygen Demand [CBOD5] and/or ammonia) permit limits using a TMDL Calculator.

The TMDL Calculator will allow the States to evaluate various scenarios and develop a practicable and equitable TMDL reduction implementation strategy. As long as the TMDL reduction implementation strategy and the resultant Ultimate Oxygen Demand (UOD) and National Pollutant Discharge Elimination System (NPDES) UOD, CBOD5 and/or ammonia permit limits selected meet the applicable TMDL as calculated via the TMDL Calculator, the TMDL scenario meets the goals of this TMDL. The allowable UOD will vary depending on the size and location of the individual CBOD5 and ammonia loads and which specific conditions of the Georgia and South Carolina Water Quality Standards are applicable. The initial TMDL target is a daily average delta DO of 0.1 mg/L for Georgia only waters and 0.10 mg/L for waters that are shared with South Carolina. For this initial TMDL target, established during the critical period, the allowable TMDL range is 80,000 to 115,000 lbs/day.

This TMDL replaces the November 2006 United States Environmental Protection Agency (EPA) Savannah Harbor TMDL that was based on the previous Georgia DO Standard, which is no longer applicable for Clean Water Act purposes. EPA has worked with the Georgia Environmental Protection Division (EPD) and the South Carolina Department of Health and Environmental Control (DHEC) along with a Technical Modeling Advisory Group to develop this revised Savannah Harbor DO TMDL.

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1. Savannah Harbor Description

The Savannah River Basin is located on the border of eastern Georgia and western South Carolina and has a drainage area of 10,577 square miles. The Savannah River serves as the boundary between Georgia and South Carolina, and the Harbor is shared by both states. The portions of the Savannah River Basin included in this TMDL are the middle and lower watersheds encompassing the area from Thurmond Dam to the Atlantic Ocean. Land uses within these watersheds are mostly forestlands, wetlands, and agriculture.

The area of concern is the Savannah Harbor located at the mouth of the Savannah River where the Savannah River discharges to the Atlantic Ocean. The Savannah Harbor from Fort Pulaski (Mile 0) to Seaboard Coastline R/R Bridge (River Mile 27.4) is the segment identified on the State of Georgia's Section 303(d) list as impaired for dissolved oxygen. The basis for the 2006 TMDL was that the Savannah Harbor was on Georgia's 2002 Section 303(d) list for failing to meet the dissolved oxygen (DO) criterion associated with the Georgia's Coastal Fishing water quality use designation based on data collected in the summers of 1997 and 1999.

The hydrodynamic and water quality harbor model used to develop the TMDL extends upstream on the Savannah River to River Mile 61.0 near Clyo, Georgia, at United States Geologic Survey (USGS) station 02198500. The downstream end of the model extends approximately 25 miles offshore from Oyster Island to cover the navigational channel of Savannah Harbor. The model covers the Savannah River, the Front River, the Middle River, the Little Back River, the Back River, the South Channel, and the offshore portions in the Atlantic Ocean. Figure 1 is a map that shows the overall location of the study area.

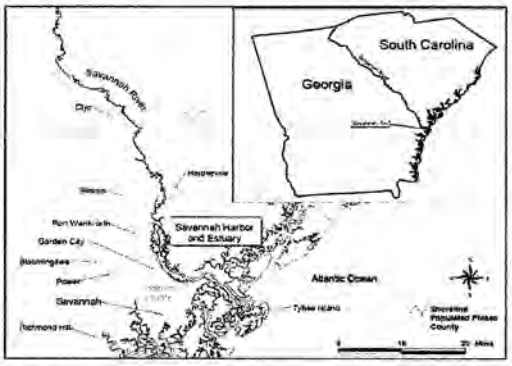

Figure 1 Savannah Harbor Location Map

Water quality studies, conducted over the past twenty years, were used to develop the TMDL. The purpose of the field studies was to characterize the DO regime of the harbor, to determine the principle causes of impairment, and to provide sufficient data and information to develop a complex hydrodynamic and water quality model. The data used in the calibration and confirmation of the hydrodynamic and water quality models were collected by the Georgia Ports Authority (GPA), the USGS, the Georgia Environmental Protection Division (EPD), the U.S. Army Corps of Engineers (USACE), and the United State Environmental Protection Agency (EPA). Additional details on the water quality and hydrodynamic modeling can be found in *Development of the Hydrodynamic and Water Quality Model for the Savannah Harbor Expansion Project, January 2006 (Tetra Tech 2006)* and in the draft EPA and Tetra Tech Z-Grid Modeling Report (EPA 2010).

2. TMDL Targets

2.1. Georgia DO Standard for Savannah Harbor

In Georgia, the water use classification for the Savannah Harbor is Coastal Fishing. The applicable water quality standards for DO for this use classification as stated in Georgia *Rules and Regulations for Water Quality Control*, Chapter 391-3-6-.03, Water Use Classifications and Water Quality Standards are:

"Dissolved Oxygen (D.O.): A daily average of 5.0 mg/L and no less than 4.0 mg/L is maintained at all times. If it is determined that the "natural condition" in the waterbody is less than the values stated above, then the criteria will revert to the "natural condition" and the water quality standard will allow for a 0.1 mg/L deficit from the "natural" dissolved oxygen value. Up to a 10% deficit will be allowed if it is demonstrated that resident aquatic species shall not be adversely affected."

2.2. South Carolina DO Standard for Savannah Harbor

In South Carolina, the applicable water quality standards for DO state that "Certain natural conditions may cause a depression of dissolved oxygen in surface waters while existing and classified uses are still maintained. The Department shall allow a dissolved oxygen depression in these naturally low dissolved oxygen waterbodies as prescribed below pursuant to the Act, Section 48-1-83, et seq., 1976 Code of Laws:

a. For purposes of section D of this regulation, the term "naturally low dissolved oxygen waterbody" is a waterbody that, between and including the months of March and October, has naturally low dissolved oxygen levels at some time and for which limits during those months shall be set based on a critical condition analysis. The term does not include the months of November through February unless low dissolved oxygen levels are known to exist during those months in the waterbody. For a naturally low dissolved oxygen waterbody, the quality of the surface waters shall not be cumulatively lowered more than 0.10 mg/L for dissolved oxygen from point sources and other activities; or

b. Where natural conditions alone create dissolved oxygen concentrations less than 110 percent of the applicable water quality standard established for that waterbody, the minimum acceptable concentration is 90 percent of the natural condition. Under these circumstances, an anthropogenic dissolved oxygen depression greater than 0.10 mg/L shall not be allowed unless it is demonstrated that resident aquatic species shall not be adversely affected pursuant to Section 48-1-83. The Department may modify permit conditions to require appropriate instream biological monitoring.

c. The dissolved oxygen concentrations shall not be cumulatively lowered more than the deficit described above utilizing a daily average unless it can be demonstrated that resident aquatic species shall not be adversely affected by an alternate averaging period."

2.3. *Potential TMDL Targets*

Based on Georgia's and South Carolina's Water Quality Standards, the TMDL governing the discharge of wastewater CBOD5 and ammonia to the Savannah River and Harbor reflects a range from the 0.1 mg/L or 0.10 mg/L deficit from the "natural" dissolved oxygen value, up to a 10% deficit allowed if it is demonstrated that resident aquatic species shall not be adversely affected. Within this range, there are three potential TMDL targets:

1. The initial TMDL target established during the critical period based on a daily average delta DO of 0.1 mg/L for Georgia only waters and 0.10 mg/L for waters that are in South Carolina when Harbor waters naturally fall below 5 mg/L.
2. A 0.1 mg/L Delta DO target for all Harbor waters naturally below 5 mg/L. This target would be available if and when South Carolina changes the applicable Delta DO standard from 0.10 mg/L to 0.1 mg/L.
3. An "up to 10%" deficit DO TMDL target established based on a demonstration, acceptable to the States, that resident aquatic species will not be adversely affected. Such a target would allow for a delta DO range of greater than 0.1 mg/L up to 0.35 mg/L. Under such a scenario, the TMDL calculator can be used to determine the appropriate NPDES limits.

After this TMDL is established, EPA expects the States to select from these potential targets to implement the TMDL based on the then-applicable water quality standards (i.e., either 0.1/0.10 mg/L DO deficit based on the current expression of the standards; 0.1 mg/L DO deficit based on a change to the South Carolina standard; or up to 10% DO deficit based on an acceptable demonstration showing the protection of resident aquatic species).

3. Modeling Approach

EPA Region 4 used the Savannah Harbor Z-Grid Model to develop this TMDL (Tetra Tech 2008; EPA 2010). The Z-Grid model builds on the original harbor model developed for EPA Region 4 during the development of the Total Maximum Daily Load

in 2004-2005 and the enhanced model for the United States Army Corps of Engineers (USACE) finalized on January 30, 2006 (2004, 2006 Tetra Tech).

The hydrodynamic model used is the Environmental Fluid Dynamics Code (EFDC) developed and maintained by Tetra Tech (Hamrick 1992). The water quality model used is the Water Quality Analysis Simulation Program (WASP) maintained by EPA.

The setup, calibration, and confirmation of the EFDC and WASP original Savannah Harbor models are well documented in the January 30, 2006 Tetra Tech modeling report. (2006 Tetra Tech) After two years of intense efforts by several modelers and many agency meetings, final acceptance letters approving the use of the model were received from the EPA Region 4, Georgia EPD, South Carolina DHEC, National Marine Fisheries, and the United States Fish and Wildlife Service (USF&W) in March 2006. Other reviewers of the enhanced models included the Harbor Committee (MACTEC as their consultant), the USACE Engineer Research and Development Center (ERDC), and the United States Geological Survey (USGS).

3.1. Z-Grid Model

During 2007, EPA Region 4 determined a need to convert the sigma grid of the enhanced model to a Z-Grid. The Z-Grid allows for varying number of vertical layers throughout the model domain. Where the sigma grid was six vertical layers with widely varying layer depths, converting to a Z-Grid with five vertical layers in the navigation channel and one vertical layer in the Middle, Back, Little Back, and Upper Savannah Rivers allowed all the layers to be similar depths. The Z-Grid allowed for the invert of the river bottom elevation to be modified with one vertical layer going upstream from the I-95 Bridge to the Clyo USGS gage on the Savannah River. The longitudinal slope was evenly distributed from the headwater cell to above the I-95 Bridge by adjusting bottom elevations. The water surface elevation at the headwater boundary cell was raised to better match the gage height reported at the Clyo USGS gage. In addition to the Z-Grid conversion, the watershed tributary flows and marsh areas were revised.

The Z-Grid model contains 608 horizontal cells and 1,778 total cells when including the vertical cells. Figure 2 shows the Harbor portion of the Z-Grid Savannah Harbor model.

Figure 2 Z-Grid Harbor Cells and Existing Marsh Areas

3.2. Updated Marsh Approach

The marsh areas were revised from the sigma grid model (Tetra Tech 2006) to include the areas downstream of Fort Jackson. One area upstream near the I-95 Bridge was added as well. Table 1 reflects the new marsh loadings. The color of each marsh indicates whether it was included in the model as a freshwater (blue), brackish (orange) or saltwater (red) marsh.

Table 1 Existing Marsh Loads

Marsh	Actual Area (ac)	Actual Depth (m)	BODU Export Rate (kg/day/acre)	BODU (kg/day)	BODU (lb/day)
	742	0.12	6	4,454	9,820
	3,467	0.25	12	41,606	91,726

[redacted]	1,682	0.18	6	10,089	22,243
[redacted]	421	0.21	6	2,527	5,570
[redacted]	310	0.20	6	1,862	4,104
[redacted]	570	0.16	6	3,423	7,546
[redacted]	731	0.29	6	4,384	9,665
[redacted]	845	0.14	6	5,070	11,177
[redacted]	485	0.21	3	1,456	3,210
[redacted]	602	0.22	6	3,613	7,966
[redacted]	12,676	0.15	12	152,114	335,353
[redacted]	1,548	0.15	12	18,580	40,963
[redacted]	5,819	0.15	12	69,822	153,931
Q14	6,049	0.15	[redacted]	5,155	11,364 *
[redacted]	1,633	0.15	3	4,898	10,798
			TOTALS =	**329,053**	**725,436**

* Q14 is Dredge Disposal Area Managed by the Corps, the load was calculated based on CBOD5 and weir flows as a peak load.

To address seasonality of the marsh loads, a reference paper was used that measured dissolved inorganic carbon (DIC) in tidal freshwater marshes in Virginia and the adjacent estuary. The paper is titled "Transport of dissolved inorganic carbon from a tidal freshwater marsh to the York River Estuary" by Scott C. Neubauer and Iris C. Anderson from the Virginia Institute of Marine Science, School of Marine Science, College of William and Mary. The percentages in Table 2 below were derived from the referenced study and were applied to the loads listed in Table 1 (for existing) to develop the monthly WASP loads for Ultimate Carbonaceous Biochemical Oxygen Demand (CBODu) from the marsh areas.

Table 2 Seasonal Distribution of Marsh Loads

Month	Percent of Total Load
January	20
February	20
March	40
April	40
May	60
June	80
July	100
August	100
September	80
October	60
November	40
December	40

3.3. Updated Hydrodynamics

The original flow, velocity, elevation and temperature predictions were calculated using the EFDC hydrodynamic model and calibrated to the extensive 1997 and 1999 data set (2006 Tetra Tech). The EFDC model inputs were updated to reflect more recent information. This information includes new flow gages by USGS in the harbor, long-term DO data at the USACE Dock, updates to the boundary conditions, connection to EPD's river model, and updates to water quality kinetics. Figure 3 shows the original sampling locations for the 1999 study, some of which were also used for the 2008 data collection.

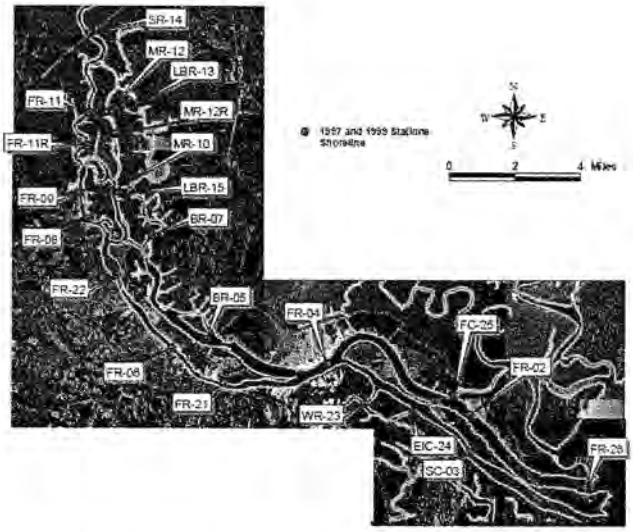

Figure 3 1999 Sampling Locations

3.3.1. Middle and Back Rivers Updated Hydrodynamics

The USGS collected detailed (15 minute) water surface elevation, velocity and flow data during the fall and winter of 2008 – 2009 at the Middle and Back Rivers near the Houlihan Bridge crossings at Stations MR-10 and LBR-15, respectively. These data were used to improve the hydrodynamic predictive ability of the model in the Middle and Back Rivers. The updates focused on improving the width and depths of the river channels in the model and changing the marsh storage areas to better reflect the movement of water through the channels so the model would better reflect the measured

flows, velocities and elevations. (2010 EPA Region 4) Figure 4 and Figure 5 illustrate an example of the models predictive capabilities for gage height and flows for Little Back River at Houlihan Bridge. The performance of the model is considered very good.

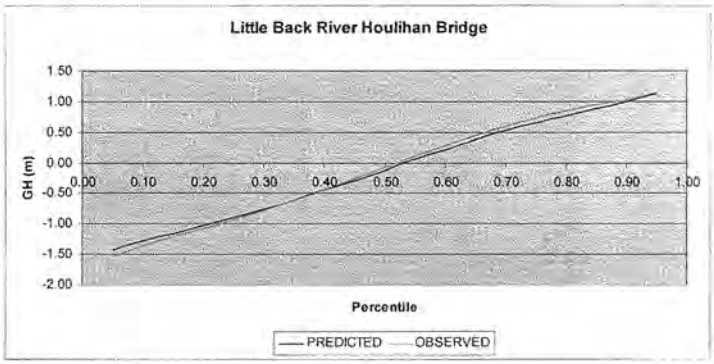

Figure 4 Percentile Comparison of Predicted and Measured Gage Heights

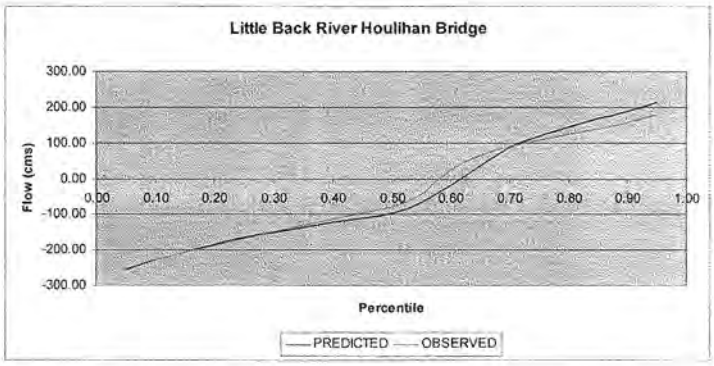

Figure 5 Percentile Comparison of Predicted and Measured Flows

3.3.2. Upstream Boundary Conditions at Clyo

Georgia EPD has developed a hydrodynamic and water quality model (EPDRiv1 Model) for the Savannah River from the Augusta Canal diversion dam to the USGS stage recorder (02198760) near Hardeeville, South Carolina. This model was used to transport the oxygen demanding substances from the upper watershed to the Harbor Model. The River Model (2010, GaEPD) provided the flow, DO, Temperature, CBOD (fast and slow) and ammonia boundary conditions for the calibrated TMDL Harbor Model. (2010 EPA Region 4)

The 2006 EFDC model used USGS gage flow data and monthly measured temperatures at Clyo for the upstream boundary. Since 2006, EPD has updated and recalibrated the Savannah River EPDRiv1 Model. The flow and temperature hourly outputs at Clyo, from the River Model were used as the headwater conditions for the Harbor model. This provides a seamless connection between the Savannah River Model and the Savannah Harbor Model. Figure 6 and Figure 7 illustrate the comparison of RIV1 flows and temperatures to observed data.

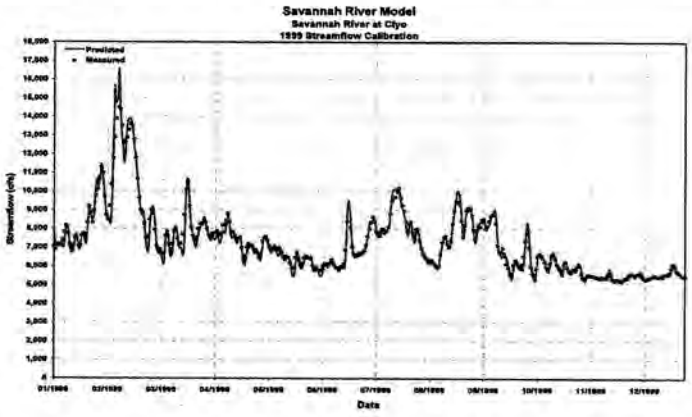

Figure 6 1999 Stream Flow Calibration at Clyo

Figure 7 1999 Stream Temperature Calibration at Clyo

3.4. Updated Water Quality Rates and Kinetics

The main changes to the water quality portion of the 2006 Savannah Harbor model (2006 Tetra Tech) were an update of the reaeration approach and a fine tuning of the CBOD decay rates. The main modeling parameters impacting the DO balance of the Harbor are the reaeration rate, the sediment oxygen demand (SOD) rate and the oxygen demanding substances (CBOD and ammonia) decay rates. Table 3 provides a summary of the rates used in the Harbor Model.

Table 3 WASP Kinetic Rates

WASP Kinetic Parameters	Value
Reaeration Rate @ 20 °C (per day)	O'Connor-Dobbins Formulation
Sediment Oxygen Demand (g/m2/day) @20 °C	0.7 to 2.4
BOD (1) Decay Rate Constant @20 °C (per day)	0.06
BOD (2) Decay Rate Constant @20 °C (per day)	0.04
BOD (3) Decay Rate Constant @20 °C (per day)	0.02
Ammonia, nitrate, phosphorus rates @20 °C (per day)	0.015

3.4.1. Reaeration Rate and Sediment Oxygen Demand

The O'Connor-Dobbins Reaeration formulation that uses velocity and total depth (a WASP7 update) of the river was used to determine the reaeration rates for the Savannah Harbor System.

Sediment oxygen demand rates were revised and ranged from 0.7 to 2.4 g/m^2/day at @20 °C:

- 0.7 g/m^2/day for Ocean, Middle and Back Rivers
- 1.6 g/m^2/day for Upper Savannah River Clyo to Hwy 17 bridge
- 2.0 g/m^2/day for main Harbor area
- 2.4 g/m^2/day for Sediment basin and Turning Basins.

3.4.2. Pollutant Decay Rates

The WASP 7 model has the option of using up to three separate CBODu inputs and decay rates i.e., the CBOD loads to the model can be divided into three CBODu state variables. Based on analyses of the Harbor's long term BODs and the wastewater dischargers effluent long term BODs, it was determined that the three CBODu decay rates of 0.02, 0.04 and 0.06 per day best reflected the BOD decay activity going on in the Harbor system. Each BOD load to the system was assigned to one of these compartments based on their specific long term BOD characteristics.

- Marsh BOD loads were put in the 0.04/day compartment
- River fast decaying BOD loads in the 0.06/ day compartment
- River slow decaying BOD loads in the 0.02/ day compartment
- Ocean BOD concentrations/loads half in 0.06 and the rest in 0.02/ day compartments
- Dischargers BOD loads in to their appropriate compartment(s) based on their specific long term data. More details in Section 4.

Note the original 2006 modeling had a CBODu decay rate compartment of 0.12/day to reflect the decay of secondary treated wastewater in the Harbor. Now most of the wastewater is more highly treated and the 0.12/day decay rate is no longer appropriate.

3.5. *Modeling Technical Review Group*

Interactive discussions between state and federal agency staff and dischargers regarding the Savannah Harbor DO issue have been ongoing for more than a decade. Formation of a group of technical experts, from the Savannah Harbor Committee (SHC), Central Savannah River Area TMDL (CSRA) Group and agencies, was established to provide ongoing input on model development for the river and harbor portions of the system. The participants in the modeling subgroup were nominated by USEPA, Georgia EPD, South Carolina DHEC, SHC, and CSRA for their expertise in modeling and for their specific knowledge of the Savannah River and Harbor ecosystem (2009 SHMTRG). These refined modeling tools reviewed by the modeling subgroup were used to develop this revised TMDL to achieve the recently adopted Georgia DO standard for Savannah Harbor.

Recommendations from the Modeling Technical Review Group:

1. River and Harbor Models as refined during 2009 subgroup work effort provide sufficient tools to develop a revised TMDL based on a relative change in DO concentrations (e.g. DO deficit). Use of the models for precise comparisons of predicted DO concentrations with individual species needs may require additional refinement.
2. Time-variable loading approach was utilized for TMDL development for the Savannah Harbor based on overall flow and DO target conditions developed by the modeling subgroup agency participants. (See section 4.2)
3. Development of the TMDL Calculator for the Savannah Harbor that allows multiple alternative scenarios to be evaluated without hours of model runs for each scenario. The Calculator is based on a unit response for BOD and DO discharged for each permit holder throughout the 2 mile segments of the Harbor model. (See Section 4.3)
4. Verification process for dischargers simulated with a variable-loading approach included an annual comparison of achieved effluent quality with the distribution used in the final TMDL simulation,.
5. The modeling subgroup to remain as a resource to agency staff, throughout the TMDL development process, as technical questions arise that would benefit from the group discussions that have occurred over the past eleven months.

4. Source Assessment for Oxygen Demanding Pollutants

A TMDL evaluation examines the known potential sources of the pollutant of concern in the watershed, including facilities regulated by the NPDES program, non-point sources, other sources of pollution, and background levels of the pollutant in the affected waterbody.

4.1. NPDES Permits

The NPDES permitted discharges to the Savannah watershed can be separated into three groups:

- Direct Discharges to the Harbor
- Direct Discharges to Savannah River below Thurmond Dam to Clyo
- Watershed Discharges to tributaries feeding the Savannah River

4.1.1. Harbor NPDES Dischargers

Table 4 NPDES Permitted Dischargers BOD5 and Ammonia Loads to Harbor lists the relevant NPDES dischargers to the Harbor along with their permit number and permitted CBOD5 and ammonia loadings. Figure 8 shows the Harbor discharger locations in the Harbor.

Table 4 NPDES Permitted Dischargers BOD5 and Ammonia Loads to Harbor

Facility Name	Receiving Water	Permit Number	Effluent Flow Rate (MGD)	BOD5 (mg/L)	Ammonia (mg/L)	BOD5 (lbs/day)	Ammonia (lbs/day)
BASF	Harbor	GA0048330	--	--	--	--	880
Garden City WPCP	Harbor	GA0031038	2	30	17	500	290
Georgia Pacific - Savannah River Mill	Harbor	GA0046973	*18*	--	--	10,850	105
BJW&SA	Harbor	SC0034584	4	30	20	1001	667
International Paper Company - Savannah Mill	Harbor	GA0001988	*44*	--	--	25,000	257
PCS Nitrogen Fertilizer	Harbor	GA0002356	--	--	--	--	1,000
Savannah - President Street WPCP	Harbor	GA0025348	27	18.5 (CBOD5)	12.6	4,165	2,837
Savannah - Travis Field WPCP	Harbor	GA0020427	2	20	12	250	145
Savannah - Wilshire WPCP	Harbor	GA0020443	5	30	17.4	1126	653
US Army - Hunter Airfield	Harbor	GA0027588	1	20	17	209	181
Weyerhaeuser Company - Port Wentworth	Harbor	GA0002798	*13*	--	--	6,700	76

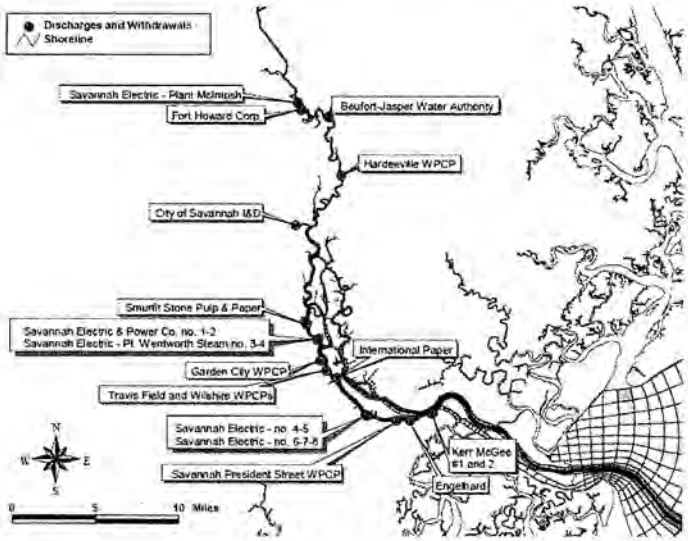

Figure 8 NPDES Permit Discharge Location

Long-term BOD analyses were completed (2000 and 2004 MACTEC; 2006 Tetra Tech; 2010 EPA Region 4) on the dischargers' wastewater to develop the appropriate f-ratios and CBODu category to input the CBOD5 loads into the model. Table 5 provides the permitted ultimate CBOD and ultimate Nitrogenous BOD (NBOD) loads to the Harbor Model. The specific WTFs' CBODu division between fast and slow CBODu decay rates is detailed in the updated Harbor Modeling Report (2010, EPA).

Table 5 Harbor Dischargers Permitted CBODu and NBODu Loads

Facility Name	Receiving Water	Permit Number	CBODu (lbs/day)	NBODu (lbs/day)
BASF	Harbor	GA0048330	--	4,022
Garden City WPCP	Harbor	GA0031038	2,760	1,325
Georgia Pacific - Savannah River Mill	Harbor	GA0046973	59,892	480
BJW&SW	Harbor	SC0034584	5,524	3,049

International Paper Company - Savannah Mill	Harbor	GA0001988	146,300	1,174
PCS Nitrogen Fertilizer	Harbor	GA0002356	--	4,570
Savannah - President Street WPCP	Harbor	GA0025348	22,991	12,965
Savannah - Travis Field WPCP	Harbor	GA0020427	1,380	663
Savannah - Wilshire WPCP	Harbor	GA0020443	6,216	2,984
US Army - Hunter Airfield	Harbor	GA0027588	1,154	827
Weyerhaeuser Company - Port Wentworth	Harbor	GA0002798	54,334	347
TOTAL	Harbor		300,551	32,407

4.1.2. River NPDES Dischargers

Table 6 lists the relevant NPDES dischargers along with their permit number and permitted CBOD5 and ammonia loadings to the Savannah River below Thurmond Dam to Clyo. Table 7 provides the permitted ultimate CBOD and ultimate Nitrogenous BOD (NBOD) loads to the River Model. The specific WTFs' CBODu division between fast and slow CBODu decay rates is detailed in the River Modeling Report (2010, GaEPD).

Table 6 NPDES Permitted Dischargers BOD5 and Ammonia Loads to River

Facility Name	Receiving Water	Permit Number	Effluent Flow Rate (MGD)	BOD5 (mg/L)	Ammonia (mg/L)	BOD5 (lbs/day)	Ammonia (lbs/day)
Aiken PSA/Horse Creek WWTF	River	SC0024457	26	30	11	6,505	2,385
Allendale	River	SC0039918	4	25	20	834	667
Augusta - James B. Messerly WPCP	River	GA0037621	46	30	17	11,534	6,690
Clariant Corp/Martin Plant	River	SC0042803	--	--	--	564	2,000
Columbia County - Crawford Creek WPCP	River	GA0031984	2	12	1	150	15

Columbia County - Little River WPCP	River	GA0047775	6	8	4	375	215
Columbia County - Reed Creek WPCP	River	GA0031992	5	30	17	1,151	668
Columbia County – Kiokee Creek WPCP	River	GA0038342	0.3	20	7	50	18
DSM Chemicals Augusta Inc	River	GA0002160	4	--	--	727	--
International Paper Company - Augusta Mill	River	GA0002801	24	--	0.7	30,000	140
Kimberly-Clark/Beech Island	River	SC0000582	11	--	--	4,031	--
PCS Nitrogen Fertilizer	River	GA0002071	1	30	--	350	1,162
Savannah River Site (SRS) Discharges (50% Reduction)	River	SC0000175				218	22

Table 7 River Dischargers Permitted CBODu and NBODu Loads

Facility Name	Receiving Water	Permit Number	CBODu (lbs/day)	NBODu (lbs/day)
Aiken PSA/Horse Creek WWTF	River	SC0024457	19,924	8,386
Allendale	River	SC0039918	3,019	3,048
Augusta - James B. Messerly WPCP	River	GA0037621	41,753	30,573
Clariant Corp/Martin Plant	River	SC0042803	2,042	9,140
Columbia County Combined	River	GA0031984	5,705	4,118
DSM Chemicals Augusta Inc	River	GA0002160	2632	--
International Paper Company - Augusta Mill	River	GA0002801	108,600	640
Kimberly-Clark/Beech Island	River	SC0000582	14,592	--

PCS Nitrogen Fertilizer	River	GA0002071	1,267	5,310
Savannah River Site (SRS) Discharges (50% Reduction)	River	SC0000175	789	101
TOTAL	River		204,491	63,899

4.1.3. Watershed NPDES Dischargers to Tributaries

The watershed discharges to the Savannah River tributaries at their existing loadings have an insignificant impact on the DO levels in the Harbor and are not included as contributing sources in this TMDL. Current or future tributary discharger loadings, including municipal and industrial stormwater, are allowable if it is demonstrated, via modeling that their loads are at background conditions by the time they reach the river.

The SRS dischargers, although multiple watershed discharges, was handled as a direct discharge because of its proximity to the River. A fifty percent decay of the effluent load was assumed to account for the travel time to the River. The Columbia County dischargers were assumed to enter the Savannah River at 100 percent of their load.

The CBOD5 and ammonia loadings from future discharges or expansions of existing dischargers over their 2009 loadings to the Savannah River should be examined and if significant included in the River Model and TMDL Calculator.

4.1.4. Total Ultimate Oxygen Demand for NPDES Dischargers

The summary of the Ultimate Oxygen Demand (UOD) loads from NPDES Dischargers to the Savannah Harbor and River System is listed in Table 8.

Table 8 Summary of the Permitted UOD Loads for the Harbor and the River

Receiving Water	CBODu (lbs/day)	NBODu (lbs/day)	UOD (lbs/day)
Harbor	300,551	32,407	332,958
River	204,491	63,899	268,390
TOTAL	505,042	96,306	601,347

4.2. Time-variable loading approach for NPDES Discharger Inputs

The traditional TMDL and wasteload allocation (WLA) approach uses steady state models with 7Q10 stream flows, average tides, and constant WTF discharger loads incorporated into monthly permit limits. The Savannah Harbor Variable Discharge Approach uses a dynamic three dimensional model with actual flows, tides, and meteorological data and variable (daily) WTF discharger loads. These variable loads, through a TMDL Calculator, are incorporated into the analysis and are developed into appropriate NPDES monthly permit limits. The Variable Loading Approach considers assimilative capacity of the flows above the 7Q10 and provides protection for flows below the 7Q10.

The variable discharger load time-series are based on historical wastewater effluent CBOD5 and ammonia data for each facility and then simulated using monthly permit load and Coefficient of Variance CV. For the smaller dischargers, a constant load based on the monthly permitted load and CV was used with the result that the Permit monthly load equals 1.5 times the TMDL daily load. For the five largest discharges, three years of daily time-series loading were used with each year time-series representing a high, medium, and low loading year. These three loading years were based on and are representative of fifty years of simulated discharge loadings. HydroQual's 2010 report provides the details for each of the wastewater dischargers (2010 HQI). Figure 9 illustrates the relationship between the monthly permitted load and the actual discharge daily time-series for CBOD5.

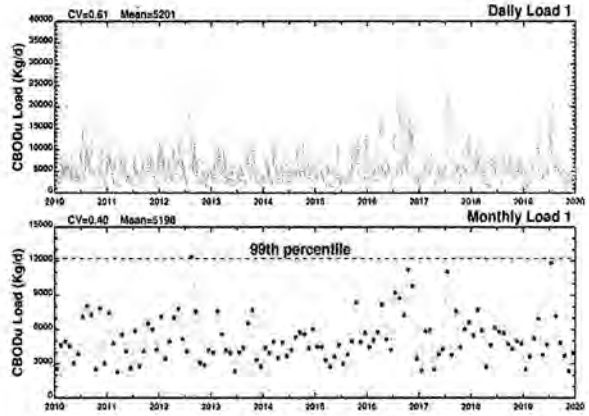

Figure 4. Savannah Model, CBODu Loads L1 and L2 (2010-2035)
Existing (red) and Reduced (blue)

Figure 9 Monthly Permit CBODu Load and the 99 Percentile

The use of variable discharge loads in permits is not a "new" idea. The MeadWestvaco Pulp and Paper Mill in Covington, Virginia has a variable discharge NPDES permit. Also EPA's Technical Support Document (TSD) for Toxics provides methodology and examples of incorporating variable load calculations in permits using 99 percentile and an appropriate CV, while the Anacostia TMDLs set a clear precedent that daily maximum loads can allow for daily variability in continuous point sources.

Additional details of this approach are laid out in the HydroQual's 2010 report. (2010 HQI).

4.3. TMDL and NPDES Permit Limit Calculator for the Savannah Harbor

The Savannah DO TMDL Calculator was developed as an efficient method to calculate the effect of various combinations of the 22 wastewater effluent dischargers on the DO levels in the Savannah Harbor and all the conditions allowable in the Georgia and South Carolina Water Quality Standards for the Harbor. The potential TMDL targets governing

the discharge of wastewater CBOD5 and ammonia to the Savannah River and Harbor are described in Section 2.3 of this TMDL.

With 22 wastewater dischargers, there are many combinations of wastewater effluent CBOD5 and ammonia that could meet this TMDL target. Given the run time of an annual water quality model simulation, it is impractical to evaluate a sufficient number of wastewater CBOD5 and ammonia loading combinations to adequately satisfy all the potential alternatives. The TMDL Calculator, based on hundreds of Savannah River and Harbor model runs, provides an accurate estimation of the DO impact of each discharger and can be used to evaluate various discharge scenarios and to develop the appropriate TMDL that meets the applicable standard.

4.4. Background Sources

The vast majority of the nonpoint source loadings of oxygen-demanding substances are from natural background sources including detritus transported in the stream, detritus from marsh areas flowing directly into the Harbor, and tidally-transported detritus from the ocean. These natural background loads are not controllable and therefore additional nonpoint source reduction to improve water quality is not an option.

In developing the TMDL, EPA evaluated oxygen-demanding loads from industrial and municipal stormwater sources discharging pursuant to an NPDES permit into, or upstream of, the Harbor. These loads were shown to have no measurable impact on the dissolved oxygen levels in the critical areas of concern in the Harbor. During critical periods, permitted stormwater loads were considered to be equivalent to, and part of, the natural background. EPA expects that stormwater pollution prevention plans will continue to provide for use of best management practices to ensure that such stormwater loadings do not increase above natural background levels. As long as stormwater loads continue to be less than, or equivalent to, natural background loads, the TMDL does not necessitate reductions to existing industrial and municipal stormwater sources discharging pursuant to an individual or general NPDES stormwater permit (e.g., MS4, industrial and construction general permits). [Note: This text was taken directly from EPA's August 27, 2007 letter to the States in resolution of the first round TMDL dispute.]Tributaries discussed in 4.1.3 are also included in the background condition.

As a matter of practice, EPA has established, acknowledged and approved TMDL *de minimis* thresholds below which dischargers are not subject to specific wasteload allocations or reduction expectations. Any new or existing discharger that can demonstrate that its loading is within natural background shall be considered a background source. For purposes of this TMDL, background includes those dischargers whose impact on the delta DO deficit is of such an inconsequential nature that such discharges may be deemed part of the background load.

5. TMDL Development

A TMDL establishes the total pollutant load that a waterbody can assimilate and still achieve the applicable water quality standard. The components of a TMDL include a wasteload allocation (WLA) for facilities and sources regulated by the NPDES program, a load allocation (LA) for all other sources including natural background, and a margin of safety (MOS), either implicitly or explicitly, to account for uncertainty in the analysis. Conceptually, a TMDL is defined by the equation:

$$TMDL = \Sigma WLA + \Sigma LA + MOS$$

Since the TMDL is established based on the allowable *point source* deficit below natural background conditions, the LA is not relevant to the TMDL calculation itself.

The TMDL for the Savannah Harbor in the Savannah River Basin is in terms of oxygen-demanding substances expressed as UOD, where:

$$UOD = CBODu + NBODu$$

CBODu = CBOD5 multiplied times a f-ratio associated with the appropriate CBODu decay rate(s).

NBODu = ammonia multiplied times 4.57 conversion factor

The TMDL provides for the calculation of the appropriate WLA and NPDES UOD, CBOD5 and/or ammonia effluent limits through the use of the TMDL Calculator.

Because of the distribution of the NPDES dischargers and associated loads throughout the Savannah Harbor and River system, the different conditions allowable in Georgia and South Carolina Water Quality Standards and the potential for numerous allocation strategies, along with trading scenarios to be evaluated by the States, a single TMDL UOD cannot be developed but a range of values will be proposed. The final implementation of the TMDL must provide for a UOD and associated NPDES parameters such as UOD, CBOD5, ammonia, and/or DO limits that comply with the applicable TMDL target (see Section 2.3 above).

5.1. Critical Conditions

For an estuarine TMDL, critical conditions are more complex than the critical conditions typically considered for a river system (e.g., summer temperatures and 7Q10 flow). Tidal dynamics play an important role in the DO levels of the Savannah Harbor. Calendar year 1999 was determined as the set of model flow, tide, and metrological inputs that represents the critical period and was used to develop the TMDL model and to construct the TMDL Calculator. Critical conditions were established to include an event that would occur once in ten years on the average or less often. In May 2000 and May 2003 letters, Georgia and South Carolina set the critical conditions for Savannah Harbor as:

- Upstream boundary determined by the States' Savannah River Model;
- Harbor model kinetic rates and parameters as determined by the Savannah Harbor Model calibration;
- 1999 harbor channel bathymetric physical conditions;
- A critical flow including a seven-day ten-year low-flow (7Q10), taking into account the low-flow release from Thurmond Dam;
- Meteorological and tidal conditions based on 1999 data.

Therefore, critical conditions applied to the Savannah Harbor DO TMDL are based on model runs for March through October 1999 incorporating the existing harbor physical conditions and the upstream low flow, as well as actual 1999 tidal regimes, temperature, and other meteorological conditions measured during these periods.

Additional analysis of the critical condition was completed through the Technical Model Group Review. SCDHEC conducted a flow analysis of the Savannah River and concluded that period of record 1955 through 2008 was an appropriate time frame to evaluate for appropriate critical conditions. See Appendix A. HydroQual (HQI) conducted a fifty year DO analysis and showed that 1999 was a year that adequately represented the past 50 years (2010 HQI).

Based on the critical conditions defined here, the TMDL and its associated wasteload allocation only applies during the critical months. NPDES permits may provide for different limits, not based on the TMDL, during the non-critical season.

5.2. TMDL Numeric Target

Pursuant to the Clean Water Act (CWA), TMDLs are established at a level necessary to implement the applicable water quality standard for the waterbody. For several months during the critical period, the natural background DO for the Harbor is below the daily average standard of 5 mg/L. Therefore the initial TMDL target DO is a daily average delta DO of 0.1 mg/L for Georgia only waters and 0.10 mg/L for waters that are shared with South Carolina.

The Savannah Harbor system was divided in to 27 zones as listed in Table 8. The models predicted DO values were volumetrically and daily average to produce a daily average DO time series per zone.

Table 8 Savannah Harbor Zone Descriptions and Extent

Zone	Zone Name	Ga and/or SC Waters
FR-01	Main Channel RM 0 to RM 2	Ga/SC
FR-03	Main Channel RM 2 to RM 4	Ga/SC
FR-05	Main Channel RM 4 to RM 6	Ga/SC
FR-07	Main Channel RM 6 to RM 8	Ga/SC
FR-09	Main Channel RM 8 to RM 10	Ga/SC

FR-11	Main Channel RM 10 to RM12	Ga/SC
FR-13	Main Channel RM 12 to RM 14	Ga
FR-15	Main Channel RM 14 to RM 16	Ga
FR-17	Main Channel RM 16 to RM 18	Ga
FR-19	Main Channel RM 18 to RM 20	Ga
FR-21	Main Channel RM 20 to RM 22	Ga
FR-23	Main Channel RM 22 to RM 24	Ga
FR-25	Main Channel RM 24 to RM 26	Ga
FR-27	Main Channel RM 26 to RM 28	Ga/SC
FR-29	Main Channel RM 28 to RM 30	Ga/SC
FR-35	Main Channel RM 30 to RM 40	Ga/SC
FR-45	Main Channel RM 40 to RM 50	Ga/SC
FR-55	Main Channel RM 50 to RM 60	Ga/SC
MR-01	Lower Middle River	Ga
MR-02	Upper Middle River	Ga
BR-01	Back River	Ga/SC
LBR-02	Lower Little Back River	Ga/SC
LBR-03	Upper Little Back River	Ga/SC
SC	South Channel	Ga
Ocean1	Ocean Channel Mouth to 10 miles	Ga/SC
Ocean2	Ocean Channel 10 to 20 miles	Ga/SC
SedBas	Sediment Basin - connecting Back River to Main Channel	Ga/SC

The 1999 Baseline Model - a Harbor and River model with no point source dischargers BOD and ammonia loadings - was run and a daily average DO per zone computed. Figure 10 illustrates the daily average DO time series for Zone FR-13, one of the lower DO areas of the Harbor. Figure 11 illustrates the natural daily average Zone DO for August 30, 1999. Various Scenario Model runs were then completed. These runs include the point source dischargers' BOD and ammonia loads.

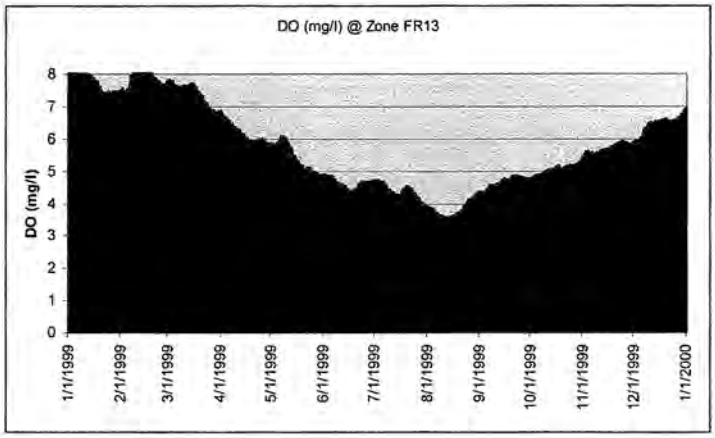

Figure 10 1999 Time Series Daily Average DO for Zone FR-13

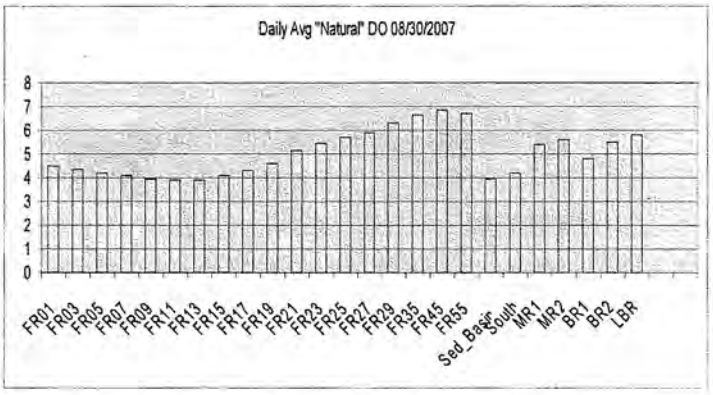

Figure 11 Daily Average DO by Zones

The initial delta DO TMDL target is calculated by taking the 90 percentile of the daily delta DOs difference calculated by subtracting the Baseline Model outputs by the Scenario Model outputs for each zone for the time period March through October. The 90 percentile was identified by the MTRG to allow for the natural variability as defined

by GaEPD regulations. The March through October time frame is defined by SCDHEC regulations. Figure 12 illustrates the Calculated Delta DOs between the Baseline and Permit Limits scenarios for all the Zones.

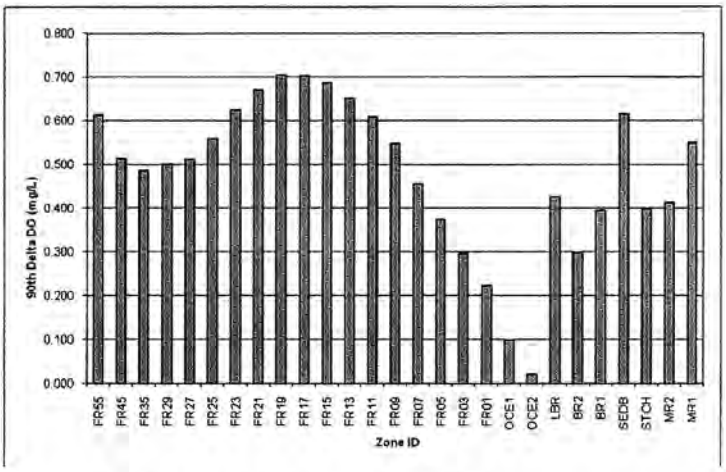

Figure 12 Delta DOs by Zone due to Point Sources at Permitted Loads

5.3. Wasteload Allocation (WLA)

The WLA component of the TMDL is the portion of the receiving water's loading capacity that is allocated to NPDES regulated point sources. This TMDL establishes the total WLA for continuous non-storm water dischargers. The individual WLA for each discharger will be determined using the TMDL Calculator.

The background sources described in Section 4.4 are not considered to be subject to the WLA.

5.4. Load Allocation (LA)

The LA component of the TMDL is the portion of the receiving water's loading capacity that is attributed to the non-NPDES regulated sources of oxygen-demanding substances, including non-point source discharges and natural background sources. The majority of the non-NPDES loadings are from natural background sources. Non-point sources are a very minor contributor of oxygen consuming wastes under critical low flow conditions because of the absence of storm water runoff. Therefore, the non-point source contribution is aggregated

with the natural background loads in this TMDL. LA is used in overall modeling of the Harbor, but is not included in the Delta DO TMDL range. If, at a later date, a significant upstream non-point source is identified, the TMDL will be revised to account for this source.

The natural background loadings to the harbor are as follows:

- Upstream loads from natural riverine UOD = 85,000 lbs/day
- Marsh loadings UOD= 145,000 lbs/day
- Ocean boundary conditions for CBODu = 5 mg/L and ammonia = 0.07 mg/L

5.5. Margin of Safety

A margin of safety (MOS) is a required component of a TMDL to account for the uncertainty in the relationship between the pollutant loads and the quality of the receiving waterbody. For Savannah Harbor, the amount of uncertainty is considered low. This system has been the subject of extensive study, including extensive data collection, and model development by various state and federal agencies. The Savannah Harbor MOS is implicitly provided by the abundance of data, the calibrated and verified three dimensional model and conservative critical condition assumptions used to develop the TMDL.

5.6. Seasonal Variation

Seasonal variation is incorporated in the Savannah Harbor TMDL by evaluating multiple years of data. For the hydrodynamic and water quality model, the years of 1997 through 2008 were evaluated. The TMDL recognizes that permit loads can be larger in the winter months when the DO standard of a daily average of 5.0 mg/L not less than 4.0 mg/L applies. Thus the River and Harbor Models can also be used to develop seasonal WLAs and seasonal NPDES permit limits, which can be done outside the TMDL as a Water Quality Based Effluent Limitation.

6. TMDL and WLA Range

There are hundreds of possible discharge reduction scenarios that could achieve the Delta DO TMDL Target. The TMDL Calculator will allow the States to evaluate various scenarios and develop a WLA or Point Source Load distribution and reduction strategies that will most practicably allow the TMDL target to be met. As long as the TMDL reduction strategy and the resultant WLA Ultimate Oxygen Demand (UOD) and National Pollutant Discharge Elimination System (NPDES) CBOD5 and ammonia permit limits selected meet the TMDL target as calculated via the TMDL Calculator, the WLA or Point Source Load distribution scenario meets the goals of this TMDL.

The allowable WLA will vary depending on the size and location of the individual CBOD5 and ammonia loads and which conditions of the Georgia and South Carolina Water Quality Standards are applicable.

The TMDL targets, based on Georgia and South Carolinas' Water Quality Standards, governing the discharge of wastewater CBOD5 and ammonia to the Savannah River and Harbor are 1) the 0.1 mg/L or 0.10 mg/L deficit from the "natural" dissolved oxygen value, 2) the 0.1 mg/L deficit from "natural" dissolved oxygen value (provided the S.C. standard is changed), and 3) up to a 10% deficit allowed if it is demonstrated that resident aquatic species shall not be adversely affected.

The Savannah Harbor TMDL is equal to the selected WLA UOD alternative plus the background LA as listed in Section 5.4.

The TMDL targets, based on Georgia and South Carolinas' Water Quality Standards, governing the discharge of wastewater CBOD5 and ammonia to the Savannah River and Harbor are 1) the 0.1 mg/L or 0.10 mg/L deficit from the "natural" dissolved oxygen value, 2) the 0.1 mg/L deficit from "natural" dissolved oxygen value (provided the S.C. standard is changed), and 3) up to a 10% deficit allowed if it is demonstrated that resident aquatic species shall not be adversely affected.

6.1. Alternative TMDL Scenarios

To demonstrate the capability and usefulness of the TMDL Calculator in determining the WLA reduction and load distribution strategy to meet the applicable TMDL target, the following scenarios are presented.

6.1.1. Initial TMDL Target

To establish the likely range for the WLA UOD values to meet the initial TMDL target of 0.1 mg/L for Georgia waters and 0.10 mg/L for joint Georgia/South Carolina waters, the distribution of loading within the system was varied resulting in a range of from 80,000 to 115,000 lbs/day UOD, depending on how the load was distributed. The WLA strategy that is ultimately implemented will depend on the distribution and location of the UOD sources and the output of the TMDL Calculator.

6.1.2. Alternative TMDL Target #1

An alternative TMDL target could be a 0.1 mg/L Delta DO for all Harbor waters naturally below 5 mg/L. This would occur if South Carolina changes their Delta DO standard from 0.10 mg/L to 0.1 mg/L. To meet the initial TMDL target of 0.1 mg/L for Georgia waters and South Carolina waters, the WLA could range from 100,000 lbs/day UOD to 130,000 lbs/day UOD. Again, the actual WLA that is ultimately implemented will depend on the distribution and location of the UOD sources and the output of the TMDL Calculator.

6.1.3. Alternative TMDL Target #2

Alternative target #2 could be if a demonstration is completed showing an increased DO delta, not to be greater than 10% of natural, does not impact the resident species. This demonstration would have to meet the requirements of both Georgia and South Carolina Water Quality Standards. This new delta DO may range from greater than 0.1 mg/L to 0.35 mg/L. If the new Delta DO were 0.25 mg/L, then the WLA could range from 200,000 lbs/day UOD to 250,000 lbs/day UOD. Again, the actual WLA that is ultimately implemented will depend on the distribution and location of the UOD sources and the output of the TMDL Calculator.

6.2. Oxygen Injection Scenario

One treatment alternative the dischargers are considering, along with other treatment upgrades, is injecting super-saturated levels of oxygen in their effluent. This could be done regardless of which of the 3 TMDL targets described above becomes the final target. Note the testing will be required to assure these oxygen levels are non-toxic and additional analysis will be required to assure oxygen entrainment under ambient conditions at injection locations.

For the initial TMDL Target scenario (Section 6.1.1) with 15,000 lbs/day of Oxygen injected equally divided between the three (3) Harbor Pulp and Paper Mill Dischargers, the WLA to meet the initial TMDL target of 0.1 mg/L for Georgia waters and 0.10 mg/L for joint Georgia/South Carolina waters, would range from 175,000 lbs/day UOD to 245,000 lbs/day UOD, depending on where the actual loads are introduced into the system

7. Trading and Implementation Considerations

EPA embraces the concept of water quality trading in watersheds with multiple sources of pollutants, and specifically endorses the use of trading to implement this TMDL. Appropriate trading of pollutant allocations and/or DO deficits between or among sources, or through oxygen injection into the Harbor, is allowed under this TMDL as long as the total TMDL is not exceeded. The TMDL Calculator will allow the States' to evaluate and determine UOD (CBOD5 and Ammonia) load and oxygen injection trading in accordance with EPA's Trading Policy.

7.1. EPA Trading Policy

Water quality trading (also called effluent trading) is an innovative way for water quality agencies and community stakeholders to develop cost-effective solutions to address water quality problems in their watersheds. EPA's regulatory requirement under Section 303(d) of the Clean Water Act to establish Total Maximum Daily Loadings (TMDLs) for each impaired water body provides a tremendous opportunity to apply market-based conservation strategies. Water quality trading may achieve these environmental goals at a lower cost than other regulatory approaches.

A TMDL provides a method for allocating pollutant discharges among sources, by establishing waste load allocations for each point source, and a load allocation for non-point (non-permitted) sources as a whole. These allocations quantify the relationship between pollutant sources and water quality. More specifically, a TMDL is the sum of the waste load allocations to point sources, the load allocations to non-point sources, and natural background, which are set at a level needed to ensure achievement of water quality standards in the impaired water body. A margin of safety is also included in the TMDL to account for any lack of knowledge concerning the relationship between the pollutant loads and the quality of the receiving water body. One result of the TMDL allocation is that discharge sources with the ability to reduce at the lowest cost are not necessarily encouraged to make substantial reductions, since they need only reduce to the level of their load allocation. Other sources may need to make considerable reductions, but their costs may be very high.

Water quality trading allows sources to use the marketplace to determine who will reduce and by how much, by allowing the buying and selling of the assigned allotments. For example, a source that reduces more than what was required can quantify that amount and create a marketable "credit." That credit, in turn, can be purchased by another source, which allows them to increase their discharge by the amount of the credit. The total discharge by both sources remains the same, thereby maintaining overall water quality standards. With trading, the market price determines the most cost-effective distribution. Sources can use the trading of allotments to accommodate anticipated growth or other increases of their discharge, and avoid expensive last-minute technology investments. They may also profit from the adoption of pollution prevention techniques that reduce their discharge by selling their excess allotment in the market.

EPA issued a Water Quality Trading Policy ("policy") on January 13, 2003 to provide guidance to states and tribes on how trading can occur under the Clean Water Act and its implementing regulations. The policy discusses Clean Water Act (CWA) requirements that are relevant to water quality trading including: requirements to obtain permits, anti-backsliding provisions, and development of water quality standards including antidegradation policy, National Pollutant Discharge Elimination System permit regulations, total maximum daily loads (TMDLs) and water quality management plans. (http://www.epa.gov/owow/watershed/trading/tradingpolicy.html)

7.2. *Implementation Considerations*

EPA also endorses the full range of administrative and regulatory tools available to the States to provide flexibility in implementing the TMDL, including the tools described in EPA's letter to the States dated August 27, 2007.

EPA recognizes that the Clean Water Act does not limit compliance schedules to the five-year permit term where a longer period is justified under Section 502(17) of the Act and 40 CFR §§ 122.2 and 122.47. With respect to implementation of the Savannah Harbor TMDL in

particular, EPA recognizes that the required process alterations and improvements will vary and, in some cases, the States may need to allow long-term compliance schedules consistent with the regulatory requirements noted above.

When finalized, this TMDL will establish the total WLA for continuous , non-storm water dischargers. The individual WLAs and NPDES permit limits for each discharger will be determined using the TMDL Calculator and set forth in an overall load distribution plan. As required under 40 C.F.R. Section 130.7, EPA will establish a final TMDL for oxygen demanding substances for portions of the Savannah River and Savannah Harbor. The final TMDL will include the total WLA and a load distribution plan that includes individual WLAs.

Georgia and South Carolina have committed to develop a load distribution plan that includes a mutually agreeable set of individual WLAs for their dischargers that meets the target as defined in Section 6 above, using the TMDL Calculator. This load distribution plan, with individual WLAs, will be included in the final TMDL and will form the basis for future NPDES permitting. EPA recognizes this is a fluid process and individual WLAs and NPDES permit limits may change due to trading or other future circumstances. The total WLA depends on the locations and distribution of the individual WLAs, so the total WLA may also change due to future circumstances. Any alternate WLAs shall be deemed in compliance with the final TMDL as long as the total of the individual WLAs for the dischargers meets the requirements of the final TMDL as determined by the TMDL Calculator.

REFERENCES

Development of the EFDC Hydrodynamic Model for the Savannah Harbor, March 2004. Report prepared for U.S.A.C.E. Savannah District and EPA Region 4. (2004 Tetra Tech, Inc.)

Development of the Hydrodynamic and Water Quality Model for the Savannah Harbor Expansion Project, January 2006. Report prepared by U.S.A.C.E. Savannah District. (2006 Tetra Tech Inc.)

Savannah Harbor Expansion Project TMDL 1999 River and Marsh Long-term Biochemical Oxygen Demand Results, June 2004. Report prepared for the Savannah Harbor Committee. (2004a MACTEC)

Draft Savannah Harbor Water Quality Model Update, April 2010. Prepared by Tetra Tech Inc and EPA Region 4. (2010 EPA)

Wastewater Characterization Study, Lower Savannah River, Final Report, May 2000. Report prepared for the Savannah Harbor Committee. (2000 MACTEC formerly LAWGIBB Group)

DO TMDL Calculator and Supporting Analyses report, *April 2010*, Report prepared for the Savannah Harbor Committee. (2010 HQI)

Draft Savannah River Water Quality Model, March 2010. Prepared by GaEPD. (2010 GaEPD)

8. Appendix A: Savannah Harbor DO TMDL Model Critical Conditions for Savannah River Flow

The effect of NPDES oxygen demand loads on dissolved oxygen (DO) in Savannah Harbor depends on upstream flow in the Savannah River. High river flow dilutes wastewater and helps flush the estuary, which reduces impact from effluent loading. The reverse is true during low flow conditions. The TMDL model endpoint delta DO is highly sensitive to river flow, so selection of the river design condition was an important consideration in the TMDL analysis. A dynamic upstream flow condition was chosen over the traditional steady 7Q10 approach to take full advantage of available data and modeling. In the dynamic approach, the model is run using an actual flow period that represents the range and distribution of hydrologic conditions.

The USGS gage at Clyo (02198500) is the upstream boundary in the Harbor Model. Daily mean stream discharge is continuously reported from 1929 forward. The Model Technical Review Group (MTRG) evaluated the Clyo data and considered three questions: 1) what historical period from the flow record best represents existing and future conditions? 2) which year, or combination of years, from the modeled period 1997 forward best represents the historical period? and 3) what to do if future conditions change due to Drought Plan modification or reauthorization of the Corps lakes?

Historical period. The period before completion of Thurmond Dam in 1954 does not represent current or foreseeable future conditions and was excluded. The record from 1955 forward shows a change in the flow data during the 1980s, when low flows appear to decrease. Conversations with Corps staff indicated project operation might have changed during the 1980s from maintaining downstream navigation flows to maintaining summer lake levels, which could have reduced downstream flows. Savannah River flows were compared to flows on Brier Creek (02198000), an unregulated tributary. Brier Creek showed a similar pattern of reduced low flows (Figure 13). Based on the comparison to the natural stream, the MTRG concluded that basin hydrology was a significant factor in addition to any possible effects from the dam. In order to capture the full range of hydrologic variation as well as any operational changes, the historical period from 1955 forward was evaluated.

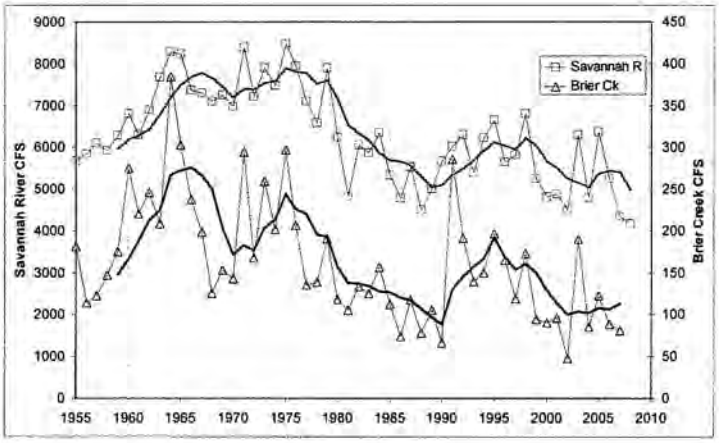

Figure 13 Savannah River and Brier Creek Flow Comparison

Representative year. It is not practical to simulate the entire period from 1955 forward in the DO model. Sufficient DO model input data are available only for recent years, and DO model runtime is a significant constraint. A representative year was selected from the modeled period in order to represent the variability in the historical record and to maximize the number of simulations that could be completed in a reasonable timeframe.

HydroQual completed a 50 year empirical modeling analysis (2010 HQI) and illustrated that 1999 was both a critical year and a year that represented the 1955 to 2008 period of record. Based on these analyses, the MTRG selected 1999 as the representative critical condition year for TMDL modeling.

Future conditions. In response to the recent drought, state and federal agencies, and other stakeholders with an interest in Savannah basin water management issues are considering a range of alternatives including modification of the Savannah Drought Plan, which balances lake levels and downstream flows during drought conditions, and changes to the Federal Authorization of the Corps lakes, which determines authorized lake uses. This TMDL is based on historical river flow conditions, which could change in the future depending on the outcome of these discussions. Proposed changes to these management plans would require NEPA review, and it is expected that TMDL issues arising from changes to the river flow regime would be addressed during the NEPA process.

EXHIBIT D

SAVANNAH HARBOR REOXYGENATION DEMONSTRATION PROJECT

SAVANNAH, GEORGIA

Prepared for:

GEORGIA PORTS AUTHORITY

Savannah, Georgia

January 8, 2008

January 8, 2008

Doug J. Marchand
Georgia Ports Authority
P.O. Box 2406
Savannah, GA 31402

Subject: **Savannah Harbor ReOxygenation Demonstration Project Report**
Georgia Ports Authority, Savannah, Georgia
MACTEC Project 6110-07-0004

Dear Mr. Marchand:

The attached Draft Report presents the results of the Savannah Harbor ReOxygenation Demonstration performed from August 7, 2007, to September 16, 2007. Due to the large volume of supporting-data collected during the project, a DVD is included that contains the pertinent data files.

If you have any comments or questions, please feel free to give us a call at (770) 421-3400.

Sincerely,

MACTEC ENGINEERING & CONSULTING, INC.

Margaret E. Tanner, P.E.
Project Manager

Larry Neal, P.E.
Senior Principal
Vice President

Cc: Hope Moorer
Leonard Ledbetter
File

Enclosures: 1 – DVD

SAVANNAH HARBOR REOXYGENATION DEMONSTRATION PROJECT

SAVANNAH, GEORGIA

Prepared for:

GEORGIA PORTS AUTHORITY

Savannah, Georgia

Prepared by:

MACTEC ENGINEERING AND CONSULTING, INC.

January 8, 2008

MACTEC Project Number: 6110-07-0004

ACKNOWLEDGEMENTS

MACTEC Engineering and Consulting, Inc. (MACTEC) first approached the Georgia Ports Authority (GPA) about a Savannah Harbor reoxygenation (ReOx) demonstration design in late 2006. From these initial discussions, GPA director Doug Marchand was quick to recognize that a successful and timely ReOx demonstration in Savannah Harbor could directly prove the feasibility of large-scale dissolved-oxygen (DO) mitigation in support of GPA's critically-needed harbor-deepening expansion project. So rather than just a ReOx demonstration design as MACTEC had initially envisioned, GPA further challenged MACTEC to also assemble, operate, and monitor the envisioned ReOx demonstration system in time for the upcoming summer "critical season" of 2007. This was an exceptionally fast-track project from the outset and MACTEC deeply appreciates the trust and "can do" spirit that Doug Marchand and his Ports Authority team brought to all phases of the project.

We particularly want to recognize GPA's Hope Moorer, who made it possible to complete the demonstration project with such an accelerated schedule, and Dick Speece, inventor of the Speece Cone superoxygenation technology, whose wise counsel made it possible to quickly adapt the technology for full-scale application in such a large tidal system as Savannah Harbor.

MACTEC would also like to acknowledge the subcontractors and equipment suppliers who contributed to the work and participated to a major degree at one stage or another during the ReOx Demonstration Project as follows: Eco-Oxygen Technologies (ECO2), Savannah Marine Services, Georgia Power, Godwin Pumps, Air Liquide, The Industrial Company, YSI Instruments, and Pine Environmental. The individuals representing these companies contributed their time and, more importantly, their technical skills and knowledge without reservation and the successful and timely completion of the demonstration project is a direct result of their collective efforts.

In addition, MACTEC acknowledges the dedicated MACTEC employees who spent long hours on the harbor in the hot summer months to develop the documentation needed for this report.

ACRONYMS

cfs	cubic feet per second
DO	dissolved oxygen
DVD	Digital Versatile Disc
EPD	Georgia Environmental Protection Division
GPA	Georgia Ports Authority
gpm	gallons per minute
KITB	Kings Island Turning Basin
MG	million gallons
mg/L	milligrams per liter
O&M	operation and maintenance
ppd	pounds per day
ppt	part per thousand
QA/QC	quality assurance/quality control
ReOx	ReOxygenation
RM	River Mile
ROM	rough order of magnitude
SC DHEC	South Carolina Department of Health and Environmental Control
TMDL	Total Maximum Daily Load
USACE	U.S. Army Corps of Engineers, Savannah District
USEPA	U.S. Environmental Protection Agency Region IV
USGS	United States Geological Survey
YSI	Yellow Springs Instrument Company

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EXECUTIVE SUMMARY

Background

Modeling previously performed by the U.S. Army Corps of Engineers (USACE) indicated that proposed further deepening of Savannah Harbor would result in lost reaeration capacity and that the lost reaeration could be offset (i.e., mitigated) by the addition of approximately 20,000 pounds per day (ppd) of dissolved oxygen (DO) to the deepened harbor during the critical summer months. The 20,000 ppd figure is called the DO "mitigation amount", (TetraTech, 2007).

On March 23, 2007, MACTEC Engineering & Consulting, Inc. (MACTEC) was contracted by the Georgia Ports Authority (GPA) to conduct an accelerated full-scale demonstration of "Speece Cone" oxygenation technology in Savannah Harbor as possible DO mitigation in support of harbor deepening. A temporary re-oxygenation (ReOx) demonstration system was designed, assembled, and operated in the harbor for a 40-day test period beginning August 7, 2007and ending September 16, 2007. The Savannah Harbor ReOxygenation Demonstration Project was performed so that questions regarding the performance of the Speece Cone technology could be addressed. This report presents the ReOx demonstration project results and provides recommendations for permanent ReOx installations.

Project Goal

The goal of the ReOx demonstration project was to prove that the DO mitigation amount of 20,000 ppd could be added to the harbor during the summer critical season and that the resulting instream DO response could be determined through instream DO monitoring.

ReOx demonstration system configuration

The ReOx demonstration system consisted of two custom-built, 12-foot diameter ECO2 Speece Cones with river water supplied by four 400-horsepower water intake pumps mounted on a 110-foot barge temporarily moored at The Industrial Company waterfront property on Hutchinson Island (river mile [RM] 14.1). Electrical power for the water intake pumps was supplied from a temporary on-shore transformer and oxygen for the Speece Cones was supplied from a liquid oxygen storage tank located on land. Liquid oxygen was delivered to the storage tank by truck every 24 to 36 hours during the 40-day demonstration period.

Speece Cone operating principles

The two Speece Cones have a combined pure oxygen dissolution maximum design capacity of approximately 30,000 ppd. The nominal water-flow capacity for the pump configuration was about 15,000 gallons per minute (gpm) at a hydraulic head of 150 feet (in the center of the cones). In operation, water was continuously pumped from the river at a depth of about 10 feet and delivered under pressure to the small-diameter top of the Speece Cones where pure oxygen bubbles are added to the incoming water flow. As the water and oxygen bubble mixture is forced downward inside the expanding cross section of the cones, the downward force of the flowing water counteracts the natural buoyancy of the pure oxygen bubbles and, thereby, suspends an oxygen "bubble swarm" inside the cones. The extended bubble-swarm contact time with the down-flowing water results in superoxygenation of the water exiting the bottom of the cones. This superoxygenated flow from the Speece Cones was piped directly back to the river to a depth of about 30 feet and mixed in the river by tidal action, without benefit of a diffuser. Some effervescence of oxygen was evidenced at the water surface in the form of rising fine bubbles. Toward

the end of the 40-day test period, additional coarse-bubble oxygen releases were episodically observed due to diminishing pump-flow capacity caused by the progression of intake-screen fouling.

Limited down time experienced

Over the 40-day demonstration period, the ReOx system operated for a total of 39 days. Down time was due to occasional equipment malfunction, running out of oxygen (twice), pump maintenance, and intake screen cleaning.

27,000 pounds per day of oxygen added to the harbor

A total of 1,272,080 pounds of oxygen was delivered and consumed over 39 days of ReOx system operation, giving an average oxygen consumption rate of 32,600 ppd. The overall transfer efficiency was 85 percent for the temporary demonstration system with some loss during tank filling, the average amount of oxygen added to the river was about 27,000 ppd. The oxygen concentration delivered from the cones to the river ranged from about 120 to 180 milligrams per liter (mg/L).

Instream monitoring to estimate DO improvement

Intensive instream DO monitoring was conducted before, during, and after the 40-day operating period in order to estimate the level of DO improvement resulting from operation of the ReOx demonstration system. Fixed-location continuous monitoring included shallow, middle, and deep zone multi-parameter recording instruments deployed at three near-shore locations: GPA Berth 20 dock at river mile (RM) 15.6, ReOx barge at RM 14.1, and USACE dock at RM 13.7. Periodic manual instream monitoring included repeated slack-tide longitudinal full-depth profiles at mid channel and cross-channel transects at five locations spaced along a three-mile river "target segment" centered on the ReOx barge location. Parameters measured or computed included: water temperature, DO concentration, DO saturation percentage, DO deficit, pH, conductivity, salinity, water density, and instrument depth.

Photosynthesis and respiration evident

The continuous near-shore monitoring results, at shallow and mid depth, often showed daily DO patterns indicative of light-driven photosynthesis and respiration with maximum DO concentrations occurring in the late afternoon and minimums occurring at dawn. This photosynthetic and respiration effect has no impact on the Speece Cone oxygen addition technology as long as instream DO concentrations at the shallow depth remain below saturation concentrations as was the case throughout the demonstration project.

ReOx system reduces target segment average DO deficit by 0.6 to 0.7 mg/L

Mid-channel low-tide longitudinal DO profiles show a target-segment average DO deficit (DO deficit is defined in Section 3.0, Page 3-1) of 3.9 mg/L just before the ReOx system began operation on August 7, 2007. After about one month of ReOx system operation, the average mid-channel low tide DO deficit was reduced to 3.3 mg/L and after the ReOx system had been shut down for about one week at the end of the 40-day demonstration period, the target segment low-tide DO deficit had returned back to the starting baseline deficit of 3.9 mg/L. This means that the ReOx system operation reduced the mid-channel average low tide DO deficit along the three-mile-long target segment by about 0.6 mg/L. Similarly, independent cross-channel transect monitoring at five locations along the target segment showed an average DO deficit reduction of about 0.7 mg/L during the ReOx demonstration period which compares favorably to the 0.6 mg/L DO deficit reduction determined from the longitudinal mid-channel profiles.

Delayed instream DO response a stabilizing benefit

Instream DO monitoring shows that it takes about three continuous days of oxygen addition to begin reducing mid-channel DO deficits and that some residual effects of oxygen addition remain locally evident near the ReOx barge for about one week after oxygen addition is ended. This delayed DO response is not unexpected for such a large and dispersive tidal system like Savannah Harbor and suggests that short interruptions of oxygen addition are not likely to cause an abrupt or significant DO decrease. This same dispersive nature of the harbor system might also be conducive to the timing of daily oxygen additions that coincide with off-peak electric power rates as a potential cost-savings measure.

Recommendations going forward

Overall, the 2007 ReOx demonstration project confirmed that the Speece Cone technology can effectively add the required DO mitigation amount to the harbor and reduce instream DO deficits during critical summer conditions. The demonstration also confirmed the soundness of the prototype design. We recommend the following actions:

- Develop a modular land-based ReOx station design specific to Savannah Harbor conditions, taking into account the "lessons learned" from the 2007 demonstration project.
- Identify, characterize, and acquire suitable shore locations for construction of two land-based dual cone ReOx stations.
- Obtain the necessary permits and approvals for construction and operation of the land-based ReOx stations.
- Construct the foundations and permanent shore-based infrastructure and service access for each ReOx station in advance and make the stations ready for subsequent seasonal installation and operation of the ReOx equipment in concert with harbor deepening.
- Until permanent land based ReOx systems are operational, temporary barge mounted systems could be used to provide oxygen for seasonal mitigation.

1.0 INTRODUCTION

The proposed deepening of Savannah Harbor is critically important to the Georgia Ports Authority (GPA) and the State of Georgia. Without deepening, the Port of Savannah and Georgia risk losing significant business and revenue to other east-coast ports that can accommodate the growing number of larger deep-draft ships. An aerial view of Savannah Harbor with river mile (RM) references is shown on Figure 1-1.

Harbor deepening will have the unintended consequence of reducing atmospheric reaeration into the harbor's deepened water. This reduced reaeration can result in reduced dissolved oxygen (DO) concentrations, particularly during the critical season from about mid June through mid October when river temperatures are higher and lower river flows are more prevalent. Three-dimensional hydrodynamic and water quality monitoring performed by the U.S. Environmental Protection Agency (USEPA) Region 4 and the U.S. Army Corps of Engineers, Savannah District (USACE) indicated that the proposed deepening of Savannah Harbor to 48 feet would result in lost reaeration capacity in the river that equates to a reduction of approximately 20,000 pounds per day in the river DO, (TetraTech, 2007).

The GPA contracted with MACTEC Engineering and Consulting, Inc. (MACTEC) to conduct the Savannah Harbor ReOxygenation (ReOx) Demonstration Project. The ReOx Project was performed to directly demonstrate the feasibility and effectiveness of pure oxygen injection technologies (specifically the Speece Cone) as a mitigation measure for the proposed deepening of the harbor. The ReOx Project was a full-scale temporary installation of the Speece Cone technology conducted in the summer of 2007. The ReOx demonstration system was designed and sized to provide sufficient quantities of oxygen to the harbor to mitigate the expected impacts to the DO levels attributed to the proposed harbor deepening.

As part of the ReOx project, MACTEC conducted extensive river water quality monitoring activities from June through September and evaluated various design features to assess performance of the ReOx system. This report summarizes the project activities and conclusions and presents conceptual design considerations for permanent ReOx systems in the harbor.

1.1 BACKGROUND

The mission of the Georgia Ports Authority is to develop, maintain, and operate ocean and inland river ports within Georgia; foster international trade and new industry for state and local communities; promote Georgia's agricultural, industrial and natural resources; and maintain the natural quality of the

environment. The Savannah River and the Port of Savannah have long been influential in the economic development of Georgia. The Port of Savannah is the second largest container port on the East Coast and is the 4th largest container port in the nation. To maintain its place as a world class container port, the GPA approached the USACE regarding further expansion of the harbor by increasing the capacity of the navigation channel. As part of the federal authorization to deepen the channel, mitigation for environmental impacts from the proposed action must be implemented. Currently, the GPA and the USACE are conducting the Savannah Harbor Expansion Project. Results of the Savannah Harbor Expansion Project have provided assessments of the projected impacts and mitigation requirements for the proposed harbor deepening project. As part of its mission, the GPA is committed to completing environmental mitigation related to further expansion of the harbor, including the expected impacts to the reaeration capacity.

In 2005, MACTEC completed a feasibility level study for the USACE that identified and evaluated alternative techniques for improving DO concentrations in the harbor (MACTEC, 2005). Based on the MACTEC study, the USACE identified molecular oxygen injection using the Speece Cone technology as a cost effective technique to improve harbor DO.

In addition to the activities ongoing as part of the Savannah Harbor Expansion Project, the USEPA Region 4, the Georgia Department of Natural Resources, Environmental Protection Division (GA EPD), and the South Carolina Department of Health & Environmental Control (SC DHEC) are coordinating the development of new DO criteria for Savannah Harbor. The completion of this coordinated effort will result in the DO criteria being included in Georgia's Water Quality Standards. The quantity of oxygen added for mitigation of dredging is independent of the DO standard for the harbor because it is the quantity of additional dissolved oxygen needed to offset the predicted DO impacts of the proposed deepening.

1.1.1 SPEECE CONE OPERATING PRINCIPLES

The Speece Cones that were used were each capable of injecting up to 15,000 pounds per day (ppd) of oxygen. The estimate of the oxygen needed for DO mitigation associated with the proposed deepening is 20,000 ppd. The injection of this quantity requires the operation of at least two Speece Cones during summer critical conditions. The nominal water-flow capacity for the pump configuration that supplied water to the Speece Cone was about 15,000 gallons per minute (gpm) at a hydraulic head of 150 feet (in the center of the cones). In operation, water was continuously pumped from the river at a depth of about

10 feet and delivered under pressure to the small-diameter top of the Speece Cones where pure oxygen bubbles were added to the incoming water flow. As the water and oxygen bubble mixture is forced downward inside the expanding cross section of the cones, the downward force of the flowing water counteracts the natural buoyancy of the pure oxygen bubbles and, thereby, suspends an oxygen "bubble swarm" inside the cones. The extended bubble-swarm contact time with the down-flowing water results in superoxygenation of the water exiting the bottom of the cones (Figure 1-2). This superoxygenated flow from the Speece Cones was piped directly back to the river and discharged at a depth of about 30 feet where it was dispersed in the river by tidal action without benefit of a diffuser. Some effervescence of oxygen was evidenced at the water surface in the form of rising fine bubbles. Toward the end of the 40-day test period, additional coarse-bubble oxygen releases were episodically observed due to diminishing pump-flow capacity caused by the progression of intake-screen fouling.

1.1.2 ReOx SYSTEM DESIGN CONSIDERATIONS

The ReOx system was a temporary barge-mounted Speece Cone system capable of providing up to 30,000 ppd of oxygen using two separate Speece Cone systems and was assembled and demonstrated on an accelerated schedule. A barge-mounted ReOx system had several potential advantages that made this approach a good alternative for the GPA.

- Because oxygen addition is typically only a seasonal need (e.g., mid June through mid October), a flexible and modular barge-mounted ReOx system can potentially be dismantled into major components and removed to land storage during the off season, thereby making the barge available for other duty.
- A barge-mounted configuration substantially eliminates the need for landside disturbances. The only landside connection needed is a seasonal power-and-oxygen umbilical running from shore to the moored barge. There is no fixed intake or discharge pipe construction required because these assemblies are attached to the barge.
- A barge-mounted ReOx system can be positioned in the harbor to minimize potential navigation hazards and can be moved on fairly short notice to accommodate harbor emergencies such as approaching meteorological events.
- Obtaining permits and approvals for fabrication and operation of a floating barge-mounted seasonal system is less difficult and time consuming than obtaining the permits and approvals required for fixed land-based installations.
- The Speece Cones fabricated for a barge-mounted system can later be reused in a permanent land-based system.
- Design is easily expanded to meet additional oxygen requirements.
- Optionally, a barge mounted system design could be used until permanent land-based systems are constructed or as the permanent system design during the critical season.

2.0 DEMONSTRATION SYSTEM DESIGN

Because the ReOx demonstration system was a temporary installation, the original design concept incorporated the use of a barge as the base for the re-oxygenation station and the use of available rental equipment. It was determined that the test would require two Speece Cones each capable of transferring a maximum of 15,000 ppd, four 400 horsepower pumps, and a single liquid oxygen storage tank and vaporization system, Figure 2-1. The intake pipes leading to the pumps employed a screen to prevent foreign matter, including debris and fish, from being entrained in the system. The intake screens were mounted to the pipes approximately 8 feet below the water surface (top of the screen) and extended to approximately 12 feet below the water surface (bottom of screen) (Figure 2-2). The return pipes for the cones extended approximately 30 feet below the water surface (Figure 2-2) and were angled to direct the super-oxygenated water toward the center of the navigation channel in the river.

During the conceptual design stage, it was determined, due to the logistics of supply, safety, and environmental issues, that diesel powered pumps and generators were unsuitable. Therefore, electrical power was supplied from a stationary site on shore. Also, due to logistical considerations liquid oxygen converted from liquid to gas on shore, was supplied by use of an umbilical to the barge. Both of these elements were located at the temporary mooring site for the barge at river mile (RM) 14.1.

3.0 SYSTEM PERFORMANCE VERIFICATION

The ReOx system was operated from August 7 to September 16, 2007 and required a total of 1,272,080 lbs of oxygen (provided at the storage tank). This oxygen was dissolved into approximately 837 million gallons (MG) of river water that was reintroduced at a depth of 30 feet below the water surface. The amount of oxygen dissolved into the river system averaged 27,000 ppd over the 39 days of operation. The project demonstrated that it was possible to achieve the main project goal of reliably injecting a minimum of 20,000 ppd of oxygen into the Savannah Harbor system to offset the estimated DO impact from the proposed deepening.

To assess the amount of oxygen added to the river system three checks were in place: 1) A log was kept of the amount of oxygen that was supplied to the liquid oxygen storage tank; 2) Water quality meters (Yellow Springs Instrument Company [YSI] 6920 data sondes) were used to periodically measure a side stream sample of super-oxygenated water from the return pipes; and 3) A control panel attached to each cone recorded flow, temperature, pressure, and oxygen usage. In addition to the three oxygen usage checks, the intake river water DO concentration was also monitored.

As part of the evaluation of the performance of the Speece Cones, extensive instream water quality monitoring was conducted before, during, and after the demonstration period. In analyzing DO data sets for Savannah Harbor, there are many concurrent and variable influences on DO concentrations that can confound interpretation of DO monitoring results. Atmospheric oxygen is only sparingly soluble in water and the DO solubility limit, or DO saturation concentration, is a direct function of water temperature, salinity and barometric pressure for a water sample; colder water can hold more DO than warm water, fresh water can hold more DO than saline water, and all water can hold more atmospheric DO as barometric pressure increases.

The DO deficit is the difference between the calculated DO saturation concentration for the prevailing temperature, salinity, and barometric pressure and the directly measured DO concentration in a water sample. By normalizing the DO concentration data to DO deficit concentrations, the data are, thereby, automatically normalized for the direct and highly variable effects of changes in temperature, salinity, and barometric pressure. Therefore, changes in the DO deficit substantially reflect only those DO changes resulting from factors and processes other than changes in water temperature, salinity, and barometric

pressure. For these reasons, changes in the instream DO deficit distributions are considered the single best direct indicator of oxygen addition results. Therefore, representative measurement of the DO deficit distribution in the target segment of the harbor is a key monitoring objective.

The two Speece Cones (Cone 1 and Cone 2) were turned on August 7 and turned off September 16, 2007. Cone 1 was shutdown for a total of 2 days, 5 hours, and 58 minutes for an effective operation of 37 days, 13 hours, and 9 minutes. The total amount of water pumped through Cone 1 during operations was 418 MG. Cone 2 was shutdown for a total of 21 hours and 54 minutes for a total effective operation of 39 days. The total amount of water pumped through Cone 2 during ReOx operations was 419 MG. Thus, the total amount of water pumped through the pump configuration for two cones was 837 MG. On average the ReOx system pumped at a rate of 15,000 gallons per minute. The demonstration project consumed 960,000 kWh. The energy usage cost approximately $89,000.

3.1 INFLUENT MONITORING

Continuous water quality monitoring was performed using the 6920 sondes. A sample of river water from the intake side of the cones was pumped to a monitoring station located on the barge deck. Monitoring of the influent began August 4, 2007, approximately three days before startup and continued until September 16, 2007, when the system was turned off. Influent water quality monitoring data are available in Appendix A Geodatabase referenced as Table Intake_Zone located on the Digital Versatile Disc (DVD) provided as part of this report.

Results from continuous monitoring of the intake water are shown in Figure 3-1. The water temperature intake data show a significant nighttime cooling effect on the Savannah River. Additionally, the data indicate that there was no significant short circuiting from the superoxygenated return flow to the intake. The intake DO deficit (daily average) was 3.4 milligrams per liter (mg/L) at startup on August 7, 2007. The smallest DO deficit (daily average) was observed on August 24, 2007 at 2.7 mg/L. During operations, the highest daily average DO deficit measured from the intake was on August 29, 2007 at 3.8 mg/L when the ReOx system was off for a brief time during the day for oxygen flow adjustments.

3.2 OXYGEN USAGE INFORMATION

A total of 1,272,080 pounds of oxygen was delivered and consumed over 39 days, from August 7 to September 16, 2007, of ReOx system operation, giving an average oxygen consumption rate of 32,600 ppd. The overall transfer efficiency was 85 percent for the temporary demonstration system with some loss during tank filling, the average amount of oxygen added to the river was about 27,000 ppd. The oxygen concentration delivered from the cones to the river ranged from about 120 to 180 milligrams per liter (mg/L). Return flow concentrations varied with flow rates through the cones.

3.3 SPEECE CONES DATA REPORTING

The control panel on each Speece Cone records oxygen flow rates entering the cone, the intake water flow rate, water temperature, and system pressure. These data are shown graphically on Figures 3-1 through 4-2 and the data are in Appendix A. Each cone was set to have a nominal oxygen flow of 15,000 ppd. During the ReOx system operation, it was noted that Cone 2 was not performing similar to Cone 1. The oxygen flow valve on Cone 2 (31 percent) was opened significantly less than Cone 1 (46 percent) and fewer bubbles were noted in the view ports on Cone 2. Discussions with the Speece Cone representatives concluded that the oxygen flow meter on Cone 2 was likely mis-calibrated and that the oxygen flow in Cone 2 was too low previously. Therefore, after several oxygen flow ramp-up tests on August 29 and August 30, 2007 were conducted, an appropriate setting for the percent open for the oxygen flow valve for Cone 2 was determined. Once completed, the oxygen flow range setting on the control panel was adjusted to represent a set oxygen flow of 15,000 ppd for Cone 2. Both flow meters (Cones 1 and 2) were returned to the manufacturer after completion of the demonstration project and recalibrated so that they can be reinstalled when the cones are redeployed at a later date.

3.4 SYSTEM PERFORMANCE

Water Intake System Performance

Biological growth, recognized as several species of hydroid (Class Hydrozoa), began to accumulate on the intake screens. The amount of biological growth on the intake screens was not anticipated by MACTEC or the screen manufacturers who had experience in the conditions in the harbor. Cleaning of the exterior of each intake screen box was performed twice by a diver. However, no contingencies were

made for cleaning the interior of the intake screen boxes. Therefore, there was notable progressive head loss in the pumping system, primarily in Cone 2. As part of the observations of the demonstration project, regular cleaning or replacement of the screens must be part of the design and operations of permanent systems. Photographs of the intake screens before and after the demonstration period may be found in Figure 3-2.

Maintenance was performed on the pumps approximately every 250 hours of operation. The system was turned off for maintenance on August 16, August 27, and September 6, 2007. In the beginning, the maintenance was performed one cone at a time thus the pumps for only one cone would be off at a time. Once it became necessary for a diver to remove biological growth from the intake screens, it was decided to shut down both systems during pump maintenance due to diver safety concerns.

Oxygen Delivery to Cones

During routine oxygen tank refills the pressure would drop in the liquid oxygen storage tank and result in a temporary loss of pressure in the oxygen supply lines. This pressure drop could result in system shutdown. By working with the liquid oxygen supply company it was possible to minimize occurrences of this problem. Also, the control panel settings were initially set to shut the system down when a change of 200 ppd of oxygen flow was detected. An oxygen flow drop of this magnitude would occur during the filling of the storage tank. Because it was more important to maintain system flow, the alarm/shutdown setting was adjusted to allow a maximum change of 1,000 ppd of oxygen before an automatic shutdown. Additional adjustments of the appropriate set points for the alarm system would be needed for permanent installations. Approximately 32,600 ppd of liquid oxygen were delivered to the liquid oxygen storage tank. Spot checks of oxygen concentrations in the discharge line showed concentrations from approximately 120 mg/L to 180 mg/L.

4.0 RIVER MONITORING

Various activities were going on during the demonstration project. The activities that occurred during the ReOx system demonstration period are shown on a timeline of events prepared as Figure 4-1. Events noted included USACE dredging schedule and system operations.

During the ReOx Demonstration Project water quality monitoring was conducted by MACTEC at three stationary near-bank locations (at GPA Berth 20 (RM 15.6), at the barge location (RM 14.1), and the USACE Dock (RM 13.7) shown in Figure 4-2. In addition to the stationary monitoring locations, periodic monitoring along mid-channel profiles (Figure-4-3, 4-3.1, and 4-3.2) including extended long run monitoring to the KITB (RM 19) and five cross-channel transects was conducted during low and high tide events (Figures 4-4, 4-4.1 and 4-4.2. Water quality parameters measured, or calculated from primary measurements, included: water temperature, DO, DO percent saturation, DO deficit, salinity, conductivity, pH, density, and instrument depth. Sampling locations for the periodic measurements are shown on Figures 4-3 and 4-4. Long run monitoring locations are shown on Figure 4-5.

Water quality monitoring was conducted to assess instream conditions before, during, and one week after the 40-day ReOx project demonstration period. At both the stationary locations and periodic locations, YSI 6290 multi-parameter sondes were used to monitor water quality parameters. Instrument calibration and maintenance was conducted in accordance with the manufacturer's instructions and the procedures specified in the Monitoring Plan in Appendix B. Additional instrument calibration checks were performed as site conditions dictated. Calibration data were recorded and filed with the project field records and may be found in Appendix A, Geodatabase. At the beginning and end of each sampling event, equipment was inspected for damage, or faulty parts, and problems reported to the monitoring team leader. The monitoring team leader was responsible for equipment, its repair status, and ordering of parts.

For the periodic monitoring events, quality control grab samples were taken at monitoring locations using a Kemmerer type water sampler to collect a corresponding DO sample for comparison with the water quality monitoring instrument (YSI 6920 sondes). This grab sample is taken to the field laboratory for testing using the EPA approved Winkler method. DO grab samples were fixed in the field and returned to the field laboratory for DO titration (Hach Water Analysis Handbook, 2003). Data from the Winkler titrations were used as a quality assurance/quality control (QA/QC) check of the field instrument measurements. A minimum of ten percent (10 percent) of the discrete monitoring points in the river had QA/QC water samples collected. The measurement of these "field duplicate samples" met the measure of

precision necessary to maintain and follow the quality control protocols for this water quality monitoring specified in the Savannah Harbor ReOxygenation Water Quality Monitoring Plan (Appendix B).

4.1 DREDGING ACTIVITIES

Dredging disturbs sediments on the bottom of the river and some are released to the water column. Such sediments generally contain an organic component that may cause an increased oxygen demand in the water column as dredging is under way. Therefore, dredging in the harbor is limited to times when the DO of the river is greater than 3 mg/L. Generally, dredging activities occur less during the summer when water temperatures are higher and DO concentrations are lower. When MACTEC activated the stationary background water quality monitoring stations on July 9, 2007, USACE dredging was occurring near the Marsh Island Turning Basin and this dredging continued until August 24, 2007. The USACE dredging began in the King's Island Turning Basin (KITB) on August 25 and continued through September 30, 2007, at several locations well after the ReOx system shutdown on September 16, 2007. The USACE measured water quality in the harbor during dredging operations. These USACE data are tabulated in Appendix C.

MACTEC was notified on August 25 that a break in the USACE dredge line had occurred. Increased sediment in the on-deck monitoring system at the ReOx barge location was noted from August 21 to August 24, 2007. The break in the dredge line released high concentrations of sediment to the water column. This high sediment load likely resulted in increased oxygen demand in the river system.

4.2 MONITORING AT STATIONARY LOCATIONS

Eighteen water quality sondes were deployed at the near-shore stationary monitoring stations (GPA Berth 20, the barge location, and the USACE Dock). Six sondes were used at each location. Sondes were placed in pairs (designated as primary and secondary) at selected depths (approximately 1 meter below the surface, near mid depth, and 1 meter from the bottom) to continuously monitor water quality (DO concentration, DO percent saturation, water temperature, conductivity, salinity, and depth). Each sonde was set to record water quality data at 15 minute intervals. The monitoring data collected at these stationary locations are available in electronic format in the Geodatabase (Appendix A) on the attached DVD. These data have been subjected to the appropriate QA/QC checks.

Due to the volume of the data collected, the data are summarized in graphical displays. Figure 4-2 (multiple figures for each stationary location) presents the continuous near-shore monitoring series:

- Figure 4-2.1 is based on data collected upstream from the ReOx system (at GPA Berth 20, RM 15.6);
- Figure 4-2.2 is based on data collected at the ReOx barge location, (RM 14.1); and
- Figure 4-2.3 is based on data collected downstream from the ReOx system (at the USACE Dock, RM 13.7).

The secondary sondes were deployed at each location and depth to duplicate the primary sonde readings in order to reduce the potential for data gaps resulting from instrument problems. Personnel checked on the sondes remotely (via internet) and visited the deployment locations approximately once per week to replace the sondes (one set at a time – primary or secondary) with recalibrated instrumentation. Sondes removed from a site underwent a calibration check (to check for potential instrument drift), data collection (downloaded from the memory of the sonde), cleaning, maintenance as needed, and were recalibrated prior to redeployment at a new location.

Monitoring Procedures

The reference standards for field instrument calibration are described in the monitoring plan (Appendix B). If there was evidence of fouling on the sondes or notable drift in the data, then the sondes were changed out more often than required by the standards. To allow for uninterrupted data monitoring, scheduling for the change out and recalibration of the sondes was such that a continuous monitoring sonde and its associated duplicate were not being changed at the same time. Calibration of the sondes was in accordance with the manufacturer's specification and the guidelines that are outlined for instrument calibration in the monitoring plan, Appendix B.

Findings From Stationary Locations

Monitoring data from the stationary locations show a noticeable diurnal pattern of the DO concentration. These diurnal DO swings are particularly noticeable on the shallow series data for each stationary location as shown in the Figure 4-2 series. This diurnal swing, not as notable in the mid or deep data, is likely caused by photosynthetic activity in the upper layers of the water column. Also observed are fairly stable and higher water temperatures prior to August 24, 2007 and a cooling trend afterward. This

indicates that the ocean boundary cooled and produced higher oxygen concentrations (lower DO deficits) near the ocean and during high tides.

Upstream of the ReOx system (at GPA Berth 20, RM 15.6):

The GPA Berth 20 monitoring station was approximately 1.5 miles upstream from the ReOx system. The station was attached to the Berth 20 dock located on the right side of water (city side). It was necessary to locate the continuous monitoring stations on fixed structures in the harbor and out of the navigation channel; therefore, the placement was not ideal to monitor the effects of the ReOx system in the navigation channel.

Prior to startup on August 6, 2007 the DO deficit was 3.7 mg/L (shallow zone), 4.0 mg/L (middle zone), and 4.2 mg/L (deep zone). Within 48 hours the average DO deficit was improved (decreased) at the GPA monitoring location (1.5 miles upstream from the ReOx system) by about 0.1 mg/L. After 4 days of reoxygenation the average DO deficit was improved by 0.4 mg/L. These comparisons use the daily average DO.

GPA (RM 15.6)	Prior to ReOx System Startup	Elapsed time after ReOx system startup			
	8/6/2007 DO deficit (mg/L)	48-hour DO deficit (mg/L)	48-hour DO Deficit improvement (mg/L)	4-day DO deficit (mg/L)	4-day DO deficit Improvement (mg/L)
Shallow zone	3.7	3.6	0.1	3.3	0.4
Middle zone	4.0	3.9	0.1	3.6	0.5
Deep zone	4.2	4.1	0.1	3.9	0.3

Prepared By: TRK 11/19/07
Checked By: LMS 11/19/07

After running for about 10 days straight, the ReOx system was turned off for operations and maintenance (O&M) on August 16, 2007. At shutdown the DO deficit was 3.4 mg/L (shallow zone), 3.7 mg/L (middle zone), and 3.9 mg/L (deep zone). The ReOx system was reactivated on August 17, 2007. Forty-eight hours after restarting the ReOx system the average DO deficit across the water column at the GPA location was improved by 0.5 mg/L.

GPA (RM 15.6)	System shutdown	While system was off	Elapsed time after ReOx system restart	
	8/16/07 DO Deficit (mg/L)	8/18/2007 DO deficit (mg/L)	8/20/07 DO deficit (mg/L)	4-day DO Deficit improvement (mg/L)
Shallow zone	3.4	2.9	2.5	0.9
Middle zone	3.7	3.6	3.3	0.4
Deep zone	3.9	4.0	3.7	0.2

Prepared By: TRK 11/19/07
Checked By: LMS 11/19/07

On the day of final system shutdown (9/16/07), the DO deficit at the GPA monitoring location was 3.1 mg/L (shallow zone), 3.4 mg/L (middle zone), and 3.6 mg/L (deep zone). Eight days after the ReOx system was shutdown, the DO deficit averaged 3.6 mg/L in the water column which was significantly less than the 40 day earlier DO deficit average of 4.0 mg/L in the water column. This decrease in DO deficit is attributed to the influence of cooler ocean water with lower DO deficits during high tides.

At the ReOx system location, (Barge, RM 14.1):

Prior to startup on August 6, 2007 the DO deficit was 3.9 mg/L (middle zone) and 4.0 mg/L (deep zone). After 48 hours the DO deficit was improved at the ReOx monitoring location by 0.3 mg/L in the middle zone and 0.2 mg/L in the deep zone. After 7 days the ReOx system had improved the DO deficit by 0.5 mg/L in the middle zone and 0.6 mg/L in the deep zone.

After running for about 10 days straight, the ReOx system was turned off for O&M on August 16, 2007 at which time the DO deficit was 3.3 mg/L (shallow zone), 3.3 mg/L (middle zone), and 3.5 mg/L (deep zone).

On the day of final shutdown (9/16/07), the DO deficit at the ReOx barge location was 3.0 mg/L (middle zone) and 3.2 mg/L (deep zone). Eight days after shutting the system down, the DO deficit was still less than it was prior to startup conditions.

ReOx System (RM 14.1)	Prior to ReOx System Startup	Elapsed time after ReOx system startup			
	8/6/2007 DO deficit (mg/L)	48-hour DO deficit (mg/L)	7-day DO deficit (mg/L)	14-day DO deficit (mg/L)	9/16/07 Shutdown deficit (mg/L)
Shallow zone	No data	3.7	3.4	2.4	No data
Middle zone	3.9	3.6	3.4	3.0	3.0
Deep zone	4.0	3.8	3.5	3.3	3.2

Prepared By: TRK 11/19/07
Checked By: LMS 11/19/07

The minimum DO deficits at the ReOx barge location were observed between September 12 and September 14, 2007. The deep zone had a DO deficit of 2.9 mg/L on September 12, 2007 began and the shallow and middle zone had a DO deficit of 2.3 mg/L and 2.8 mg/L respectively, on September 14, 2007, some 38 days after ReOx injection began.

Downstream of ReOx system (at the USACE Dock, RM 13.7):

Just prior to ReOx system startup the water temperature was rising and the DO deficit at the USACE dock was 3.7 mg/L in the middle zone and 3.8 mg/L in the deep zone. Approximately 24 hours later, after the system began operating, the DO deficit had decreased by 0.2 mg/L in both the middle and deep zones.

The ReOx system was shut down on August 18, 2007 for O&M. The water column average DO deficit was reduced by 0.3 mg/L about 24 hours after the system resumed normal operation on August 19, 2007 when water temperatures remained relatively constant. Forty-eight hours after operations were resumed August 20, 2007, the middle zone DO deficit daily average was 2.6 mg/L which was the best improvement noted during the demonstration project from the initial 3.7 mg/L DO deficit on August 6, 2007, thus the deficit was reduced by 1.1 mg/L. The best observed DO deficit daily average for the shallow zone was on August 22, 2007 at 2.4 mg/L and the minimum deficit for the deep zone was on August 24, 2007 at a deficit of 2.9 mg/L.

The system was operating at a steady rate on September 12, 2007, four days before shutdown, with the DO deficit daily water column average of 2.9 mg/L, which is similar to the water column four days after shutdown.

USACE Dock (RM 13.7)	Prior to ReOx System Startup	Elapsed time since ReOx system startup			
	8/6/2007 DO deficit (mg/L)	14 Day DO deficit (mg/L) 8/20/07	1 day after Shutdown DO deficit (mg/L)	4 days after Shutdown DO Deficit (mg/L)	8 days after Shutdown DO Deficit (mg/L)
Shallow zone	No data	2.5	3.1	2.7	3.3
Middle zone	3.7	2.6	3.3	2.9	3.5
Deep zone	3.8	2.9	3.2	2.8	3.4

Prepared By: TRK 11/19/07
Checked By: LMS 11/19/07

4.3 MONITORING ALONG MID-CHANNEL

Water quality sampling in the middle of the navigation channel was performed periodically (at least weekly) at 14 locations, V1 – V14, which extended from GPA Berth 20 to the USACE Dock (Figure 4-3). Due to the strength of the tides and the need to sample during slack tide conditions, the sampling was performed in a 2 to 3 hour window centered on a high or low slack tide.

Sampling locations were monitored using the hand held YSI 6920 sondes. These mid-channel DO measurements were taken at four (4) depths: 3 feet below water surface; 1/3 of total depth; 2/3 of total depth; and 3 feet above bottom. At the request of EPD, MACTEC assessed the potential for conducting more detailed water column measurements at 1-foot intervals for the top 10 feet and 2-foot intervals to the bottom. Since the mid-channel depths ranged from 48 feet (low tide) to 55 feet (high tide), the total number of measurements at one point would have been as high as 32 discrete measurements. Since it took a minimum of two to three minutes for the instrument to stabilize, the total time for measurement of one location approached one and a half hours. Since there were 14 sampling locations and it was important to keep the measurement period as short as possible so that the data were obtained under similar conditions and to avoid high currents (maximum time three hours per event), this methodology was not feasible, within available resources, for the periodic river sampling events.

The pH, specific conductivity, salinity, and DO instrumentation were calibrated prior to deployment and the calibration was checked after completion of the sampling event.

4.3.1 Mid-Channel Findings – DO Deficit

Table 4-1 summarizes the grid averaged DO deficit calculations. The grid average is the average DO deficit of the water column. The following details the Figures 4-3 s mid-channel isopleths.

Figure 4-3.1 a-b – Mid-Channel Monitoring DO Deficit at Low Tide
Figure 4-3.1 c-d – Mid-Channel Monitoring DO Deficit at High Tide
Figure 4-3.1 e-f – Mid-Channel Monitoring DO Concentration at Low Tide
Figure 4-3.1 g-h – Mid-Channel Monitoring DO Concentration at High Tide
Figure 4-3.1 i-j – Mid-Channel Monitoring DO Percent Saturation at Low Tide
Figure 4-3.1 k-l – Mid-Channel Monitoring DO Percent Saturation at High Tide

Low Tide Events

The results from the mid-channel monitoring events at low tide indicated that the improvement from August 6, 2007 to September 7, 2007 of the grid average DO deficit from the operation of the ReOx system was approximately 0.6 mg/L. The mid-channel low-tide monitoring event that occurred just prior to system startup indicated that the three-mile river segment being monitored had a grid average DO deficit of 3.9 mg/L. Once the effects of the ReOx system operation stabilized, on August 20, 2007, the grid average DO deficit after 13 days of reoxygenation was 3.3 mg/L, thus the DO deficit was improved by 0.6 mg/L. The average DO deficit based on all five low tide event grid averages was 3.4 mg/L, a DO deficit improvement of 0.5 mg/L, though after August 24, 2007 a cooling trend began to occur in the water temperature, which meant the stabilized condition on August 20, 2007 was more representative of the ReOx system effect during critical conditions than the period of time when the cooling trend began. The final monitoring event for the 3-mile segment 10 days post system shutdown indicated that the average DO deficit at low tide had returned to 3.9 mg/L, thus the effects of the system lasted for days after the system shut down.

These mid channel monitoring locations act as "snapshots" of the water quality profiles along the three-mile long target segment of the river centered on the ReOx barge location. Figure 4-3.1 graphically presents the low tide sampling results for all events.

High Tide Events

At mid-channel high tide improvement in DO was observed but was not as predominant and clear as the low tide measurements. Table 4-1 summarizes the grid average DO deficit calculations. Figures 4-3.2 present the high tide events. Prior to startup a DO deficit of 3.9 mg/L was observed a few weeks prior to startup during fairly steady critical conditions of high temperatures and low water flows. A week after the startup of the ReOx system, the DO deficit had been improved by 0.7 mg/L from July 16, 2007 to August 27, 2007. The average DO deficit from two high tide events during stable water temperature conditions was 3.2 mg/L. After August 24, 2007, the high tide deficits continued to further naturally decrease as a result of cooling sea temperatures and lower DO deficits.

4.3.2 Other Water Quality Data Findings

Mid-channel data for pH, salinity, and temperature are presented in a low and high tide series on Figures 4-3.2 as detailed below.

Figure 4-3.2 a-b – Mid-Channel Monitoring pH at Low Tide
Figure 4-3.2 c-d – Mid-Channel Monitoring pH at High Tide
Figure 4-3.2 e-f – Mid-Channel Monitoring Salinity at Low Tide
Figure 4-3.2 g-h – Mid-Channel Monitoring Salinity at High Tide
Figure 4-3.2 i-j – Mid-Channel Monitoring Temperature at Low Tide
Figure 4-3.2 i-j – Mid-Channel Monitoring Temperature at High Tide

Low Tide Events

During low tide conditions, the pH in the river is relatively neutral and is slightly greater at the bottom of the river. Salinity tends to have a low surface salinity and gradually increases with depth. The salinity ranges from approximately 6 parts per thousand (ppt) at the surface to 16 ppt at the bottom of the river. The temperature trends are very apparent on the Figure 4-3.2i-j; hotter temperatures appear red to yellow and cooler temperature appear green or blue.

At low tide the river was stratified through the first several weeks of monitoring (7/9/07 through 9/4/07). Salinity in the river was highest around August 20, 2007; this date 4900 cubic feet per second was observed (Figure 4-8.2) as a period of low flow as measured at the U.S. Geological Survey (USGS) Gage 02198500 near Clyo, GA. Water temperature was also highest during this same time. Figure 4-3.2 shows

effects of the ReOx project on the river temperatures on August 20, 2007. This gradient effect was likely due to the lower river flows (as measured at the USGS Gage near Clyo, Georgia) and the fact that the intakes were located at the edge of water near the surface where water temperatures were warmer, particularly during daylight hours.

High Tide Events

Generally, high tide conditions brought a higher pH water into the harbor. The highest pH values occurred at the bottom of the river. Salinity at high tide conditions have a similar gradient as at low tide events, low values at the surface and higher at the bottom. However, a much higher salinity values are observed at high tide throughout the water column. Water temperatures during high tide events are generally cooler than during low tide events.

4.3.3 Long River Run Monitoring (RM 4 to RM 19)

In addition to the three-mile target segment in the vicinity of the ReOx system, monitoring over a 15 mile segment was also conducted. These "long run" monitoring events extended from approximately RM 4 to RM 19 as included at the end of Figure 4-3.1. Shortly after the ReOx system had been turned on, the USACE noticed an increased DO level at their KITB monitoring location approximately eight miles up river from the ReOx system location. After reviewing the data, it became apparent that long run monitoring would be helpful to assess a larger scope of the influence of the ReOx demonstration project. Beginning the week of September 6 to September 25, 2007, long run monitoring was completed weekly in Savannah Harbor. This was accomplished by beginning at RM 4 off Long Island upstream of Fort Pulaski and conducting a vertical profile (3 depths) every half mile until reaching RM 19 at the KITB (Figure 4-5). Profile readings were taken at shallow, middle, and deep depths. Long run results may be found in Appendix A, Geodatabase, Table Additional_Sampling_Water_Quality_Data.

Results from the long run monitoring indicated that DO levels were higher near the ocean and that the three-mile target segment under study for the ReOx Demonstration Project (USACE Dock to GPA Berth 20) was the critical segment identified in the TMDL report (USEPA, 2004). Also, data revealed that the KITB appeared to act as a storage location for higher DO water. As the flood tide moved upstream, the higher DO water from the ReOx system filled the KITB. As the tide moved out, the higher DO water was released and flowed downriver. A subset of the long run data (from RM 13 to RM 16) was incorporated in the mid-channel "target zone" series depicted on Figure 4-3. The long run monitoring data was

collected on September 6, 7, 13, 19, and 25, 2007 and referenced as "Long Run" on the Figure 4-3.1 low and high tide series.

4.4 CROSS SECTIONS

Water quality was measured at five cross-section transects (at Berth 20, upstream of the Talmadge Bridge, the barge location, the convention center, and the USACE Dock) were measured (Figure 4-4). Figure 4-4.1 shows transect sampling points as follows:

- Overbank (river left facing downstream at A1 and A2)
- Channel toe (river left facing downstream at B1 through B3)
- Mid-channel (T1 through T5 readings at C1 through C4)
- Channel toe (river right facing downstream at D1 through D3)
- Overbank (river right facing downstream at E1 and E2)

These cross section transects act as slack tide "snapshots" of water quality within the ReOx demonstration target zone. Figures 4-4.2 depicts the low and high tide transects monitoring results for all events.

As with the periodic mid-channel sampling events, the cross section monitoring events were timed to coincide with local slack tide conditions (low or high). The pH, specific conductivity, salinity and DO instrumentation were calibrated prior to sonde deployment and checked at the completion of the sampling event.

Cross-Section Monitoring Findings

Table 4-2 shows the average DO deficit within each cross section and for all five cross sections for each tidal event.

The cross check between the mid-channel readings and the cross section readings are quite similar. The low-tide cross section point averaged DO deficit prior to ReOx injection was 3.9 mg/L. The cross section transects DO deficit at low tide was reduced from 3.9 mg/L to 3.0 mg/L after 14 days of ReOx system operation. During relatively stable river water temperatures between 8/10/2007 and 8/21/2007 the average DO deficit was 3.3 mg/L. This indicates that the DO deficit improvement was 0.6 mg/L.

4.5 NEAR BARGE MONITORING

Additional river monitoring included near barge monitoring shown on Figure 4-4 during the demonstration period to evaluate the local instream extent of notably supersaturated water from the ReOx system. Near-barge monitoring included taking profile readings at locations (S0A– 4A, S0B-S2B, S0C – S2C) adjacent to the barge on the day of ReOx system start up, August 7, 2007. Monitoring was completed in the center of the return line flow on the river side of the barge as shown in Figure 4-5.1. Readings were taken from a radius of 25 feet to 100 feet surrounding the barge at shallow, middle, and deep readings. As shown on Figure 4-5.1, the reoxygenated water dispersed quickly into the river and no extreme initial gradients were observed. The near barge monitoring consisted of 33 points taken on the day of the ReOx system startup, which averaged a 46 percent DO percent saturation, 3.4 mg/L DO concentration, and a DO deficit of 3.8 mg/L. This DO deficit at startup is consistent with the 3.9 mg/L measured in the mid-channel and cross section transects data sets.

As observed during the demonstration project, some effervescence was occurring, particularly as noted during slack tide conditions (Figure 4-6). This effervescence was attributed to turbulence occurring around the gate valves that controlled system pressure and flow at the discharge end of the ReOx system return lines. The gate valves were closed about 80 percent to create sufficient pressure in the cones. Effervescence was not noticed at mid-tide conditions because there was substantially more mixing of the water as a result of tidal flow in the river for mixing. Estimates from Dr. Richard Speece indicated that the oxygen lost to effervescence was likely much less than five percent of the total oxygen input. During near-barge monitoring several readings were taken in the center of the noted effervescence bubbles to assess DO concentrations; the highest DO concentration measurement was 4.3 mg/L. A permanent system design may utilize valves with a smoother transition and a multiport diffuser to further limit the potential for effervescence.

4.6 QA/QC REVIEW

For the ReOx Demonstration Project, MACTEC achieved a greater than 98 percent data recovery. The field monitoring data collected from the continuous monitoring stations and weekly sampling stations are stored in a non-relational database in Appendix A, Geodatabase. These data were reviewed by MACTEC so that the necessary parameters, measurements, and analytical results were properly recorded; the analytical results were evaluated for completeness and accuracy and suspected errors were investigated and resolved, as possible.

Data from the YSI 6290 sondes were considered valid if the post deployment calibration check did not deviate from pre-deployment calibration by more than ten percent. Data from sondes that did deviate by more than 10 percent were considered outliers and the corresponding measurement from the duplicate sondes were used to fill such data gaps.

In addition, during sonde deployment at the USACE dock it was noted that tidal/wave actions were causing the sondes to bounce on the support bolt in the sonde standpipes. This caused damage to the sonde batteries resulting in some data loss before this problem was identified and rectified. Data lost includes:

- Stationary Monitoring Location USACE-Mid (8/11 5:45pm to 8/13 4:00 pm), (8/24 11:00am to 8/27 3:00pm), and USACEM (9/15 11:30am to 9/16 2:00pm);
- Stationary Monitoring Location USACE-Deep (7/30 9:30am to 8/1 4:30pm) and (8/24 11:30am to 8/27 2:30pm)

Additionally, there were occasional events where data was lost due to the following: a floating surface sonde was caught by river debris and restrained at depth or by the support rope and came out of the water during low tides; at The Industrial Company due to available location for sonde placement prior to the barge setup that resulted in sondes being out of the water; and the monitoring station on the barge coming loose from the supports as a result of a boat collision.

Data Quality Objectives

The data quality objective for the ReOx project was to obtain sufficient and credible data that would support, with a reasonable level of certainty, that the monitoring results are correct. The quality controls for the ReOx project included assessing the precision, representativeness, comparability, and accuracy of the monitored parameter values, with particular emphasis on changes in DO deficit concentrations. See Appendix B, Savannah Harbor ReOxygenation Water Quality Monitoring Plan, for more detail on the data quality objectives. These data quality objectives were met for the project and a greater than 98 percent data recovery for all data collected by MACTEC was achieved.

4.7 DYE TEST OBSERVATIONS

A dye test was conducted near the end of the operation period to assess the dispersion characteristics of the superoxygenated water in the river. This test was planned as a qualitative observation of the behavior

of the dye as it was released in the return lines. The dye test on September 12, 2007, was conducted at low slack conditions and as the river started flowing upriver toward the Kings Island Turning Basin. At approximately 17:05 hours on September 12, 2007, 55 gallons of permailon blue dye was injected into the ReOx system. Observations were made of the visible dye movement in the river.

Photograph log:

- Digital photographs were taken during the test every minute for the first 10 minutes and every 5 minutes thereafter until the dye had dispersed.
- Photographs were taken from the following locations during the dye test:
    - Barge location
    - Hyatt Hotel (located on River Street directly across the river)
    - Talmadge Bridge (upstream of the barge)
    - Boat

Visual observations did not note substantial quantities of dye at the surface of the river; this indicated that the superoxygenated return flow was entrained at deeper depths. There was some drag up of dye from the effervescence but the color noted indicated a large dilution of dye injected. To compare the injected dye color noted at the surface to the potential color if the flow had short-circuited to the surface, five gallons of dye were released from a boat to the surface of the river. Figure 4-7 shows the comparison of the deep dye injection versus the surface dye release.

In addition to field observations, water samples taken with a Kemmerer type sampler were also collected at 1 foot, 10 feet, 20 feet, 30 feet, and 40 feet below the river surface and placed in glass sample bottles. Visual observations of the samples indicated that the darkest dye color was noted at 30 feet and 20 feet. Medium color (as compared to the darkest samples) was noted at 40 feet and 1 foot. Samples collected at 10 feet were the lightest indicating that the surface color noted was likely due to drag up of dye from the effervescence noted during slack tide conditions and that the bulk of the supersaturated water was dispersed in the mid-depth of the water column that corresponded to the return line outlet depth.

Observations were made to determine if the dye was noticeable upstream of the ReOx System. Observations made showed that the only visual evidence was from the surface release. There was little evidence at the GPA Berth 20 Dock of the dye. This confirmed the hypothesis that the superoxygenated water remained largely within the navigation channel.

4.8 OTHER MONITORING AND ANALYSES

4.8.1 USGS Gage at USACE Dock

Provisional water quality data from the USGS Gage 021989773 Savannah River at USACE Dock, at Savannah, GA matched very closely the data from deep monitoring zone USACE monitoring station data collected by MACTEC, Appendix B Geodatabase, referenced as Table USGS_Gage_Data. The USGS station was set at approximately 4 feet from the bottom at the USACE dock. Figure 4-8.1 presents the USGS provisional water quality data at the USACE dock (USGS, 2007a).

4.8.2 USACE Kings Island Turning Basin Monitoring

The USACE provided water quality data taken at various locations in the Savannah River while dredging was occurring upstream from the ReOx barge location. These data are shown in Appendix C.

4.8.3 USGS Gage at Clyo

The USGS gage station data from the Savannah River near Clyo, GA, USGS 02198500, for July 9, 2007 through September 25, 2007, are provided in Appendix A, Geodatabase, referenced as Table USGS at Clyo and are provisional. Figure 4-8.2 depicts streamflow data for the Clyo gage. The data showed an average flow rate of 5086 cubic feet per second (cfs) during the ReOx project (USGS, 2007b). The maximum flow, 5650 cfs, on 7/14/2007 and the minimum flow, 4590 cfs, on 7/25/2007 at the Clyo gauge were both prior to the ReOx system startup. During the monitoring period of July 9 through September 25, 2007, instream flow was observed at and sometimes below critical instream flow conditions of 5000 cfs.

4.8.4 Rainfall Monitoring

The rainfall data have been included on Figures 4-2 of the stationary monitoring locations. These data are provided in Appendix A Geodatabase as provisional from the USGS Gage 021989773 Savannah River at USACE Dock, at Savannah, GA weather station, referenced as Table USGS_Gage_Data. The maximum rain event between July and September 2007 was on 7/30/2007 with 12.59 centimeters (approximately 5 inches) of precipitation. The maximum weekly rain event occurred between July 30th to August 5th with a total weekly precipitation of 18.84 centimeters (7.4 inches) (USGS, 2007a).

4.8.5 Data Analysis by Georgia Tech Students

- Data provided by GPA to Civil and Environmental Engineering students at Georgia Tech.
- Reviewed/analyzed only data from continuous near-bank monitoring locations. and did not analyze more-representative centerline or cross section monitoring.
- Compared DO percent saturation before, after, and during project for all tides combined such that progressive sea cooling effect on high tide data masked low-tide deficit reductions
- Concluded there was not a statistically strong positive impact on DO as a result of oxygen addition.
- While MACTEC appreciates the contribution of the Georgia Tech students, it is important to note that their conclusions are based entirely on the near-bank monitoring while the dominant influence of the ReOx project was on the central part of the river (USACE, 2007).

5.0 FULL-SCALE DESIGN CONSIDERATIONS

Locations for permanent stations will require certain infrastructure to support the operations of the ReOx systems. For example, a station incorporating liquid oxygen will require a road so that the tanker trucks delivering the liquid oxygen would be able to have access to the site. A station incorporating an oxygen generator would be able to utilize a more rudimentary road for access for the personnel who will be servicing and operating the system. Electrical service will be needed to supply power for the pump system.

The ReOx discharge lines should be placed as deep in the river as possible and preferably discharge toward the navigation channel or river bottom. For example, the design of the demonstration project included discharge lines that sloped downward approximately 10 degrees (from horizontal), and the momentum of the water flow transported the supersaturated water into the navigation channel. A similar approach should be considered for the permanent installation to simplify the discharge pipe layout. Discharge lines should be placed so they present the least possible impact on normal river operations (ship traffic, dredging, etc.) and may be seasonally deployed.

5.1 CONCEPTUAL DESIGN SCHEMATICS

Based on the results of the demonstration project, MACTEC anticipates that two permanent installations would be sufficient to provide oxygen to mitigate the effects of harbor deepening, with one station having one cone (but designed with the contingency of adding a second cone) and the other station having two cones (an extra to allow one cone to be down for maintenance at either station). Additionally, each system should have a backup pump system so that operation could continue during pump maintenance or failure.

Depending on the sites selected for permanent installation of ReOx stations, there are several possible design scenarios to consider, including:

- River bank below ground installation of the Speece Cone (Figure 5-1)
- Above ground installation of the Speece Cone (Figure 5-2)
- Barge mounted systems similar to the demonstration project

Each of these alternatives, depending on site location and access, could take advantage of various design alternatives such as: a single or dual cone design; intake screen type; and oxygen generation or liquid

oxygen supply. Figures 5-1 and 5-2 provide a general conceptual layout of two types of mounting configurations for single cone systems that may be adapted to dual cones systems as needed. Final design layouts for a permanent system will depend on site-specific requirements.

5.2 ESTIMATED COSTS TO CONSTRUCT

As a planning tool, MACTEC has prepared rough order of magnitude (ROM) estimated costs for one cone stations based on the conceptual designs presented in Figures 5-1 and 5-2. Table 1 presents the ROM estimated costs for a basic one-cone land-based ReOx Station. These costs do not include land procurement, utility installation, or roadway construction as these are highly dependent on the actual sites selected. Costs presented in Table 5-1 are summarized below:

- Above Ground Installation – Oxygen Generator: $1.90 million
- Above Ground Installation – Liquid Oxygen Supply: $2.05 million

- Below Ground Installation – Oxygen Generator: $4.80 million
- Below Ground Installation – Liquid Oxygen Supply: $4.95 million

Additional considerations for the design of each permanent ReOx station location would be the annual O&M requirements. Estimated ROM annual O&M costs per cone are presented in Table 5-2 and are summarized below.

- Oxygen Generator: $24,000
- Liquid Oxygen Supply: $131,000

Additional costs would include the cost of a support building at each ReOx Station. The support building would house equipment, control panels, oxygen generation equipment (if applicable), and provide off-season storage of ReOx pumps, Speece Cone(s), and other equipment. Building costs will vary depending on the type (prefabricated, block, or concrete) and the finish required (some areas may have specific design requirements, i.e. brick, rock, etc.) for a specific location selected. These costs range from $150,000 to $300,000 or more. The below ground installation is more expensive because sheet piling and dewatering would be required during installation.

6.0 ANECDOTAL INFORMATION

- The Nature Conservancy conducted sturgeon monitoring in the vicinity of the ReOx project using underwater receivers to monitor whether tagged fish pass by a particular Savannah River section. No tagged sturgeons were noted during the ReOx demonstration project.

- It was necessary to scrape off barnacles from the continuous monitoring sondes routinely as part of the operation and maintenance procedures.

- When the ReOx system return lines were disassembled and brought to the surface, blue crabs were noticed on the return lines which they were using as habitat structure.

- The mid-channel and cross section transect data were collected from a registered boat and carefully coordinated with the United States Coast Guard and other pilots navigating the Savannah River.

- The ReOx demonstration project used four 400 horsepower pumps that were mounted on the barge deck. The rated decibel levels were 72-76 decibels for each pump at 30 feet. It is expected that the vertical pumps planned for the permanent installations would generate approximately 65 decibels for each pump at the pumps on the barge deck.

7.0 CONCLUSIONS

1. **The ReOx system was able to meet the target oxygen mitigation quantity of 20,000 ppd.** The goal of adding enough oxygen, approximately 20,000 ppd, to mitigate the effects of harbor deepening was achieved using two Speece Cones each designed for up to 15,000 ppd.

2. **Operation of the ReOx system resulted in an average decrease of the DO deficit of 0.6 mg/L.** Mid channel DO profiling along the river study length indicated that about three days of continuous oxygen injection were needed to initiate measurable DO deficit reduction and that an overall average deficit reduction of approximately 0.6 mg/L was achieved during the demonstration period as compared to pre- and post- monitoring data.

3. **The positive effects on water quality from the ReOx system were notable after system shutdown.** For at least seven days after the ReOx system was shut down, residual positive effects of oxygen addition were still clearly evident in nearby cross-section transects taken at low tide. Ten days after ReOx system shut down there was no continuing evidence of residual instream DO improvement, and mid-channel low tide DO deficits had substantially returned to pre start-up deficit levels of 3.9 mg/L.

4. **Near barge monitoring did not detect excessively high DO concentrations in the river.** Immediately after startup, the near barge monitoring performed around the ReOx system at the request of EPD indicated that the superoxygenated river water was dispersing quickly into the tidal flow of the Savannah River system. Continuous stationary and periodic mid-channel and cross section monitoring also indicated that the superoxygenated river water was dispersing quickly into the river system.

5. **Influent monitoring concluded no short circuiting of the reoxygenated water.** The influent water pumped into the system from the river was not oxygen rich; thus, tidal movement effectively transported new water into the target injection area.

6. **Data collected by project monitoring activities was verified by USGS monitoring.** USGS water quality gaging station data closely matched MACTEC water quality deep monitoring data at the USACE dock.

8.0 REFERENCES

Free Tide Tables, 2007. http://www.freetidetables.com

HACH, 2003, "Hack Water Analysis Handbook."

USACE, 2007. "Statistical Analysis of Savannah Harbor Reoxygenation Experiment". December 2007.

MACTEC, 2005. "Identification and Screening Level Evaluation of Measures to Improve Dissolved Oxygen in the Savannah River Estuary" Savannah Harbor Expansion Project and Savannah Harbor Ecosystem Restoration Study – Chatham County, Georgia submitted to USACE Savannah District.

TetraTech, 2007. "Design of Dissolved Oxygen Improvement Systems in Savannah Harbor, Savannah Harbor Ecosystem Restoration Study and Savannah Harbor Expansion Project, Chatham County, Georgia".

USEPA, 2004. "Draft Total Maximum Daily Load (TMDL) for Dissolved Oxygen in Savannah Harbor Savannah River Basin Chatham and Effingham Counties, Georgia"

USGS, 1998. Table 6.2-6 Solubility of oxygen in water at various temperatures and pressures from R.F. Weiss (1970).

USGS, 2007a. 15-min Data for the Savannah River at USACE Dock at Savannah, GA (021989773). http://waterdata.usgs.gov.

USGS, 2007b. 15-min Data for the Savannah River Near Clyo, GA (02198500). http://waterdata.usgs.gov.

TABLES

FIGURES

APPENDIX A

GEODATABASE
(Electronic Only)

APPENDIX A

Appendix A contains the project database located on the attached DVD in Microsoft Access format. In addition to the database file, selected tables have been prepared as referenced in the text.

APPENDIX B

SAVANNAH HARBOR REOXYGENATION WATER QUALITY MONITORING PLAN

TITLE

Text begins here.

APPENDIX C

USACE Water Quality Monitoring Data, 2007

APPENDIX C

USACE Water Quality Monitoring Data, 2007

The USACE Water Quality Monitoring Data as provided by the USACE, Savannah District is provided here in tabular format. This data is also available on the Project DVD (Appendix A).

Georgia Port Authority

Page 4

767-MM-21-EC01

Comment: *According to the GPA's careful analysis, the ample net transportation benefits are understated. Adjustment of even a few of the overly conservative assumptions used by the Corps results in maximization of net benefits with a 48-foot channel, qualifying it as the National Economic Development ("NED") plan that the GPA recommended.*

Response: The study team used empirical data and input from independent consultants in the shipping industry to develop the transportation figures used in the economic analysis. To address some of the uncertainties in the future without project condition, the study team ran several sensitivity analyses. Nearly all of these scenarios resulted in the -47 foot depth being the NED alternative. Admittedly, there are added efficiency savings beyond -47 feet, but the incremental costs offset the additional savings [lower net benefits].

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767-MM-21-EC02

Comment: *Whether the Corps should recommend expansion to a MLW depth of 47 feet or a MLW depth of 48 feet is an open issue. The GPA supports expansion to a MLW depth of 48 feet and asks that the final agency action adopt the 48-foot depth. The Corps calculated that a 48-foot SHEP would save more than $150 million in transportation costs annually, and that net economic benefits should average $115 million a year over the next 50 years. The resulting benefits to cost ratio of 4.3:1 satisfies Water Resources Development Act ("WRDA") criteria for supporting the project.*

Response: The Corps' *Principles & Guidelines* defines the Federal objective as "contributing to National Economic Development (NED) consistent with protecting the environment". The NED plan represents the alternative that reasonably maximizes the project's defined benefits [to the nation] in comparison to its economic costs.

In the case of Savannah Harbor, the 47-foot deepening alternative resulted in the highest net change in benefits over costs, thus rendering it the NED plan. In accordance with Corps policy, a non-Federal project sponsor has the choice of choosing another option, i.e., the locally-preferred plan - 48-foot depth. However, departures from the NED alternative have cost-sharing implications and need to be approved by the Assistant Secretary of the Army, Civil Works.

Using numbers in the Draft GRR and EIS, the Corps recognizes that the difference in net benefits between the 47-foot NED plan and the 48-foot Locally-Preferred Plan is roughly $300,000 per year, which is less than 1/2 percent of the calculated benefits. In light of the 25 percent contingency placed on project costs, the difference is small. However, Corps policy states that when two plans produce roughly the same amount of benefits, the Corps should generally select the plan that costs the least to implement. In this case, the 47-foot NED plan would cost roughly $37 million less to implement than the 48-foot Locally-Preferred Plan. Therefore, Corps policy indicates that the 47-foot depth should be selected.

With the authorization provided by Congress for the SHEP, the views of the four Federal agency heads are of particular interest. In this case, the USFWS and their parent Department of Interior identified that the 48-foot depth alternative would produce greater environmental impacts to resources over which they are responsible. As a result, they do not support the 48-foot depth alternative.

As a result of both Corps policy and in recognition of the views of the Department of Interior, the Corps elected to select the 47-foot NED depth alternative for implementation rather than the 48-foot Locally-Preferred Plan.

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767-MM-21-EC03

Comment: *The GPA agrees the SHEP will generate substantial transportation savings that easily justify project approval. However, the Corps analysis significantly understates the economic benefits the SHEP will generate, particularly in the 47 to 48 feet channel depth range, for several reasons. The Corps analysis relies on unrealistic conservative assumptions of the vessel fleet utilization and of the loading drafts of the vessels expected to call on the Savannah Harbor.*

Response: The assumptions used by the study team were based on empirical field data and from input provided by independent consultants [within and outside the shipping industry]. These suppositions were vetted several times by technical reviewers, policy specialists, and independent panels. While some may feel the District was overly conservative in its assumptions, the agency is confident those assumptions are reasonable and will be validated by future events in the shipping industry.

767-MM-21-EC04

Comment: *First, the Corps assumes a certain percentage of post-Panamax ships calling on the Savannah Harbor will take advantage of favorable tidal conditions and adjust their loads accordingly. In fact, the Corps assigns maximum practicable capacity of vessels using 5-feet of usable tide as one of the considerations. This assumption is unrealistic, and the Corps provides no explicit rationale for assuming that vessel assignments will be made on the basis of using five feet of tide.*

Response: The determination or measure of underkeel clearance (UKC) on economic studies is in accordance with Corps planning guidance, which recommends evaluation of actual vessel operator and pilot practice with adjustment as appropriate or practical for with-project conditions. General "rules of thumb" such as allowing 10 percent of the transit draft for clearance have been long superseded with efforts to evaluate actual practice because such guidelines tended to be conservative and overly generous in allowance compared to what is often actually employed or needed. With respect to reviewer concerns that the allowances of 4.0 feet seem more than needed or excessive it may be of value to present a general discussion of allowances for underkeel clearance. Generally, practices for underkeel clearance are determined through review of written pilotage rules and guidelines, interviews with pilots and vessel operators, and analysis of actual past and present practices based on relevant data for vessel movements. With regard to evaluation of data concerning actual practices, typically underkeel clearance is benchmarked or measured relative to measured immersed vessel draft in the static condition (i.e., motionless at dockside). Evaluation of when the vessel is moved or initiates transit relative to immersed draft, tide stage and commensurate water depth allows reasonable evaluation of clearance throughout the course or time of vessel transit within a given waterway. When clearance is measured in the static condition explicit estimation or allowances for squat, trim, and sinkage are unnecessary as the pilot or vessel operator has already accounted for such influences within allowances observed. Alternatively explained, if a pilot or vessel operator is willing to move a vessel with three feet

of clearance as measured in the static condition this indicates that net clearance in the dynamic (moving condition) may be actually one and a half (1.5) to two (2.0) feet given allowances of perhaps as much as a foot to 1.5 feet for squat relative to speed, net changes in trim, and degree of influence for sinkage (where applicable). Evaluation of all movements renders a distribution of clearance, with many observations or vessel movements employing more than is needed simply due to timing and varying degree of unconstrained drafts for relatively smaller vessels. Evaluation of minimized clearance (i.e., some level of clearance below which operators or pilots will not move a vessel due to concerns for insufficient safety) helps to quantify the window(s) of time each day a given vessel with a specified immersed draft can be moved relative to tide. Given the measurement of clearance in the described manner combined with input from pilots on their practices has revealed that underkeel clearance in Savannah is slightly more than many US coastal ports.

General evaluation of practices for UKC at most coastal ports in the United States has revealed that clearances for all vessel types are often 2.0 to 3.0 feet measured in the static condition for many historical fleets having Panamax or lesser service with an average of approximately 2.7 feet for vessels of Handymax up through about Panamax size. Most coastal ports also have comparatively limited runs or distances between ocean approaches and dock facilities (i.e., less than 20 miles) so loss of tidal advantage during transit is less of a concern compared to Savannah. Regarding vessel size under with-project conditions it is understood that most post-Panamax vessels need more clearance depending on blockage factors, currents, and relative confinement of the waterway with most post-Panamax containerships needing about 3.3 to 3.6 feet for vessels with breadths of 120 to nearly 150 feet, lengths overall (LOA) approaching 1,150 feet and summer loadline drafts of 46 to approximately 49.0 feet. At Savannah, the required clearance for vessel sizes of Panamax and up through the first generation of post-Panamax hulls (approximately 123 feet in breadth and up to approximately 1,120 feet in length) based on pilot guidance and actual experience is approximately 4.0 feet. The additional margin above 3.3 to 3.6 feet is due to time for the relatively long run upriver and downriver between the ocean approach and dock facilities (about 25 miles), currents and blockage, and the notable change in salinity and resulting influence for sinkage associated with the more prevalent freshwater environment upriver. During the course of studies it was discussed with the pilots whether the larger classes of containerships (beyond first generation post-Panamax hulls) would require more clearance and it was indicated that larger hulls would likely require some increase in UKC to maintain an acceptable level of safety, though how much had not been determined. Given experience with hydraulics of the waterway, past traffic, and the relative stability in clearance allowances based on size progression from Handymax and Panamax through first generation post-Panamax, it was asked if another quarter of a foot would be sufficient and the pilots indicated this to be acceptable for study purposes with the estimate rounded up to the nearest tenth of a foot (to 4.3 feet) as ultimately applied for analysis of second generation post-Panamax containerships. Given the preceding discussion concerning distance for transit and freshwater influence characteristic of Savannah Harbor, the allowances for UKC applied for studies of Savannah Harbor are considered reasonable and consistent when compared to other deep-draft harbors situated along the coastline of the United States.

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767-MM-21-EC05

Comment: *There are several statements in the Corps report that appear to contradict use of five feet of tide in vessel assignments.*

Response: See previous response.

767-MM-21-EC06, 767-MM-21-EC07

Comment: *The concern about "just in time" arrivals would indicate that use of five feet of tide is not a predominant factor in vessel deployment decisions or operating practices. It was also clear from industry representatives and confirmed by empirical field data that a critically important factor in deployment of container vessels is maintaining the schedule. Waiting for five feet of tide does not comport with the need for dependable scheduling. By examining actual vessel calls at various ports, as noted below, design drafts are generally two to three feet greater than the channel design depth. To wait for five feet of tide is not "likely" according to operators and empirical data as described previously. Figure 19 on Page 25 of the Economic Appendix indicates very few vessels ride the tide more than a few feet.*
Assuming a tide utilization of two to three feet as reflected in the empirical data rather five feet as the Corps assumed would most likely increase the NED depth, probably by two or three feet.

Response: See response to 767-MM-21-EC04.

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767-MM-21-EC08

Comment: *Additionally, it was not evident that the Corps included the costs of landside delays within its analysis of the costs resulting from tidal delays. In shipping, if a vessel is delayed from either arriving to or departing from the berth due to tide, significant direct and indirect costs are incurred with respect to landside activities including stand-by fees for labor, trucker wait time and fuel costs, rail administration from rebooking cargo, staffing times at distribution and deconsolidation centers and, with just-in-time deliveries, production delays at manufacturing facilities. The costs of landside delays need to be factored into the evaluations of benefits of deepening.*

Response: The PDT explored the issue of obtaining information on landside costs of tide delay from the GPA. Following coordination with the USACE chief economist it was determined that this information would not qualify as NED benefits. However, while vessel delays due to landside reasons were not accounted for, the delays for ocean side are. A vessel can be delayed for a variety of reasons - insufficient channel depth, another transiting vessel, etc. The unloading rate at the dock is a variable input to the HarborSym analysis that was performed. The user inputs three likely loading/unloading scenarios (Minimum, Most Likely, Maximum) that ensure a vessels time at the dock varies slightly throughout the period of analysis.

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767-MM-21-EC09

Comment: *Third, the projected vessel fleet distribution projections do not seem to match extensive empirical data from other ports that are supported by industry studies, trade publications and academic studies. Data from Savannah and from other ports show that vessel fleets are comprised of a distribution of incremental vessel design drafts generally growing gradually from the smaller vessels then peaking at a design draft two or three feet greater than the channel design depth and then dropping off rapidly. This fleet distribution pattern is referred to in the Corps report as a "cluster" distribution. On occasion, vessels with design drafts more than two to three feet greater than the channel design depth call at ports, but that does not appear to happen on a regular basis.*

Response: An updated world fleet forecast by vessel [depth] class was obtained from MSI. The relationship between the world fleet and the vessels predicted to call at Savannah has been updated and the revised analysis included in the Final GRR. This update included an evaluation of the recent economic downturn [in the worldwide economy], its effects on order cancellations and new purchases, and the most currently available outlook of fleet expansion through 2030. This evaluation includes an update of vessels [by capacity] calling at Savannah during the 2000-2010 timeframe and the subset of that capacity which will be in PPX1 and PPX2 vessels.

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767-MM-21-EC10

Comment: *The MPC calculation is critical to the analysis and identification of the NED Plan because it controls how much cargo would be carried on each vessel. While the GPA understands that vessels rarely sail at maximum design draft, vessels do regularly sail at drafts beyond the MPC assigned by the Corps in the report. The sensitivity analysis shows that if the MPC is adjusted for efficient vessel loading without the constraints assigned to the draft through the MPC, then the 48 foot depth has the maximum average annual benefits. The practice of limiting vessel drafts with an assigned MPC for vessel classes restricts the full benefits of the project from being identified.*

Response: Containerships carry cargo destined for multiple ports, but the goods are loaded onto a single vessel [at a given time]. This necessitates that the load factor analysis use averages to estimate the amount of cargo [and associated drafts]. The only way to perform a true directional deployment analysis would be to know the "vessel's manifest" for an entire journey. Since that information is proprietary, the study team was compelled to rely on data for cargo being loaded/unloaded at Savannah. Nonetheless, by applying average empties, bunkerage, and other factors, the team was able to estimate the aggregate tonnage on a vessel at a particular time given the vessel's draft.

767-MM-21-EC11

Comment: *Finally, the report mentions the use of the Suez Canal as an alternate route for Far East – East Coast US trade but apparently does not include using the Suez Canal as a reasonable alternate assumption to using the Panama Canal. At least two Corps reports, Miami and Norfolk, identified the Suez Canal as a reasonable alternate assumption for trade with Asia. There are also data to support that the Suez alternative is currently being used for Far East-ECUS trade. Whether that use will continue after the Panama Canal is expanded is unknown. While the assumption of a competitive Suez Canal may not have been reasonable in the past, it appears to be reasonable now. With the economies of scale in the current and most likely future world fleet as well as shifting points of origin of manufacturing in Asia from China to the sub-continent, as is happening, it would actually be more economical to ship FE-ECUS via Suez rather than Panama. This does not suggest the analysis should be revised, but only to recognize in the risk and uncertainty analysis that delay of an expanded Panama Canal would not affect the justification for channel deepening. Whether the NED benefits might be greater or less using the Suez route, the channel increment of depth maximizing net benefits would not likely change. That is to say, selection of the NED Plan is not dependent on or sensitive to completion of the Panama Canal expansion.*

Response: More recent trade data support the growing importance of transit through the Suez Canal for Asian trade and concomitant decreased reliance on the Panama Canal for same. The updated economic analysis includes the expectation of additional use of the Suez Canal for some routes.

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767-MM-21-EN01, 767-MM-21-EN02

Comment: *Another item that needs to be addressed with respect to the NED plan is the project cost analysis. While not a part of the economics analysis, the cost impacts NED plan identification. A 25% contingency factor is placed on essentially every element which seems excessive for many elements of the cost estimate. An explanation would be helpful to understand the 25% contingency factor particularly for dredging costs. The Corps dredges millions of cubic yards every year from the Savannah River Channel and has been doing so for many years. Data on the annual costs for each of the past 10 years might be helpful in judging whether the 25% contingency is appropriate. Regardless of whether 25 % is the appropriate contingency factor according to Corps regulations, those regulations describe maximum, most likely, and minimum levels of risk in the estimating process. It seems that the contingency factors for this report are reported at the maximum level of risk. In order to compare costs and benefits on an equal basis, it seems appropriate to use both costs and benefits at their "most likely" level in order to get appropriate comparison.*

Response: While individual project elements certainly vary, the District seeks to realize a cumulative 80% confidence in its estimate of the total project cost. The 25% contingency [used for this project] was necessary to obtain the noted overall resultant of all risk at this 80% confidence interval. Given the variation in risk levels, those which vary the most are captured on a sensitivity chart in the cost/risk appendix.

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767-MM-21-EC12

Comment: *Each of the individual sensitivity tests suggests only one or in a few cases two alternate assumptions. None of the alternate assumptions standing alone or in twos cause the outcome of the analysis to change. Examination of the sensitivity analysis shows the alternate assumptions used for sensitivity testing themselves do not reflect a reasonable range of assumptions. The two most critical assumption sensitivities are not addressed at all, i.e., use of five feet of tide in the loading calculations and recognizing and testing the sensitivity of the cluster effect of fleet distribution. The GPA believes these two assumptions should be tested with sensitivity analyses.*

Response: The 5-foot of usable tide is based on analysis of physical conditions in the harbor and is not a parameter that the project could change. Therefore, analysis of altering that parameter is not warranted. Section 5.2 of the Economic Appendix describes the sensitivity analyses that the Corps performed related to vessel availability and loadings. Sensitivity analyses 6 – 13 result in different vessel fleets, as suggested in the comment.

767-MM-21-EC13

Comment: *The Corps' transportation cost-focused analysis overlooks other economic benefits the SHEP will generate. The full economic benefits from the SHEP will be more substantial for nearby Georgia and South Carolina populations that constitute the metro-Savannah region as well as for Georgia generally than the Corps analysis takes into account. The Corps does not consider investments made by port users, nor does it consider indirect multiplier impacts for the region.*

Response: An updated and expanded socioeconomic resources section for the SHEP EIS is included in the final document. Output from the economic *Impact Forecasting System Model* has also been included to describe the project's potential economic impacts to the local economy.

Page 18

767-MM-21-EV01

Comment: *Dr. Humphreys is the Director of the Selig Center for Economic Growth. The study included data for the Savannah Harbor and the port at Brunswick, Georgia. The studies are attached to these comments as Exhibits A and B. The GPA requests that the Corps include these studies as part of the administrative record.*

Response: As requested, Exhibits A and B of the GPA comments (Dr. Humphrey's reports) will be included in the administrative record for the SHEP.

Page 19

767-MM-21-EC14

Comment: *In the Economic Appendix of the Draft GRR, the Corps analyzes the Regional Economic Development Benefits of several counties surrounding Savannah Harbor including Chatham, Effingham, Bryan and Liberty Counties in the inner ring, and Screven, Bulloch, Candler, Evans, Tattnall, Long and McIntosh Counties in the outer ring. The counties in South Carolina bordering Savannah Harbor were not included in the analysis, and certainly the GPA believes that the Corps should include the South Carolina counties. Numerous South Carolinians are employed directly by the GPA and by companies doing business at or through the GPA facilities. The GPA believes the project will have a positive benefit on these neighboring counties in South Carolina, particularly on bordering Jasper and Hampton Counties, two of the most economically depressed counties in the state.*

Response: An updated and expanded socioeconomic resources section for the SHEP EIS is included in the final document. Output from the economic *Impact Forecasting System Model* has also been included to describe the project's potential economic impacts to the local economy.

Page 29

767-MM-21-EV02

Comment: *The proposed magnitude of acquisition and preservation of existing wetlands is significant and meets all legal requirements. At the recommendation of EPA Region 4, the Corps used its Standard Operating Procedures ("SOP"), which have been adopted by the natural resource agencies in Georgia, to evaluate impacts and calculate compensatory mitigation necessary to offset remaining project impacts for the 45, 46, 47, and 48-foot alternatives. Preservation of lands and existing wetlands bordering the refuge is necessary to offset remaining impacts for each of these depth alternatives. The Savannah District consulted with the Corps Center for Expertise for Ecosystem Restoration (the "CEER") which confirmed the SOP was technically sound for use to determine the acreage needed for preservation to offset remaining project impacts. The proposed project mitigation plan also conforms to the new mitigation rule, jointly established by EPA and the Corps (published in the Federal Register on April 10, 2008), and meets the requirements of 33 C.F.R. Part 332.*

Response: The District has evaluated the wetland impacts and proposed mitigation with respect to the Final Mitigation Rule (33 CFR Part 332). Those findings are reported in Appendix C – Mitigation Planning, Section VII- Consideration of the USEPA/USACE Mitigation Rule.

Page 39

767-MM-21-EV03

Comment: *The City of Savannah has a water intake on Abercorn Creek to obtain source water for its water supply treatment plant. The City of Savannah asked the Corps to conduct studies to confirm the SHEP would not cause elevations in chlorides at the Abercorn Creek water intake. The Corps conducted the requested studies and those studies confirm the SHEP will not have an adverse impact on water quality at the Abercorn Creek water intake. The worst case scenario predicted an increase of chloride concentration by 3 percent. Although the worst-case scenario is not a risk to the City of Savannah, the City has disagreed with the methodology and modeling. As noted, the Corps continues to collect data and is conducting additional modeling and analysis at the request of the City of Savannah. These results and any further recommendations will be included in the Final Environmental Impact Statement. The Corps will monitor chloride levels in Abercorn Creek as part on the monitoring plan to determine if chloride levels rise beyond the model predictions.*

Response: As you are aware,the District collected additional recent data which was used to update both the predictive tool and its assessment of potential project impacts to chloride levels in Abercorn Creek. The updated analysis is included in the final reports. This updated analysis indicates that construction of the SHEP would increase chloride levels at the City of Savannah's water intake on Abercorn Creek during high tides and low flows. Concerns associated with this increase in chlorides include an increase in lead corrosion in pipes and the formation of disinfection byproducts which would be caused by the need for the City to treat the water with more chlorine. Lead and disinfection byproducts are both regulated by EPA in regards to drinking water. Consequently, the FEIS includes the construction of a raw water storage impoundment which would allow the City to use this stored water in times of high chloride spikes. The Monitoring Plan includes monitoring chloride levels at the City's water intake before, during and after construction.

Page 41

767-MM-21-EV04

Comment: *Some agencies are concerned that the funds will not be available for adaptive management should changes in the project be necessary. The GPA has committed to set aside the local sponsor share for the program in a separate account so the funds are available if needed. The Corps will request the federal share of funds as needed during its routine budgeting process. However, since Congress directed the Corps to employ adaptive management on water resource projects, the GPA submits that federal funds should also be budgeted and set aside during construction to make changes in mitigation for the ecologically sensitive areas within the Savannah Harbor.*

Response: The District appreciates the commitment made by the State to set aside its portion of the funds expected to be needed to carry out the Monitoring and Adaptive Management Plans. The District intends to obtain its share of the expected Adaptive Management costs as the dredging occurs, so that they will be available if/when needed.

767-MM-Z1-EV05

Comment: *The Corps proposes that post construction monitoring would continue for five years after the completion of construction. The GPA, however, requests extension of that monitoring program to a length more appropriate to determine estuarine trends, but within the limits prescribed by Congress as part of the Water Resources Development Act of 2007.*

Response: The District revised the Monitoring Plan in the FEIS to include post-construction monitoring for a 10-year period. During that time frame, the field data would be used in conjunction with the updated hydrodynamic and water quality models to evaluate the project's performance and the success of its mitigation measures.

#1121

GEORGIA DEPARTMENT OF LABOR
148 ANDREW YOUNG INTERNATIONAL BLVD., N. E.
ATLANTA, GEORGIA 30303-1751

MARK BUTLER
COMMISSIONER

January 19, 2011

William Bailey
ATTN: PD, US Army Corps of Engineers, Savannah District
100 West Oglethorpe Avenue
Savannah, GA 31401-3640

Dear Mr. Bailey,

As Commissioner of the Georgia Department of Labor, I submit this letter of support for the proposed deepening of the Savannah Harbor.

It is my understanding that by increasing the Savannah River's channel depth to 48 feet, the Savannah Harbor Expansion Project (SHEP) will provide U.S. exporters and importers the infrastructure required to efficiently accommodate global commercial demands. The SHEP will allow access to the new generation of larger container vessels, using the expanded Panama Canal beginning in 2014. In turn, this will provide Georgia businesses cost savings and efficiencies in ocean commerce that are essential to create new jobs for the American people. This is an important national priority because the Port of Savannah serves more than 44 percent of the U.S. population and is the fastest growing container port in the nation and the second largest on the East Coast. Furthermore, Savannah handles 12 percent of all U.S. containerized exports.

It is also important to note the statewide economic impact of Georgia's Deepwater Ports. According to Georgia Ports Authority, it is estimated that more than 295,000 jobs, approximately seven percent of Georgia's total employment will be created and $15.5 billion in income (five percent of Georgia's total personal income) will be generated.

In this challenging economic environment, it is important for our government to make the investments required to support job growth in the United States. With a nearly 5-to-1 benefit-to-cost ratio, America cannot afford to pass up the opportunity for economic growth created by this important project.

I appreciate your time and efforts towards the successful completion of this nationally significant project.

Sincerely,

Mark Butler

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An Equal Opportunity Employer/Program

Georgia Department of Labor

Comment: Letter of support.

Response: Comment noted.

GEORGIA
DEPARTMENT OF NATURAL RESOURCES
HISTORIC PRESERVATION DIVISION

MARK WILLIAMS
COMMISSIONER

DR. DAVID CRASS
DIVISION DIRECTOR

December 17, 2010

Mr. William Bailey
ATNN: PD
US Army Corps of Engineers
Savannah District
100 West Oglethorpe Avenue
Savannah, Georgia 31401-3640
CESAS-PD@usace.army.mil

RE: Savannah Harbor Navigation Channel Project
Chatham County, Georgia
HP-911120-001

Dear Mr. Bailey:

The Historic Preservation Division (HPD) has received the Draft Tier II Environmental Impact Statement (DEIS) and General Reevaluation Report (GRR) for the above referenced undertaking in Chatham County, Georgia. Our comments are offered to assist the US Army Corps of Engineers (USACE) in complying with Section 106 of the National Historic Preservation Act of 1966, as amended. Since the proposed project will occur in South Carolina as well as Georgia, please note that our comments are directed to the portion of the overall project that have an area of potential effects (APE) in Georgia.

Based on the information provided, HPD agrees with the findings of the DEIS. Specifically, we agree that the draft Programmatic Agreement (PA) will be adequate to address impacts associated with this undertaking. We look forward to further consultation with USACE to finalize this PA among the USACE, the South Carolina SHPO and our office.

Please note that HPD requests hard copies of any future documentation provided for our review and comment. If you have any questions, please contact Elizabeth (Betsy) Shirk, Environmental Review Coordinator, at 404-651-6624 or via email at elizabeth.shirk@dnr.state.ga.us.

Sincerely,

Karen Anderson-Cordova

Karen Anderson-Córdova, Program Manager
Environmental Review & Preservation Planning

KAC/ECS

cc: Rebekah Dobrasko, South Carolina SHPO, dobrasko@scdah.state.sc.us
Jason Kotarski, Coastal Georgia RC

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Georgia Department of Natural Resources Historic Preservation Division

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Comment: *Please note that HPD requests hard copies of any future documentation provided for our review and comment. If you have any questions, please contact Elizabeth (Betsy) Shirk, Environmental review Coordinator, at 404-651-6624 or via email at Elizabeth.shirk@dnr.state.ga.us*

Response: Savannah District will comply with the request.

GEORGIA
DEPARTMENT OF NATURAL RESOURCES
COASTAL RESOURCES DIVISION

MARK WILLIAMS
COMMISSIONER

WAYNE WOODWARD
DIRECTOR

January 25, 2011

Mr. William Bailey
Attn: PD, USACE, Savannah District
100 West Oglethorpe Avenue
Savannah, Georgia 31401-3640

RE: SHEP Tier II DEIS & GRR, Savannah Harbor Deepening Project, Federal Consistency Determination

Dear Mr. Bailey:

Staff of the Georgia Coastal Management Program (GCMP) has reviewed your November 15, 2010 letter and attached Savannah Harbor Expansion Project (SHEP) Tier II Draft Environmental Impact Statement (DEIS) and General Re-Evaluation Report (GRR) to determine the Savannah Harbor Expansion Project's consistency with the Georgia Coastal Management Program. The Federal Coastal Zone Management Act, 16 USC 1451 et seq., as amended, requires each Federal agency activity performed within or outside of a state's coastal zone boundary that affects land or water uses, or natural resources of the coastal zone, to be carried out in a manner that is consistent to the maximum extent practicable with the enforceable policies of the approved coastal management program.

Georgia Coastal Management Program staff has worked for years with staff of the Corps, Georgia Department of Transportation, stakeholder groups, the City of Tybee and those with a vested interest in the project and especially the disposition of dredged material from the project, and the public. Program staff appreciates the access to Corps staff that has been afforded throughout the project development process.

The documents describe six harbor deepening plans. Alternative A is a No Action Alternative that maintains the current harbor depth at –42 feet mean low water. Alternative B dredges to –44 feet mean low water. Alternative C dredges to –45 feet mean low water. Alternative D dredges to –46 feet mean low water. Alternative E dredges to –47 feet mean low water and is the National Economic Development (NED) plan. Alternative F dredges to –48 feet mean low water and is the recommended plan of the non-federal sponsor of the project, the Georgia Department of Transportation (GaDOT). In addition to the dredging plan alternatives, the documents also describe, in varying levels of detail, dredged material disposal alternatives, positive and adverse impacts of the project, and the mitigation of adverse impacts.

In general, the proposal to deepen the Savannah Harbor by dredging to any of its alternative depths, as described above, is consistent with the enforceable policies of the Georgia Coastal Management Program. The Georgia Coastal Management Program especially supports dredging

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the project to –48 feet mean low water, the recommended plan of the non-federal sponsor of the project, GaDOT. However, the disposition of dredge materials is not described with sufficient detail, clarity, or finality for a determination to be made at this time that the dredged material placement portion of the project is consistent with the enforceable policies of the Georgia Coastal Management Program. Also, Georgia DNR's Environmental Protection Division and Wildlife Resource Division are submitting comments that will likely affect the GCMP's final federal consistency determination letter.

A particular concern at this time is that the described project would place **new work dredge material** in nearshore areas that could have adverse affects to the City of Tybee Island's economic and environmental interests. The City has determined that new work dredge material proposed for placement is unsuitable for placement in state waters. The State supports Tybee's position and finds that placement of dredge material at locations in state waters that would be adverse to the quality of the Tybee nearshore environment and/or its beach nourishment borrow site is not acceptable.

Further, placement of **new work dredge material** in federal waters outside of the Environmental Protection Agency (EPA) Approved Ocean Dredge Material Disposal Site (ODMDS) is likely to cause long-term adverse impacts to marine habitat, commercial and recreational offshore fishing, and cultural resources. Enhanced fish habitat benefits will be short lived from placement at sites outside of the ODMDS. Prevailing currents will quickly dissipate the materials. The State's experience with placing concrete rubble on offshore artificial reefs, as proposed, has been that the rubble quickly settles into the sea floor without retaining the mounded sand beneath. Also, two unmarked structures exist in close proximity to proposed dredge disposal Site #11 and Site #12 (a plane and a vessel) that are currently targeted by anglers and could be negatively impacted by shifting dredge materials. Therefore, disposal at Sites #11 and #12 should not occur. It is unknown if other hard bottom habitats exist nearby which could also be negatively impacted by placement of dredge materials.

New work material from the Outer Channel Extension (Station -57+000B to Station -98+600B, estimated volume = 4,652,033 cubic yards), located in Federal water but not proposed for beach replenishment, is expected to meet City of Tybee suitability criteria for nearshore placement (≤ 10% fines and minimal marine clays). Nearshore placement and beneficial use of these materials would allow the Corps to accomplish several objectives stated in the DEIS:

a. Offset deflation of the Tybee shelf and beach caused by historic construction and maintenance of the Harbor;
b. Meet environmental management and restoration measures set out in the Long Term Maintenance Strategy (LTMP) and Dredge Material Management Plan (DMMP)
c. Mitigate environmental consequences; and
d. Improve sustainability of the navigation project and the shore protection project.

The project GRR indicates that all future **maintenance dredging** will be performed by hopper dredge and in all probability taken to the ODMDS. Maintenance material excavated by hopper dredge having overflow capability that separates fine grained fractions could be highly suitable for both nearshore and potentially onshore placement on Tybee Island. The proposal notes that some 325,000 cubic yards of sediment excavated annually between Stations -30+000B and -

40+000B could be recovered and placed in a beneficial manner by a hopper dredge with pump-out capability. The City of Tybee Island has determined that this is acceptable and the State supports that determination and disposal alternative. Further, the possibility of beneficially using material from the Jones/Oysterbed area should be explored.

Based on the above, the project's compliance with the River and Harbor Development Act needs to be redressed. We believe that Outer Channel Extension new work dredged material, and Operation and Maintenance materials from Station –30+000B to –40+000B and Jones/Oysterbed (Station +28+000 to 0+000) are suitable for beach replenishment. To determine the feasibility of using these materials for beach replenishment, the costs or savings to the project, irregardless of how those costs might be met, must be identified and provided to the State.

The Program looks forward to working with the Corps to resolve these matters discussed above and is committed to doing so as quickly as possible. Please feel free to contact Kelie Moore at 912-262-2334 or me at 912-262-3130 if you have questions, need of additional information, or if we can be of additional assistance.

Sincerely,

B. Gane

Brad Gane, Chief
Ecological Services Section

cc: Mayor Jason Buelterman, City of Tybee Island
Allen Barnes, Ga DNR EPD
Dan Forster, Ga DNR WRD

Georgia Department of Natural Resources, Coastal Resource Division

Page 1

762-BB-09-EV01, 762-BB-09-EV02, 762-BB-09-EV03

Comment: *In general, the proposal to deepen the Savannah Harbor by dredging to any of its alternative depths, as described above, is consistent with the enforceable policies of the Georgia Coastal Management Program. The Georgia Coastal Management Program especially supports dredging the project to –48 feet mean low water, the recommended plan of the non-federal sponsor of the project, GaDOT. However, the disposition of dredge materials is not described with sufficient detail, clarity, or finality for a determination to be made at this time that the dredged material placement portion of the project is consistent with the enforceable policies of the Georgia Coastal Management Program. Also, Georgia DNR's Environmental Protection Division and Wildlife Resource Division are submitting comments that will likely affect the GCMP's final federal consistency determination letter.*

Response: Concur. The Corps is pleased that GA DNR-CRD agrees (in general) that the proposed action is consistent with the Georgia Coastal Management Program.

The Corps acknowledges GA-DNR CRD's support of the 48-foot depth alternative, the alternative recommended by the non-Federal sponsor.

After receipt of this letter and others during the public comment period, and subsequent coordination with GA DNR-CRD and the City of Tybee Island, Georgia, the District has revised the dredged material placement plan for sediments excavated from the entrance channel. The final reports show that new work materials from the entrance channel would be deposited in previously-approved areas: either in the Offshore Dredged Material Disposal Site or an upland confined disposal site.

Page 2

762-BB-09-EV04

Comment: *A particular concern at this time is that the described project would place new work dredge material in nearshore areas that could have adverse affects to the City of Tybee Island's economic and environmental interests. The City has determined that new work dredge material proposed for placement is unsuitable for placement in state waters. The State supports Tybee's position and finds that placement of dredge material at locations in state waters that would be adverse to the quality of the Tybee nearshore environment and/or its beach nourishment borrow site is not acceptable.*

Response: The Corps acknowledges the position of both the City of Tybee Island and GA DNR-CRD. Based on input from both parties, the placement plan has been revised in the Final EIS. All new work will be placed in previously-approved areas: either in the Offshore Dredged Material Disposal Site or an upland confined disposal site.

762-BB-09-EV05

Comment: *Further, placement of new work dredge material in federal waters outside of the Environmental Protection Agency (EPA) Approved Ocean Dredge Material Disposal Site (ODMDS) is likely to cause long-term adverse impacts to marine habitat, commercial and recreational offshore fishing, and cultural resources. Enhanced fish habitat benefits will be short lived from placement at sites outside of the ODMDS. Prevailing currents will quickly dissipate the materials. The State's experience with placing concrete rubble on offshore artificial reefs, as proposed, has been that the rubble quickly settles into the*

sea floor without retaining the mounded sand beneath. Also, two unmarked structures exist in close proximity to proposed dredge disposal Site #11 and Site #12 (a plane and a vessel) that are currently targeted by anglers and could be negatively impacted by shifting dredge materials. Therefore, disposal at Sites #11 and #12 should not occur. It is unknown if other hard bottom habitats exist nearby which could also be negatively impacted by placement of dredge materials.

Response: After receipt of this letter and others during the public comment period, and subsequent coordination with GA DNR-CRD and EPA, the dredged material placement plan has been revised and Sites 11 and 12 have been removed from the proposed project. The Final EIS shows the revised sediment placement plan.

762-BB-09-EV06

Comment: *New work material from the Outer Channel Extension (Station -57+000B to Station -98+600B, estimated volume = 4,652,033 cubic yards), located in Federal water but not proposed for beach replenishment, is expected to meet City of Tybee suitability criteria for nearshore placement (≤ 10% fines and minimal marine clays). Nearshore placement and beneficial use of these materials would allow the Corps to accomplish several objectives stated in the DEIS:*

Response: After receipt of this letter and others during the public comment period, and subsequent coordination with GA DNR-CRD and the City of Tybee Island, Georgia, the dredged material placement plan has been revised and placement of all sediments excavated from the entrance channel will be deposited in previously-approved areas: either in the Offshore Dredged Material Disposal Site or an upland confined disposal site. The new work material from Stations -57+000B to -98+600B had been proposed for beneficial use at Sites 11 and 12, but GA DNR-CRD, EPA, NOAA-Fisheries, and the City of Tybee Island indicated they did not concur with the proposed action. As such, sediments from those reaches would be placed in the ODMDS.

Since Sites 11 and 12 will no longer be used, the Base Plan (the plan that is most cost efficient and environmentally acceptable) for disposal of new work material from the entrance channel extension is to place those sediments into the ODMDS. Placing these sediments in the nearshore sites (Site MLW 200, Site MLW 500, ERDC Nearshore, Site 2, Site 2 Extension) as requested would exceed the costs of the Base Plan and thus require a separate cost-sharing sponsor.

762-BB-09-EV07, 762-BB-09-EV08

Comment: *The project GRR indicates that all future maintenance dredging will be performed by hopper dredge and in all probability taken to the ODMDS. Maintenance material excavated by hopper dredge having overflow capability that separates fine grained fractions could be highly suitable for both nearshore and potentially onshore placement on Tybee Island. The proposal notes that some 325,000 cubic yards of sediment excavated annually between Stations -30+000B and -40+000B could be recovered and placed in a beneficial manner by a hopper dredge with pump-out capability. The City of Tybee Island has determined that this is acceptable and the State supports that determination and disposal alternative. Further, the possibility of beneficially using material from the Jones/Oysterbed area should be explored.*

Response: In regards to maintenance of the completed project, the Base Plan for disposal of material from Stations 0+000 to 28+000 will be to place the material into the Jones Island/Oysterbed Island CDF. As provided for in the LTMS, the Base Plan for maintenance of the entrance channel will be to place the material into the ODMDS or Sites 2 and 3 adjacent to the entrance channel. However, as also provided

for in the LTMS, suitable maintenance material from Stations 0+000 to 28+000 or the entrance channel could be placed into the nearshore off Tybee Island (Sites MLW 200, MLW 500, ERDC Nearshore, Site 2, Site 2 Extension) or directly on Tybee Beach. The EPA has informed the District that any dredged material disposal site beyond the 3-mile line is considered an ocean dredged material disposal site which must be studied and approved pursuant to Section 103 of the MPRSA. Consequently, there are no plans to use Sites 4, 5, and 6 at this time. Sites 11 and 12 have been removed from consideration in view of the commenter's opposition.

The incremental cost of depositing these O&M sediments into the nearshore sites (MLW 200, MLW 500, ERDC Nearshore, Site 2, Site 2 Extension) or depositing this material directly on the beach is too great when compared to the benefit that would occur to warrant the additional Federal expenditure. Placing these sediments in the nearshore as requested would exceed the costs of the Base Plan and thus require a separate cost-sharing sponsor.

762-BB-09-EN01

Comment: *Based on the above, the project's compliance with the River and Harbor Development Act needs to be redressed. We believe that Outer Channel Extension new work dredged material, and Operation and Maintenance materials from Station –30+000B to –40+000B and Jones/Oysterbed (Station +28+000 to 0+000) are suitable for beach replenishment. To determine the feasibility of using these materials for beach replenishment, the costs or savings to the project, irregardless of how those costs might be met, must be identified and provided to the State.*

Response: The District provided this and other related information to the Coastal Resources Division in May 2011. The table we provided showed the expected additional incremental dredging/deposition costs for depositing new work sediments from the outer end of the entrance channel in the nearshore area, rather than in the ODMDS as planned, is expected to be $9 per CY. Additional costs would also be likely such as those necessary to obtain the environmental clearances for such placement if the Corps does not already have them, additional costs for engineering work (before and after surveys), mobilization and demobilization costs, and additional contract administration costs.

The use of maintenance material from Stations +28+000 to 0+000 and Stations -30+000B to -40+000B for beach replenishment was addressed in a previous response. The District's Operation and Maintenance dredged material disposal plans comply with NOAA, EPA and Corps policy and regulations. Consequently, the District does not believe these plans conflict with the provisions of the Georgia River and Harbor Development Act.

GEORGIA
DEPARTMENT OF NATURAL RESOURCES
WILDLIFE RESOURCES DIVISION

MARK WILLIAMS
COMMISSIONER

DAN FORSTER
DIRECTOR

January 24, 2011

Mr. William Bailey
US Army Corps of Engineers
Savannah District
100 West Oglethorpe Avenue
Savannah, Georgia 31401-3640

Subject: Comments on draft Tier II Environmental Impact Statement (EIS) and General Reevaluation Report (GRR) for Savannah Harbor Expansion Project

Dear Mr. Bailey:

Thank you for the opportunity to review and provide comment on the Draft Tier II Environmental Impact Statement (EIS) and General Reevaluation Report for the Savannah Harbor Expansion Project. The Georgia Department of Natural Resources, Wildlife Resources Division (WRD) has worked closely with you and your colleges at the Corps of Engineers and other cooperating agencies on this project for many years. We appreciate the level of cooperation, inclusion and data sharing that has occurred between our respective agencies through the 12-plus years we have been working together on this project. Through this process, our involvement has been primarily focused on the assessment of potential impacts on fishery resources, including the important Savannah River striped bass fishery. This once thriving population nearly collapsed in the late 1980's due to changes in bathymetry and increased salinity levels in important spawning grounds in the Savannah Estuary. WRD has made a long term commitment to the recovery of the Savannah River striped bass population and has made tremendous strides toward recovering this fishery. Recent signs of population recovery include increased numbers of adult striped bass and a measurable amount of natural recruitment. After nearly 17 years of a striped bass harvest moratorium, this popular sport fishery was successfully re-opened to limited harvest in October 2005. We continue our commitment to the striped bass fishery through annual population monitoring and stocking.

The EIS identifies the predicted impacts at alternative project depths from 44 to 48 feet and predicts the effectiveness of mitigation features at each depth. The National Economic Development Plan of 47' channel depth alternative and the maximum authorized depth alternative of 48' predict the loss of 26.9% and 27.8% of the remaining critical striped bass habitat in the Savannah River estuary respectively. This loss is after all flow altering and dissolved oxygen mitigation features of plan 6a are in place. This reduction in critical striped bass habitat warrants further mitigation. Permanent loss of this critical habitat will likely preclude the restoration of a naturally self-sustaining population in the Savannah River and require annual stocking of 6 to 8 inch striped bass. The striped bass compensatory mitigation, as

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outlined in the Draft EIS, should be provided to Georgia DNR WRD prior to inner harbor dredging associated with the deepening project. Should post monitoring efforts show that more habitat was lost than predicted, then we would ask that the loss be calculated and mitigated using the same methodologies that were used to determine the initial 27.8% loss.

Impacts to shortnose sturgeon remain after mitigation features are included. To compensate for this loss, a fish passage structure at the New Savannah Bluff Lock and Dam (NSBLD) and an earthen sill at the junction of Middle and Front River are proposed. The fish passage structure is intended to allow shortnose sturgeon to access historical spawning grounds above NSBLD. Although funds for monitoring the fish passage site have been allocated, no passage standards for shortnose sturgeon have been identified. A shortnose sturgeon passage standard would help to define success of the passage facility as well as guide any adaptive management measures implemented. The second part of mitigation proposed for shortnose sturgeon is the construction of an earthen sill at the junction of Middle and Front Rivers. Further clarification is needed as to the predicted effects of this proposed mitigation feature on additional saltwater intrusion up the Front River and sedimentation in the Middle River.

Thank you for the opportunity to provide additional input and review in this important process. If you need additional information or have further questions, please contact Tim Barrett (912-727-2112) at our Richmond Hill office. We look forward to continuing our work together on this project.

Sincerely,

Dan Forster

DF/tab

Georgia Department of Natural Resources, Wildlife Resources Division

Page 1

764-BB-05-EV01, 764-BB-05-EV02, 764-BB-05-EV03

Comment: *The EIS identifies the predicted impacts at alternative project depths from 44 to 48 feet and predicts the effectiveness of mitigation features at each depth. The National Economic Development Plan of 47' channel depth alternative and the maximum authorized depth alternative of 48' predict the loss of 26.9% and 27.8% of the remaining critical striped bass habitat in the Savannah River estuary respectively. This loss is after all flow altering and dissolved oxygen mitigation features of plan 6a are in place. This reduction in critical striped bass habitat warrants further mitigation. Permanent loss of this critical habitat will likely preclude the restoration of a naturally self-sustaining population in the Savannah River and require annual stocking of 6 to 8 inch striped bass. The striped bass compensatory mitigation, as outlined in the Draft EIS, should be provided to Georgia DNR WRD prior to inner harbor dredging associated with the deepening project. Should post monitoring efforts show that more habitat was lost than predicted, then we would ask that the loss be calculated and mitigated using the same methodologies that were used to determine the initial 27.8% loss.*

Response: The mitigation plan includes funding for additional stocking of Striped bass fingerlings to compensate for the loss in population expected to occur as a result of the reduced spawning, egg, and larval Striped bass habitats. The schedule has been revised to provide for funding to be made available to the GA DNR earlier in the construction phase of the project. The Monitoring and Adaptive Management Plan (Appendix D) provides for a study to be conducted during Years 2, 4, and 9 of the Post-Construction Monitoring to assess project impacts on Striped bass habitat.

If monitoring efforts show that more striped bass habitat is lost than predicted, the Corps would coordinate with GA DNR-Wildlife Resources Division to determine an appropriate method to mitigate for the additional loss. Adaptive management funds could be used for that purpose.

Page 2

764-BB-05-EV04, 764-BB-05-EV05

Comment: *Impacts to shortnose sturgeon remain after mitigation features are included. To compensate for this loss, a fish passage structure at the New Savannah Bluff Lock and Dam (NSBLD) and an earthen sill at the junction of Middle and Front River are proposed. The fish passage structure is intended to allow shortnose sturgeon to access historical spawning grounds above NSBLD. Although funds for monitoring the fish passage site have been allocated, no passage standards for shortnose sturgeon have been identified. A shortnose sturgeon passage standard would help to define success of the passage facility as well as guide any adaptive management measures implemented. The second part of mitigation proposed for shortnose sturgeon is the construction of an earthen sill at the junction of Middle and Front Rivers. Further clarification is needed as to the predicted effects of this proposed mitigation feature on additional saltwater intrusion up the Front River and sedimentation in the Middle River.*

Response: The goal of the fish passage structure (Off-channel Rock ramp) at NSBLD is to achieve at least 75 percent upstream passage effectiveness for both Shortnose sturgeon and Atlantic sturgeon, at least 85 percent downstream passage effectiveness, and cause no serious injury to sturgeon that come into contact with the passage or dam structures. These objectives are included in the Biological Opinion (BO) prepared by the NMFS. The Corps would monitor the passage of Shortnose sturgeon through the structure to ensure it performs as intended (EIS-Appendix D). The Corps would coordinate with the Cooperating Agencies prior to construction to develop a detailed post-construction monitoring plan for Shortnose sturgeon passage at the New Savannah Bluff Lock and Dam.

The Middle River sill would have produced minimal beneficial effects on SNS habitat in the estuary. Because of its low cost effectiveness, that feature has been removed from the project. The project proposed in the FEIS does not include a sill in Middle River.

Georgia Department of Natural Resources
2 Martin Luther King, Jr. Drive, S.E., Suite 1152 East Tower, Atlanta, Georgia 30334-9000
Mark Williams, Commissioner
F. Allen Barnes, Director
Environmental Protection Division
404/656-4713

February 16, 2011

Colonel Jeffrey M. Hall
U.S. Army Corps of Engineers
Savannah District
PO Box 889
Savannah, Georgia 31402-0889

Re: Water Quality Certification
November 15, 2010 Joint Public Notice
Navigation Channel Improvements
Savannah River Harbor
Deepening and Maintenance Activities
Savannah River Basin
Chatham County

Dear Colonel Hall:

Pursuant to Section 401 of the Federal Clean Water Act, the State of Georgia issues this certification to the U.S. Army Corps of Engineers (USACE), Savannah District, an applicant for a federal permit or license to conduct an activity in, on or adjacent to the waters of the State of Georgia.

The State of Georgia certifies that there is no applicable provision of Section 301; no limitation under Section 302; no standard under Section 306; and no standard under Section 307, for the applicant's activity. The State of Georgia certifies that the applicant's activity will comply with all applicable provisions of Section 303, contingent upon the following conditions:

1. All work performed during construction will be done in a manner so as not to violate applicable water quality standards.

2. No oils, grease, materials or other pollutants will be discharged from the construction activities that reach public waters.

3. Savannah's Industrial and Domestic Drinking Water Treatment Facility

With respect to the City of Savannah's Industrial and Domestic (I&D) drinking water facility, elevated chlorides are a treatment cost and public health concern. The public health concern is related to the uncertainty of how increased chloride levels will impact the lead and copper concentrations in the water provided to the customers of the Savannah I&D system and the purchase water systems. The industrial concerns relate to potential negative impacts on industrial processes.

The City withdraws water from Abercorn Creek, a tributary of the Savannah River located upstream of the Savannah Harbor Expansion Project (SHEP). The Chloride Modeling for the SHEP (document dated December 15, 2010) predicts elevated chloride levels at the Savannah I&D drinking water intake. The USACE is continuing to evaluate the science, modeling and impacts regarding this issue and as part of that evaluation, the USACE is working with the City of Savannah and key industries supplied by the City of Savannah's I&D drinking water system to determine the effects of potential elevated chlorides. Those additional analyses will be completed and included in the Final Environmental Impact Statement (EIS).

The Georgia Environmental Protection Division (Georgia EPD) will evaluate the results of the aforementioned studies. Once the pending studies have been completed as discussed above, the USACE will include, within the Final EIS, the chloride information, impacts, and its determination based on the studies regarding any mitigation remedy selected. The schedule for completion of the selected mitigation will be in conjunction with the start of the SHEP and will be dependent on the aforementioned study results. Mitigation will be based on the Savannah I&D treatment plant design capacity of 62.5 MGD. Any proposed adjustments in the water treatment process to mitigate the increased chloride concentrations must address simultaneous compliance with all drinking water regulations. In addition, after consultation and agreement with the Georgia EPD, the schedule, sampling locations and parameters for the selected mitigation's monitoring program (to include the case where mitigation may not be required) will be specified in the Final EIS. Pursuant to Special Condition 14, the issues associated with increased chlorides at the Abercorn Creek drinking water intake will be carefully reviewed on an ongoing basis throughout the life of the project.

4. Chloride Migration into the Floridan Aquifer

The Floridan Aquifer Analysis is based on the initial Study Report of September 2003 and the Supplemental Study of September 2005. The aquifer is the main water supply throughout most of South Georgia.

Monitoring and Reporting. To insure early detection of chloride migration, the USACE shall establish monitoring stations at appropriate locations throughout the project to monitor salinity seepage through the Miocene sediments. Annual chloride monitoring reports shall be provided to the Georgia EPD by January 31st of each year following initiation of dredging.

Monitoring Along Groundwater Flow Paths (Sentry Wells). Monitoring of chloride in the Upper Floridan aquifer must be conducted along critical groundwater flow paths where chloride migrating downward through the confining unit beneath the Savannah River could move toward Savannah area production wells. Sentry wells along critical groundwater flow paths must be installed at two depths:

- Near the top of the aquifer to monitor downward migration of chloride through the confining unit; and
- Deeper in the aquifer to monitor how horizontal flow of fresh water within the aquifer mixes with and dilutes the chloride.

Sentry wells must be located west of the locations of exploratory borings SHE-11 and SHE-13, and on Cockspur Island near Fort Pulaski. Existing wells can be used as sentry wells if the existing wells were constructed to allow monitoring near the top of the aquifer and deeper in the aquifer. The Georgia EPD must approve locations and depths of sentry wells.

Upgradient Background Wells. Monitoring wells must be installed upgradient of critical groundwater flow paths to provide information on background chloride concentrations associated with groundwater withdrawals in the Savannah area independent of SHEP dredging activities. Background wells must be installed near the top of the aquifer and deeper in the aquifer. The Georgia EPD must approve locations and depths of background wells.

Establish Background Concentrations. Background chloride concentrations at sentry and background wells must be established. At least four background samples must be collected from each sentry and background well and statistical methods must be used to establish background chloride concentrations at each

sentry and background well. The Georgia EPD must approve the collection of background samples and the statistical methods used to establish background chloride concentrations. Background sampling must be conducted before any SHEP dredging activities are started.

Annual Monitoring. Monitoring of sentry and background wells must occur annually for the life of the project, which may be 50 years. Groundwater samples collected for monitoring must be analyzed for chloride. Samples may be analyzed for specific conductance if chloride is also analyzed. At no time during the monitoring will analyses for specific conductance be substituted for analyses of chloride.

In the annual monitoring reports, differences in the long-term trends of chloride concentrations in the sentry and background wells must be used to evaluate impacts of SHEP dredging activities from impacts of groundwater withdrawals on chloride concentrations in the Upper Floridan aquifer. SHEP dredging activities include the initial dredging and maintenance dredging over the 50-year project period. The Georgia EPD must approve the methods used to evaluate impacts of SHEP dredging activities.

Benchmark Concentrations and Analysis. A benchmark chloride concentration must be established for each sentry well. The USACE must also determine what chloride concentrations caused by SHEP dredging activities would result in a measurable increase in chloride concentrations at Savannah area production wells. The benchmark chloride concentrations must be protective of the Savannah area production wells. Savannah area production wells include industrial, commercial, municipal, agricultural, and other un-permitted wells. Benchmark concentrations must be established for each pair of sentry wells and for sentry wells near the top of the Upper Floridan aquifer and deeper in the aquifer. The Georgia EPD must approve each benchmark concentration.

If benchmark concentrations are exceeded at any sentry well, and it has been determined that the exceedence is due to SHEP dredging activities, all sentry wells must immediately be resampled for chloride. If exceedence of a benchmark concentration is confirmed at any sentry well, additional evaluation of wells must be conducted to determine if any new monitoring wells are warranted. The Georgia EPD must approve locations and depths of additional monitoring wells.

Remediation Plan and Implementation. If it is determined that the chloride entering the Upper Floridan aquifer through the confining unit beneath the Savannah River could affect Savannah area production wells the USACE shall develop a remediation and implementation plan. The plan must account for adaptive management measures specific to accelerated chloride intrusion into the aquifer.

Mitigation must be implemented if sampling of additional monitoring wells indicates that Savannah area production wells may be affected by downward migration of chloride through the confining unit as a result of SHEP dredging activities. The Georgia EPD must approve mitigation activities. Pursuant to Special Condition 14, these migration issues will be carefully reviewed on an ongoing basis throughout the life of the project.

5. Cadmium Monitoring

Cadmium is present throughout the sediments in the Savannah River Harbor. Therefore, the USACE shall conduct the following monitoring:

(a) During the Savannah River Harbor deepening activities (project depth + advance dredging + overdepth) cadmium concentrations shall be monitored weekly at the point of discharge from those Confined Disposal Facilities (CDF) receiving sediments from the four known reaches within the harbor having elevated cadmium concentration in the sediments. US EPA laboratory testing methodology must have a detection limit of at least 0.7 micrograms per liter (ug/l). Monitoring shall continue at these CDF discharge points as long as discharge is present and until all dredged sediments have been dewatered, stabilized and capped as per the Final EIS. Data shall be reported to the Georgia EPD quarterly in micrograms per liter (ug/l) within 30 days of the end of each calendar quarter.

(b) Following the installation of a stable clean cap within the CDFs that receive cadmium bearing sediments, cadmium shall be monitored weekly at the point of discharge for a period of one year. Data shall be reported to the Georgia EPD quarterly in ug/l within 30 days of the end of each calendar quarter.

(c) For maintenance dredging in known reaches of high cadmium concentration identified in the Final EIS, accumulated sediments to be dredged within 45 days shall be sampled for cadmium from two locations

within that reach that are representative of average sediment accumulation for that reach. This protocol shall remain in effect through two complete maintenance dredging cycles for each reach identified in the Final EIS at which time the Georgia EPD will review all data and determine if additional monitoring shall be required for future maintenance dredging.

Reporting: (1) Analysis of cadmium in the sediments shall be reported as mg cadmium / kilogram sediment (mg/kg). (2) Sampling results shall be provided to Georgia EPD prior to initiation of dredging within the reach to be dredged over the next 45 days.

6. Water Quality Monitoring of Dewatering Discharge from the Confined Disposal Facility

Dewatering discharge from all CDFs shall be monitored by USACE and reported to the Georgia EPD monthly and due within 30 days following the end of each reporting period. Monitoring reports shall include the location of the discharge point, dates of discharge, total suspended solids, dissolved oxygen, pH, temperature, salinity, turbidity and conductivity. The USACE will monitor weekly when there is a discharge and provide monthly reports to the Georgia EPD within 30 days of the end of each reporting period.

7. Striped Bass Recovery

(a) No dredging should be conducted upstream of Sta. 63 during the striped bass spawning period from April 1 to May 15 of each year. A variance to this condition may be granted by the Georgia EPD 1) where navigational safety is compromised and it can be demonstrated that the channel or other navigational water had been at project depth within 90 days prior to the commencement of dredging closure on April 1, or 2) if salinity conditions at a proposed dredging location are lethal to striped bass larvae.

(b) Water quality and hydrodynamic models of the proposed deepening of the inner Savannah River Harbor to –48 feet Mean Low Water (MLW) demonstrate striped bass life stages habitat may be adversely impacted. The USACE shall mitigate for this impact through compensatory mitigation to the Georgia Department of Natural Resources (Georgia DNR) Fisheries Section for continuation of the existing striped bass management/stocking program in the Savannah River.

8. Sea Turtles

(a) All hopper dredging activities (deepening and maintenance) should be restricted to December 15 through March 31 when sea turtles are least abundant. Hopper dredges must have fully functional inflow and outflow screening and protected species observers. Sea turtle takes must be reported to the Georgia Wildlife Resources Division and the Georgia EPD within 24 hours. Hopper dredging activities should be halted if sea turtle takes exceed the limits specified by NOAA. Bed leveling equipment may not be used unless approved by the Georgia EPD.

(b) Other types of dredging (non-hopper) activities should be restricted to the following windows based on the location of the placement of fill material: Deepening activities involving the placement of dredge material at any near shore site within 1,000 feet of MLW is restricted to September 1 through March 31. Deepening activities involving the placement of dredge material at any near shore site beyond 1,000 feet of MLW may occur year-round. Operation and maintenance activity involving the placement of dredge material at any near shore site within 1,000 feet of MLW is restricted to November 1 through March 31. Operation and maintenance activity involving the placement of dredge material at any near shore site beyond 1,000 feet of MLW is restricted to September 1 through March 31.

9. Dissolved Oxygen Water Quality Criteria

The Georgia Rules and Regulations for Water Quality Control establishes the Dissolved Oxygen criteria for the section of the Savannah River with a designated use of "Coastal Fishing", which includes the Savannah River Harbor.

The USACE must install continuous water quality monitoring equipment on the Front River, Middle River, and Back River at Houlihan Bridge, and the Savannah River at I-95. This equipment will collect water temperature, conductivity, pH, dissolved oxygen, and water depth data every fifteen minutes and the data will be made available on the web. The monitoring equipment is to be installed before the flow altering mitigation and Savannah River Harbor deepening begins and continue until the post-construction monitoring is complete and the dissolved oxygen mitigation is working and effective.

The oxygen injection systems on Hutchinson Island shall be installed and operational prior to commencement of channel deepening in the inner harbor

(inside the harbor entrance, Sta. 0+000). The oxygen injection system near Georgia Pacific shall be operational within one year of commencement of channel deepening in the inner harbor. The monitoring data will be used to evaluate the effectiveness of the oxygen mitigation. Pursuant to Special Condition 14, these oxygen mitigation issues will be carefully reviewed on an ongoing basis throughout the life of the project.

In addition, the USACE must secure approval from the Georgia EPD for a plan for monitoring dissolved oxygen in the proximity of all maintenance dredging operations in the Savannah River Harbor.

Dredging operations must maintain a daily average of 5.0 mg/L and an instantaneous average of 4.0 mg/L throughout the water column during those times of year when the natural condition in the waterbody has a dissolved oxygen level above these values. If it is determined that the natural condition in the waterbody is less than these values, the criteria will revert to the "natural condition" and the water quality standard will allow for a 0.1 mg/L deficit from the "natural" dissolved oxygen value. Up to a 10% deficit will be allowed if it is demonstrated that resident aquatic species shall not be adversely affected. Since the available dissolved oxygen deficit has already been allocated, the USACE will only be able to conduct maintenance dredging when the dissolved oxygen, one meter from the bottom, is 3.0 mg/L or greater and the maintenance dredging does not affect the dissolved oxygen levels in the Savannah River Harbor. Variances for maintenance dredging when dissolved oxygen levels are less than 3.0 mg/L may be granted if the additional oxygen is effectively injected into the Savannah River Harbor as appropriate.

The USACE shall provide monitoring reports monthly due within 30 days of the end of each reporting period. Reports shall include locations of dredging by river mile station, tidal flow direction, and dissolved oxygen in the downstream tidal flow of the dredge activity.

10. Maintenance Dredging Schedules

The USACE shall provide the Georgia EPD with an annual schedule by January 1 of each year for expected maintenance dredging that provides dredge locations, times, sediment amounts and placement locations with the consideration of 401 conditions, federal funding and other applicable planning issues.

11. Restoration of Confined Disposal Facility 1S

Restoration of CDF 1S is proposed to offset unavoidable direct impacts to approximately 15.68 acres of salt/brackish marsh habitat. Up to approximately 42 acres of salt marsh will be restored at this site. Restoration of this mitigation element must comply with the USEPA and USACE Final Rule for Compensatory Mitigation for Loses of Aquatic Resources of April 10, 2008 and the Savannah District USACE, Regulatory Division Mitigation SOP.

12. Buffer Variances

Various elements of the project are going to require the USACE to be granted buffer variances from the State of Georgia. Because the USACE's Draft EIS and Draft General Re-evaluation Report (GRR) do not provide the level of design necessary for variance application submittal, as various elements move toward design and construction the USACE shall submit a buffer application to the Georgia EPD. Such elements may include, but are not limited to, shore bank stationing of oxygen injection systems, a recreational boat launch, various elements of the marsh mitigation proposal, cut closures, bank stabilization, etc. Completed applications shall be submitted 90 days prior to such land disturbing activities. In accordance with the Georgia DNR's Rules for Erosion and Sedimentation Control, once the Georgia EPD has proposed issuance of a stream buffer variance, the USACE must publish a public notice to provide a 30-day public comment period.

13. Fish Passage at the New Savannah Bluff Lock and Dam

Adequate fish passage shall be established at the New Savannah Bluff Lock and Dam to provide unencumbered movement upstream of shortnose sturgeon. Georgia EPD shall review and concur with final design prior to construction.

14. Reopener for Section 401 Certification

The project shall be periodically reviewed by the Georgia EPD and the USACE to consider new dredging technologies, shoaling rates, environmental conditions, laws, regulations, any modifications to the Draft EIS and Draft GRR, additional harbors located on the Savannah River, and any other changes to the construction, maintenance and operation of the Savannah River Harbor for the life of the project as it may effect this Section 401 Certification. It is expected that

these reviews would generally be performed every 5 years. The 401 certification will be modified as appropriate.

15. Annual meeting

This is a complex project using an adaptive management approach with potential long-term impacts. EPD and USACE will meet annually to review the status of these Water Quality Certification conditions.

This certification does not relieve the applicant of any obligation or responsibility for complying with the provisions of any other laws or regulations of other federal, state or local authorities.

It is your responsibility to submit this certification to the appropriate federal agency.

Sincerely,

F. Allen Barnes
Director

FAB:kp

cc: William Bailey, USACE
Hope Moorer, GPA
David Baize, SCDHEC
Ken Rentiers, SCDNR
Spud Woodward, CRD
John Biagi, WRD

NOTE: Due to the large volume of material, additional correspondence after March 2011 with the State of South Carolina concerning Section 401 water quality certification and coastal zone consistency can be found in Appendix N, Record of Interagency Coordination.

#17

D H E C
PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

Bureau of Water
2600 Bull St
Columbia SC 29201

Water Quality Certification

Applicant: US Army Corps of Engineers, Savannah District P/N: 2010 SHEP

Pursuant to R.101.C., Water Quality Certification, the SC Department of Health and Environmental Control (Department) will not consider your application complete for processing until you publish notice of the application in a newspaper and submit the required fee. In addition, the names and addresses of all adjacent property are required before your application is considered complete. Please be advised that other information may be required in order for the Department to determine if the application is deemed complete for processing. Details of the additional requirements follow:

1. **Public Notice**: Pursuant to R. 61-101, Water Quality Certification, a notice in the newspaper must contain information explaining the location, nature and extent of the proposed activity. The notice must indicate a fifteen (15) day comment period and be published in a newspaper of local or general circulation in the county where the activity is proposed to take place for one day. **You must provide SC DHEC with an affidavit of publication from the newspaper within fifteen (15) days of publication. You must publish the following notice and submit an affidavit of publication before SC DHEC can continue processing your application.**

   PUBLIC NOTICE P/N: 2010 SHEP
   (*Applicant*) has applied to the South Carolina Department of Health and Environmental Control for a Water Quality Certification to (*Brief description of work*) for (*Public/Private*) use in (*Name and Location of Waterbody*). Comments will be received by the South Carolina Department of Health and Environmental Control at 2600 Bull St, Columbia SC 29201-1797, Attn: Chris Beckham, Division of Water Quality until (*Insert Date - 15 days from date of this notice*).

2. **List of Adjacent Property Owners:** The Department requires a list containing the names and addresses of all property owners who own property adjacent to the project area.

3. **Fee**: Pursuant to R. 61-30, Environmental Protection Fees, the SC Department of Health and Environmental Control is authorized to collect application fees for Water Quality Certification. The following fee is now due to the Department of Health and Environmental Control:

   US Army Corps of Engineers, Savannah District
   Joint Public Notice Number: 2010 SHEP
   Issue Date: November 15, 2010
   Total Due: $ 1,000.00

- The Department has 180 days to complete action on an application for 401 Water Quality Certification or the assessed fee must be returned. The180 days includes only those days in which the application is actively being reviewed by the Department; the clock stops when information is requested and the SC Department of Health and Environmental Control is waiting on a response. **Accordingly, the 180 day clock will not start until we have received an affidavit of publication, the list of adjacent property owners, and the appropriate fee.**

- If you have questions regarding this 401 Water Quality Certification public notice requirement, please contact the Project Manager, Chris Beckham, at 803-898-4261 or other available 401 Water Quality Certification staff at 803-898-4300.

401 Water Quality Certification Application Fee

US Army Corps of Engineers, Savannah District
Joint Public Notice Number: 2010 SHEP
Issue Date: November 15, 2010
Total Due: $ 1,000.00

Please return this page with your check (made payable to SC Department of Health and Environmental Control) and your affidavit of publication to:

SC Department of Health and Environmental Control
Bureau of Water
Attn: Chris Beckham, Project Manager
2600 Bull St
Columbia SC 29201-1797

D H E C
PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

Bureau of Water
2600 Bull St
Columbia SC 29201

Public Notice # 2010-SHEP

Public Notice Date: December 30, 2010

DEPARTMENT DECISION
NOTICE OF DEPARTMENT DECISION
WATER QUALITY CERTIFICATION AND
CONSTRUCTION IN NAVIGABLE WATERS PERMIT

The South Carolina Department of Health and Environmental Control (Department), acting on an application for Water Quality Certification pursuant to Section 401 of the Federal Clean Water Act, and Construction in Navigable Waters Permit pursuant to R. 19-450. et. Seq., 1976 SC Code of Laws has reached a proposed decision for the project described below:

US Army Corps of Engineers, Savannah District
Savannah Harbor Expansion Project
Savannah River
Jasper County
P/N 2010 SHEP

Section 401 of the Clean Water Act allows the State a reasonable period of time not to exceed one year to act upon an application for a 401 Water Quality Certification. The Savannah District of the US Army Corps of Engineers (Corps) has notified the Department that the Water Quality Certification for this project must be received by the end of the public comment period in late January 2011. This time period is not adequate to conduct the necessary review to fulfill the regulatory obligations pursuant to Section 401 of the Clean Water Act; Department Regulation 61-101, Water Quality Certification; and Department Regulation 19-450, Permits for Construction in Navigable Waters.

The proposed project includes extensive environmental impacts that must be thoroughly reviewed by the Department. The public notice that was issued by the Corps on November 15, 2010, notes that the project violates water quality standards and the applicant proposes to mitigate for these impacts through a mechanical oxygenation system. The project could also potentially cause direct and indirect impacts to over 1,000 acres of wetlands. These impacts and the extensive mitigation proposal that is included in the draft EIS must also be reviewed by the Department. The Department must also determine if there are feasible alternatives that reduce the adverse consequences on water quality and classified uses. The timeframe imposed by the Corps prevents the Department from reviewing comments from the public and the resource agencies prior to noticing a decision on the project. Coordination with the resource agencies is necessary for the Department to determine if the project has the potential to impact waters containing Federally recognized rare, threatened, or endangered species. Because the Savannah District did not allow adequate time to acquire and consider all of the information necessary to conduct a thorough review of the project, the Department has not been able to determine if the project is consistent with the certification requirements of Section 401 of the Clean Water Act, and does not have a reasonable assurance that the proposed project will be conducted in a manner consistent with the certification

requirements of Section 401 of the Clean Water Act. Accordingly, the Department proposes to deny Water Quality Certification for the proposed project without prejudice.

A copy of the plans submitted by the applicant is available for review in the office of the Division of Water Quality, Bureau of Water.

Additional information about the technical aspects of this application is available from Chris Beckham, the project manager, at 803-898-4261.

The issuance of this Notice of Department Decision represents a final staff decision that may be appealed. Please see the attached page titled "Notice of Appeal Procedure" for details.

Chuck Hightower, Section Manager
Water Quality Certification and
Wetland Program Section

cc: US Army Corps of Engineers,
Charleston District Office
SCDHEC, Region 8 Offices
SCDHEC-OCRM, Charleston Office

Notice of Appeal Procedure
Pursuant to S.C. Code Section 44-1-60

1. This decision of the S.C. Department of Health and Environmental Control (Department) becomes the final agency decision 15 calendar days after notice of the decision has been mailed to the applicant or respondent, unless a written request for final review accompanied by a filing fee in the amount of $100 is filed with the Department by the applicant, permittee, licensee, or affected person.

2. An applicant, permittee, licensee, or affected person who wishes to appeal this decision must file a timely written request for final review with the Clerk of the Board at the following address or by facsimile at 803-898-3393. A filing fee in the amount of $100 made payable to SC DHEC must also be received by the Clerk within the time allowed for filing a request for final review. However, if a request for final review is filed by facsimile, the filing fee may be mailed to the Clerk of the Board if the envelope is postmarked within the time allowed for filing a request for final review.

   Clerk of the Board
   SC DHEC
   2600 Bull Street
   Columbia, SC 29201

3. In order to be timely, a request for final review must be received by the Clerk of the Board within 15 calendar days after notice of the decision has been mailed to the applicant or respondent. If the 15th day occurs on a weekend or State holiday, the request is due to be received by the Clerk of the Board on the next working day. The request for final review must be received by the Clerk of the Board by 5:00 p.m. on the date it is due. A request for final review will be returned to the requestor if the filing fee is not received on time as described above.

4. The request for final review should include the following:
   a. the grounds on which the Department's decision is challenged and the specific changes sought in the decision
   b. a statement of any significant issues or factors the Board should consider in deciding whether to conduct a final review conference
   c. a copy of the Department's decision for which review is requested

5. If a timely request for final review is filed with the Clerk of the Board, the Clerk will provide additional information regarding procedures. If the Board declines in writing to schedule a final review conference, the Department's decision becomes the final agency decision and an applicant, permittee, licensee, or affected person may request a contested case hearing before the Administrative Law Court within 30 calendar days after notice is mailed that the Board declined to hold a final review conference.

The above information is provided as a courtesy; parties are responsible for complying with all applicable legal requirements.

July 1, 2010

DEPARTMENT OF THE ARMY
SAVANNAH DISTRICT, CORPS OF ENGINEERS
100 W. OGLETHORPE AVENUE
SAVANNAH, GEORGIA 31401-3640

REPLY TO
ATTENTION OF:

JAN 10 2011

Executive Office

Mr. Chuck Hightower
Water Quality Certification and Wetland Program Section, Section Manager
South Carolina Department of Health and Environmental Control
Bureau of Water
2600 Bull Street
Columbia, South Carolina 29201-1797

Dear Mr. Hightower:

The purpose of this letter is to address the proposed South Carolina Department of Health and Environmental Control (SC DHEC), Department Decision, Public Notice # 2010-SHEP, Public Notice Date: December 30, 2010.

In this proposed Department Decision, you indicated that SC DHEC proposes to deny, without prejudice, water quality certification for the Savannah Harbor Expansion Project (SHEP). The SC DHEC based its proposed decision on not having an adequate amount of time to acquire and consider all of the information necessary to conduct a thorough review in order to determine that the proposed project will be conducted in a manner consistent with the requirements of Section 401 of the Clean Water Act (CWA).

It appears that the proposed SC DHEC decision is based upon a misunderstanding concerning the pertinent time periods. I believe that SC DHEC may want to withdraw its proposed decision and not waive its obligations under Section 401 of the CWA.

The November 15, 2010 Joint Public Notice (JPN) and the November 26, 2010 publication of the Draft EIS and GRR in the Federal Register (FR) triggered two separate time periods under two different federal statutes. The JPN triggered a CWA time period and the FR notice triggered a National Environmental Policy Act (NEPA) time period.

Pursuant to the White House Council on Environmental Quality (CEQ) federal regulations that implement NEPA (40 C.F.R. § 1506.10(c)), the Corps must provide a minimum 45-day public comment period. Initially, the Corps set the closing date of the NEPA public comment period on January 10, 2011. Upon several requests, including one from SC DHEC, I extended the public comment period and agreed to accept comments until January 25, 2011. The time period established under NEPA is only intended to apply to comments on the Draft GRR and Draft EIS from the public and federal, state, and local agencies. Given the extensive public and resource agency involvement in this project over the past decade, this is a reasonable amount of time for the initial NEPA public comment period.

Under the CWA, SC DHEC has a reasonable period of time (which shall not exceed one year) to act on the Corps' request for water quality certification. The closing of the NEPA public comment period does not change the fact that SC DHEC has a reasonable period of time under the CWA to act on the Corps' request for water quality certification.

The Corps' request for Section 401 water quality certification under the CWA began on November 15, 2010, which was the date of the JPN. Please tell me what you consider to be a reasonable period of time for SC DHEC action, and when SC DHEC anticipates rendering a final determination on the Corps' water quality certification request.

We appreciate and look forward to our continued collaboration on this project with you, other federal and state resource agencies, and the public. If you have any questions, please let me know.

Sincerely,

Jeffrey M. Hall
Colonel, US Army
Commanding

CF:
Mr. Henry McMaster, Attorney General, State of South Carolina
Mr. Earl Hunter, Commissioner, SC Department of Health and Environmental Control
Clerk of the Board, SC Department of Health and Environmental Control

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January 13, 2011

Jeffrey M. Hall, Colonel, US Army, Commanding
US Army Corps of Engineers, Savannah District
100 West Oglethorpe Avenue
Savannah, Georgia 31401

Re: Savannah Harbor Expansion Project

Dear Colonel Hall:

The South Carolina Department of Health and Environmental Control (Department) has received your letter dated January 10, 2011. In this letter, you suggested that the Department might want to withdraw its proposed decision on the Savannah Harbor Expansion Project (SHEP) and not waive its obligation under Section 401 of the Clean Water Act. The letter also asked that the Department tell you what we would consider a reasonable timeframe to make a decision on the project.

During a meeting of the Savannah Maritime Commission in September 2010, the US Army Corps of Engineers (Corps) announced that the project schedule for the SHEP allowed 60 days to obtain the Section 401 Water Quality Certification (Certification). Following this meeting, the Department sent a letter dated September 29, 2010, in which a request was made to allow additional time to complete the Certification for this project. In a letter dated November 4, 2010, you made note that the project schedule calls for the Certification to be obtained at the end of the public comment period in late January 2011. On November 15, 2010, the Corps issued the public notice for the draft Environmental Impact Statement (EIS) and concurrently submitted the application for the Certification. This public notice allowed the public 60 days to submit comments to the Department. Thus, in accordance with your November 4, 2010 letter, the Certification was to be obtained at the end of this 60-day time period.

In a subsequent letter, dated December 3, 2010, the Department informed you that the allotted time frame of 60 days was not adequate, and asked for a time period of one year to make a 401 Water Quality Certification decision on the SHEP project. The Department considers one year to be a reasonable period of time to review the multiple volumes of documents and reports that comprise the draft EIS and to provide for public input as required by S.C. Regulation 61-101, *Water Quality Certification*. Since the Department received no response to our request for additional time, the decision was made to move forward with the Notice of Department Decision published on December 30, 2010. Furthermore, this decision does not constitute a waiver of the Department's obligation under Section 401 of the Clean Water Act. Rather, this decision proposes to deny the 401 Water Quality Certification for the project. According to South

Carolina state law, this decision becomes final 15 days after it was mailed to the applicant, unless a timely appeal is received; however, since this proposal is to deny the project without prejudice, the Corps has the option to resubmit the application for a 401 Water Quality Certification.

Please do not hesitate to contact me at 803-898-0369, if I can be of further assistance.

Sincerely,

Chuck Hightower, Section Manager
Water Quality Certification & Wetlands Section

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Glenn A. McCall
Coleman F. Buckhouse, MD

January 14, 2011

Jeffrey M. Hall, Colonel, US Army, Commanding
US Army Corps of Engineers, Savannah District
100 West Oglethorpe Avenue
Savannah, Georgia 31401

Re: Permit - Savannah Harbor Expansion Project (SHEP)

Dear Colonel Hall:

The South Carolina Department of Health and Environmental Control (Department) received your letter dated January 13, 2011. As you are aware, the Department issued a Notice of Department Decision on December 30, 2010, in which we proposed to deny the 401 Water Quality Certification for the SHEP due to the fact that the time provided for Department review was inadequate. In your recent letter, you state that the Corps' request for 401 certification under the Clean Water Act began on November 15, 2010, and that "SC DHEC can take until November 2011" to provide its 401 certification in this matter. The Department also confirmed with you in a January 14, 2011, telephone conversation that the project schedule now provides for the November 2011 date for the 401 certification decision.

Based on this new information, the Department hereby rescinds the Notice of Department Decision dated December 30, 2010, for the above-referenced permit. The Department will continue to process the permit application with the new 401 certification timeframe expiring November 2011.

Please do not hesitate to contact me at 803-898-0369, if I can be of further assistance.

Sincerely,

Chuck Hightower, Section Manager
Water Quality Certification & Wetlands Section
SCDHEC – Bureau of Water

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March 3, 2011

William Bailey
US Army Corps of Engineers, Savannah District
100 West Oglethorpe Avenue
Savannah, Georgia 31401

Re: P/N 2010 SHEP; Savannah Harbor Expansion Project (SHEP); Water Quality Certification

Dear Mr. Bailey:

The South Carolina Department of Health and Environmental Control (Department) received your application on November 15, 2010, for a 401 Water Quality Certification to deepen the navigation channel in the Savannah River. After reviewing the General Re-Evaluation Report (GRR) and the draft Tier II Environmental Impact Statement (EIS) submitted with the permit application, the Department is concerned that the project, as proposed, does not meet the requirements for issuance of a Water Quality Certification pursuant to Section 401 of the Clean Water Act and the requirements of State Regulation 61-101, Water Quality Certification.

In assessing the water quality impacts of this project, Regulation 61-101 requires that the Department address and consider whether there are feasible alternatives to the activity. Section F.(5)(b) of this regulation states that certification will be denied if there is a feasible alternative to the activity which reduces adverse consequences on water quality and classified water uses. The GRR and the EIS mentioned several alternatives that would alter the project impacts. Some of these alternatives include dredging to various project depths, various mitigation plans, and several alternative sites. Although the documents consider some alternatives, the analysis does not thoroughly evaluate all feasible alternatives for a project of this magnitude. For example, it seems reasonable to consider alternatives on a regional basis for such a large-scale project involving significant environmental impacts. The GRR and EIS do not consider whether or not other southeastern ports could be expanded with less cost or environmental impacts.

The Savannah River Maritime Commission, the South Carolina Department of Natural Resources, and the Southern Environmental Law Center each submitted comments on the GRR and EIS. These letters suggest that the Jasper Port Terminal alternative is viable and may have less environmental impacts than the proposed deepening. For these reasons, the establishment of a Jasper Port Terminal should be given detailed consideration as an option to the extensive cost and environmental impacts associated with the proposed expansion of the Garden City Terminal. The Department cannot meet its obligation under Regulation 61-101 by issuing a certification without a thorough investigation of all feasible alternatives. It is recommended that the

alternatives analysis for the project be amended to include the evaluation of all feasible alternatives to the proposed project.

In evaluating any project pursuant to Regulation 61-101, the Department must certify that there is reasonable assurance that the activity will be conducted in a manner that will not violate applicable water quality standards. The Water Classifications and Standards listed in Regulation 61-68 were promulgated in accordance with Section 303 of the Clean Water Act. This regulation also contains antidegradation rules that were established to ensure the protection of existing uses and water quality regardless of the water classification.

Existing conditions in the Savannah River have resulted in contraventions of the dissolved oxygen (DO) standard, particularly in the river estuaries during the warm summer months. The studies conducted for the SHEP indicate that the project will cause additional impacts to DO levels in the river system. Adding DO impacts to a waterbody that is currently experiencing low DO at certain times of the year is not consistent with the antidegration rules of Regulation 61-68. The Corps plans to use Speece Cones to inject oxygen into the river to mitigate for the DO impacts resulting from the proposed deepening.

After evaluating the DO modeling data, and the mitigation proposal outlined in the GRR and EIS, the Department is concerned with the uncertainty relating to the use of mechanical injection as mitigation for the DO impacts, especially in the shallow water areas of the Back River. The Corps is relying entirely on modeling data to support the conclusion that the Speece Cones will adequately restore DO in the river system to pre-project conditions. Furthermore, the oxygen injection system is a very costly method to mitigate for the projected impacts, and the funding for the long-term operational costs depends on unpredictable annual appropriations. Until the uncertainty from the DO impacts and mitigation has been thoroughly investigated, and reasonable assurance is provided that the project will protect existing uses and water quality standards for the life of the project, the Department cannot find the project consistent with the requirements of Regulation 61-101.

In addition to the impacts from DO, the ecosystem will also sustain significant wetland impacts. The project will impact 14.08 acres of salt marsh wetlands from excavation and indirectly impact 1,212 acres of freshwater wetlands due to increased salinity at the maximum project depth. The Corps has proposed a mitigation plan to offset these impacts. This plan includes the preservation of various properties that will become part of the Savannah National Wildlife Refuge (SNWR), the restoration of wetlands through flow altering structures, and the creation of salt marsh by grading down an area of high ground that was previously used as a dredge disposal area.

Section F.(5)(a) of Regulation 61-101 states that certification will be denied if the proposed activity alters the ecosystem in the vicinity of the project such that its functions and values are eliminated or impaired. The mitigation proposal submitted in the GRR and EIS fails to give reasonable assurance that the ecosystem will not be permanently impaired by the extensive wetland impacts from salinity intrusion. The preservation component of the mitigation plan lists several properties that would be acquired and subsequently placed under control of the SNWR. Although the EIS states that these properties contain desirable ecological resources, the

amount of wetland acreage or type of wetlands contained in these properties was not included in the EIS. In addition, the mitigation credit taken by the Corps for restoration includes the creation of 1,068 acres of brackish marsh for the 48 ft depth alternative. The flow altering structures will reduce salinity in some of the marsh areas; however, these structures will cause the conversion of salt and freshwater marsh to brackish marsh. The loss of any type of marsh should be considered an impact. Given the extensive loss of existing freshwater marsh within the ecosystem and the lack of an appropriate mitigation plan, the Department cannot certify that this project complies with the mandates in Regulations 61-101 and 61-68.

Much of the marsh areas that will be impacted by this project are located in the SNWR. Much of these impacts are to freshwater tidally influenced wetlands. These areas have been in decline for many years due to salinity intrusion from natural causes and from past harbor deepening activities. The proposed project poses a significant threat to these unique areas. The mitigation plan includes preservation of land that will be acquired by the refuge. As stated previously, the Department is concerned that the out-of-kind preservation of land does not adequately offset the significant loss of ecological resources due to this project. Regulation 61-101 states that certification will be denied if the proposed activity impacts special or unique habitats. The SNWR is considered a unique area, as such, the Department cannot issue a certification for the proposed activity unless the United States Fish and Wildlife Service (USFWS) gives concurrence that this project will not cause adverse impacts to the SNWR.

The proposed deepening will occur in waters containing Federally recognized threatened or endangered species. Species such as Shortnosed sturgeon, Atlantic sturgeon, various sea turtles, and West Indian manatees may all be impacted by the project. The loss of a significant portion of Shortnose sturgeon habitat due to lower DO levels and salinity intrusion is of particular concern. Regulation 61-101 states in Section 5(c) that certification will be denied if the project adversely impacts waters containing State or Federally recognized rare, threatened, or endangered species. Although the Corps proposes to mitigate for the loss of Shortnose sturgeon habitat by installing fish passage at the Savannah Bluff Lock and Dam, it is not known if this measure will adequately mitigate for the impacts to sturgeon. Endangered species impacts are typically evaluated by resource agencies such as the USFWS and the National Marine Fisheries Service (NMFS). Without concurrence from these agencies that the project will not cause adverse impacts to threatened or endangered species, the Department cannot certify this project.

In addition to the above list of concerns about the proposed project, the Department has not received a complete response to our previous request for information. On November 23, 2010, the Department sent a letter requesting an affidavit of public notice for the project, a list of adjacent property owners, and the application fee of $1,000. We received the affidavit and list of property owners, but we have not received the requested fee. Pursuant to Regulation 61-30, Environmental Protection Fees, the Department is authorized to collect application fees for Water Quality Certification.

In conclusion, the Department has several concerns about issuing a certification for this project. As currently proposed, this project does not meet the requirements for issuance of a Water Quality Certification pursuant to Section 401 of the Clean Water Act, 33 U.S.C. Section 1341, and the requirements of State Regulation 61-101, Water Quality Certification. It is

strongly recommended that the Corps withdraw the current application and address the issues outlined in this letter before continuing the 401 Certification process. If the Corps determines that it is necessary to move forward with a certification decision at this time, the fee should be submitted as soon as possible. Pursuant to Regulation 61-30, and Regulation 61-101, the Department has 180 days to complete action on an application for 401 Water Quality Certification or the assessed fee must be returned. These 180 days include only those days in which the Department is actively reviewing the application; the clock stops when information is requested and the Department is waiting on a response. Accordingly, the 180-day clock for this project will not start until the Department receives the requested fee and subsequent information. Should you have any questions, you may call me at (803) 898-4261 or you may e-mail beckhajc@dhec.sc.gov.

Sincerely,

Chris Beckham, Project Manager
Water Quality Certification & Wetlands Section

DEPARTMENT OF THE ARMY
SAVANNAH DISTRICT, CORPS OF ENGINEERS
100 W. OGLETHORPE AVENUE
SAVANNAH, GEORGIA 31401-3640

REPLY TO
ATTENTION OF:

Planning Division

MAR 30 2011

Mr. J. Christopher Beckham
Water Quality Certification
and Wetlands Section
South Carolina Department of Health
and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

Dear Mr. Beckham:

I refer to the March 3, 2011 letter from South Carolina Department of Health and Environmental Control (SC DHEC) concerning the Savannah Harbor Expansion Project (SHEP) and our November 15, 2010 application for Water Quality Certification pursuant to Section 401 of the Clean Water Act. In the letter, you strongly recommended the US Army Corps of Engineers (Corps) withdraw its application and address issues outlined in the letter.

Enclosed, you will find a comment/response document that addresses the issues you raised and provides the information requested. Based on the contents of your letter, it is our understanding that upon receiving concurrence of the project from US Fish and Wildlife Service and National Marine Fisheries Service, SC DHEC would be satisfied with the proposed project's mitigation for impacts to fish, wildlife, and the Savannah National Wildlife Refuge.

With regard to payment of application fees and completion date of the requested action, SC DHEC has not traditionally charged the Corps for water quality certifications and we look forward to receiving the same courtesy on this request.

The Corps believes that the issues and concerns outlined in your March 3, 2011 letter were adequately addressed in the draft reports provided in November 2010. Construction of the SHEP and its proposed mitigation features would not adversely affect the dissolved oxygen regime in South Carolina waters, nor would it adversely affect tidal freshwater wetlands or endangered species habitat in South Carolina waters. Consequently, the Corps looks forward to South Carolina issuing its Section 401 Water Certification for the Savannah Harbor Expansion Project.

We appreciate your continued support of the Corps' efforts to establish and maintain navigable waterways for the benefit of national commerce.

If you have any questions or concerns regarding the contents of this letter, please do not hesitate to contact me at (912) 652-5781.

Sincerely,

William G Bailey

William G. Bailey
Chief, Planning Division

Enclosure

US ARMY CORPS OF ENGINEERS, SAVANNAH DISTRICT

RESPONSES TO SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

LETTER DATED 3 MARCH 2011

Comment. *Although the document considers some alternatives, this analysis does not thoroughly evaluate all feasible alternatives for a project of this magnitude. For example, it seems reasonable to consider alternatives on a regional basis for such a large-scale project involving significant environmental impacts. The GRR and EIS do not consider whether or not other southeastern ports could be expanded with less cost or environmental impacts.*

Response. The Corps conducted a Regional Port Analysis and a Multiport Analysis as discussed on Page 3-3 of the DEIS and Pages 117-119 of the GRR, respectively. The full reports are included as attachments to the Economic Appendix of the GRR. The regional port analysis indicated that (1) the volume of Twenty-foot Equivalent Units (TEUs) expected to move through the southeastern US ports in the future exceeds the total capacity of any US east coast port; (2) USACE participation in planning and construction of a regional port would require Congressional authorization and a non-Federal sponsor; (3) there is no centralized planning jurisdiction that would encourage development of a regional port hub and discourage competitive development of local ports; and (4) local port planning and development is already underway (Savannah, Charleston, Jacksonville, Norfolk, Cape Fear) which would make a regional port redundant. For the foregoing reasons, the District determined that further evaluation of a single regional port is not warranted for the Savannah Harbor Expansion Project.

Comment. *For these reasons, the establishment of a Jasper Port Terminal should be given detailed consideration as an option to the extensive cost and environmental impacts associated with the proposed expansion of the Garden City Terminal. The Department cannot meet its obligation under Regulation 61-101 by issuing a certification without a thorough investigation of all feasible alternatives. It is recommended that the alternatives analysis be amended to include the evaluation of all feasible alternatives to the proposed project.*

Response. The SHEP EIS and GRR do not evaluate the environmental aspects of the expected future expansion of the Garden City Terminal. The District expects GPA to increase the throughput capability of that terminal in response to future demand independent of a harbor deepening. The SHEP EIS and GRR were prepared as directed by the US Congress to address the identified inefficiencies of the current operation of ***Savannah Harbor***. In Section 3.1 of the GRR, the Corps identified the present navigation inefficiencies:

1. Increased/ inflated operations costs due to light loading and tidal delays;
2. Light loading and tidal delays will increase as present harbor users increase their annual tonnage and as larger, more efficient ships replace older, smaller ones;

3. Existing ships are experiencing problems associated with turning capabilities and overall maneuverability in certain reaches of the inner harbor;
4. The severity of problems associated with turning capabilities and overall maneuverability in certain reaches of the inner harbor will increase as vessel size increases.

Some of these situations are expected to worsen in the near future as larger, Post-Panamax Generation 2 vessels begin to replace older, smaller vessels.

Alternative container terminal locations were thoroughly evaluated in the EIS and GRR (Chapter 3 and Appendix O (Formulation of Alternatives) of the EIS). This analysis considered methods in which the harbor's navigation problems could be reduced, including structural and non-structural methods. The structural methods included providing a deep-water channel to alternate terminal locations, four of which were in South Carolina. This analysis included a new marine container terminal at the harbor's present confined dredged material disposal facilities (CDFs) 12A, 14A, 14B, and at Jones/Oysterbed Island. The CDF 14A and 14B sites are the ones presently under consideration for a Jasper Ocean Terminal. The analysis concluded that the Garden City Terminal of the Georgia Ports Authority best met the criteria of Completeness, Effectiveness, Efficiency, and Acceptability. Consequently, the Corps concluded that the detailed studies would concentrate on evaluating the feasibility of various channel depth alternatives (42 feet to 48 feet) to the Garden City Terminal. The project's Cooperating Agencies (US Environmental Protection Agency (EPA), US Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries), and the Georgia Ports Authority) concurred in this finding. The Corps provided that analysis to your agency and the public in 2005; you provided no comments.

The Corps' analysis concluded that construction of a container terminal in Jasper County and deepening to that facility is not the best alternative to solve the existing navigation problems in Savannah Harbor. A series of sensitivity analyses (Pages 224-229 of the GRR) were conducted to identify the potential impact that a new terminal in Jasper County might have on the justification to deepen Savannah Harbor to the Garden City Terminal. This analysis showed that economic justification for deepening the channel between a Jasper County terminal and the Garden City Terminal is not particularly sensitive to the development of a container terminal in Jasper County. Rather, the proposed harbor deepening has independent utility apart from the potential Jasper County terminal. In other words, even if a container terminal in Jasper County was already constructed and operational, deepening the channel to the Garden City Terminal would still be economically justified.

Capital improvements at the Garden City Terminal have occurred in the past and the Corps expects GPA to continue to take similar actions in the future in response to increases in container traffic volumes through that facility. The Corps expects those increases in container volumes to occur with or without SHEP.

Comment. *After evaluating the DO modeling data and the mitigation proposal outlined in the GRR and EIS, the Department is concerned with the uncertainty relating to the use of mechanical injection as mitigation for the DO impacts, especially in the shallow areas of the Back River. The Corps is relying entirely on modeling data to support the conclusion that the Speece cones will adequately restore DO in the river system to pre-project conditions. Furthermore, the oxygen injection system is a costly method to mitigate for the projected impacts, and the funding for the long-term operational costs depends on unpredictable annual appropriations. Until the uncertainty from the DO impacts and mitigation has been thoroughly investigated, and reasonable assurance is provided that the project will protect existing uses and water quality standards for the life of the project, the Department cannot find the project consistent with the requirements of 61-101.*

Response. The models employed in the analysis of the impacts of the SHEP on the dissolved oxygen regime in Savannah Harbor were developed over a number of years by subject matter experts with integrated input from the Cooperating Agencies and the state resource agencies (including SC DHEC) to ensure the results are meaningful and accurate. While all models have uncertainty, the SHEP hydrodynamic and water quality models are the best prediction tool available to understand future conditions in the harbor under various scenarios. In 2006, your agency approved the use of those models on this project. In 2010, your agency concurred in use of these basic models in EPA's Revised Draft Total Maximum Daily Load (TMDL) for Dissolved Oxygen in Savannah Harbor.

The Corps used the same models to design the oxygen injection systems as it did to identify the impacts expected from the proposed project. There should be no difference in uncertainty about the effectiveness of the proposed mitigation from that for the impacts from the harbor deepening alternatives. The Corps remains confident that the flow diversion measures and the dissolved oxygen injection system would remove the incremental effects of SHEP on the dissolved oxygen regime in Savannah Harbor. In fact, when the dissolved oxygen injection system is operational, the dissolved oxygen regime is expected to improve in over 90 percent of the estuary over the without project condition.

Comment. *Section F.(5)(a) of Regulation 61-101 states that certification will be denied if the proposed activity alters the ecosystem in the vicinity of the project such that its functions and values are eliminated or impaired. The mitigation proposal submitted in the GRR and EIS fails to give reasonable assurance that the ecosystem will not be permanently impaired by the extensive wetland impacts from salinity intrusion. The preservation component of the mitigation plan lists several properties that would be acquired and subsequently placed under control of the SNWR. Although the EIS states these properties contain desirable ecological resources, the amount of wetland acreage or type of wetlands contained in these properties was not included in the EIS. In addition, the mitigation credit taken by the Corps for restoration includes the creation of 1,068 acres of brackish marsh for the 48 ft depth alternative. The flow altering structures will reduce salinities in some of the marsh areas; however, these structures will cause the conversion of salt and freshwater marsh to brackish marsh. The loss of any type of marsh should be considered an impact. Given the extensive loss of existing freshwater marsh within the*

ecosystem and the lack of an appropriate mitigation plan, the Department cannot certify that this project complies with the mandates in Regulations 61-101 and 61-68.

Response. It is important to note that installation of the flow diversion structures would not result in the conversion of any freshwater marsh to brackish marsh in South Carolina. On the contrary, the diversion of flow would reduce the upstream movement of salinity in Middle River and Little Back River from harbor deepening, thereby minimizing impacts to tidal freshwater marsh in South Carolina. On the other hand, flow diversion would result in the conversion of some saltmarsh located in the lower ends of these two streams to more brackish species, which the USFWS identified as being more ecologically valuable.

Upstream salinity increases resulting from construction of the SHEP would not eliminate the functions of any wetland. Construction of the 48-foot channel (with flow diversion) would result in the conversion of the dominant vegetative species typically observed in approximately 337 acres (net) of freshwater marsh to more brackish species. It is important to note that many of the emergent plant species associated with this freshwater marsh system would still be readily observed in the brackish environment (Latham et. al., 1994). Likewise, the 48-foot depth (with flow diversion) would result in a conversion of the dominant vegetative species typically observed in 730 acres (net) of saltmarsh to more brackish species. However, dominant saltmarsh species like *Spartina alterniflora* are still expected to be observed in those areas. While the SHEP would result in changes to the dominant wetland vegetation, the overall basic wetland functions typically associated with these systems would not change.

A review of the changes that occur to the elements of wetland functions (water purification, groundwater recharge, streamflow maintenance, fish and wildlife habitat, etc.) when freshwater marsh is converted to more a brackish marsh indicates that there are only negligible changes to these functions with the exception of fish and wildlife habitat. The wetland conversion is classified as a minor effect when considering the total function of the wetland and the continued existence of some freshwater vegetation in the areas that would become brackish marsh.

The proposed preservation lands consist of 2,683 acres (for the 48-foot channel) characterized by bottomland hardwoods, maritime forest and dispersed uplands dominated by deciduous forest and regrowth. These bottomland hardwoods are classified as palustrine, forested, broad-leaved deciduous systems that are both temporarily and seasonally flooded. Preserving these areas would ensure wildlife habitat is protected in perpetuity. The USFWS had previously identified those tracts as potentially being valuable additions to the Savannah National Wildlife Refuge (SNWR). Those lands would buffer the SNWR from future threats of development such that changes in land use would not occur immediately adjacent to existing areas of emergent wetlands within the Refuge. Thus, the acquisition and preservation of 2,683 acres of wetland and upland buffer would provide a functional replacement for the reduction in the only wetland function (i.e., fish and wildlife habitat) that would be expected to be impacted from the 337 acre freshwater to brackish marsh conversion. Consequently, the Corps believes the proposed mitigation satisfies the no-net loss of wetland function criterion.

Modeling indicates that the expected conversion of tidal freshwater marsh to brackish marsh would occur within the waters of the State of Georgia. That conversion would be confined to areas of Middle River and Front River from just below the Georgia Highway 25 crossing to just upstream of the confluence of Front River and Steamboat River. Those model studies indicate that there would be an increase in tidal freshwater marshes in the State of South Carolina in marshes associated with Little Back River in the vicinity of the SNWR intake on Little Back River.

Comment. *Regulation 61-101 states that certification will be denied if the proposed activity impacts special or unique habitat. The SNWR is considered a unique area, as such, the Department cannot issue a certification for the proposed activity unless the United States Fish and Wildlife Service (USFWS) gives concurrence that this project will not cause adverse impacts to the SNWR.*

Response. The adverse impacts of the SHEP on the SNWR are readily acknowledged and addressed in the DEIS and the GRR. Specifically, there will be direct impacts to marsh caused by excavation to expand the Kings Island Turning Basin and indirect impacts to tidal freshwater marsh caused by an increase in upstream salinity levels. Plans to minimize and mitigate those adverse impacts are also addressed. Mitigation includes restoring 28 acres of saltwater marsh, constructing flow diversion measures to reduce salinity levels in upstream areas where tidal freshwater marsh would be impacted, and purchasing and preserving lands that would be beneficial to the SNWR. The Corps believes that the SHEP Mitigation Plan adequately addresses adverse impacts to the SNWR. Also, all of the described adverse impacts to the SNWR occur in the State of Georgia. Construction of the SHEP would not adversely affect any unique areas in the State of South Carolina.

Comment. *The proposed deepening will occur in waters containing Federally recognized threatened or endangered species. Species such as Shortnose sturgeon, Atlantic sturgeon various sea turtles and West Indian manatees may all be impacted by the project. The loss of a significant portion of Shortnose sturgeon habitat due to lower DO levels and salinity intrusion is of particular concern. Regulation 61-101 states in Section 5(c) that certification will be denied if the project adversely impacts waters containing state or Federally recognized rare, threatened, or endangered species. Although the Corps proposes to mitigate for the loss of Shortnose sturgeon habitat by installing fish passage at the Savannah Bluff Lock and Dam, it is not known if this measure will adequately mitigate for the impacts to sturgeon. Endangered species impacts are typically evaluated by resource agencies such as the USFWS and the National Marine Fisheries Service (NMFS). Without concurrence from these agencies that the project will not cause adverse impacts to threatened or endangered species, the Department cannot certify this project.*

Response. The modeling studies presented in the DEIS indicate that approximately 11.0% (439 acres) of Shortnose sturgeon adult winter habitat, 8.2% (113.0 acres) of adult summer habitat, and 1.6% (21.6 acres) of juvenile winter habitat would be adversely affected by the 48-foot alternative. There would be no loss of Shortnose sturgeon habitat in South Carolina waters for any of the alternative harbor depths

analyzed. Loss of Shortnose sturgeon habitat due to SHEP would mainly occur in portions of Front River just above the Georgia Highway 25 crossing and in a small portion of Middle River near its confluence with Front River. Modeling results indicate that implementation of the SHEP with its mitigation features would result in a slight increase in Shortnose sturgeon habitat in South Carolina waters.

The proposed fishway at the New Savannah Bluff Lock and Dam was included in the mitigation plan for the project to ameliorate the remaining effects of Shortnose sturgeon habitat after the Corps and the natural resource agencies were unable to identify any measures that could be implemented in the estuary to restore sturgeon habitat or enhance existing habitat. The horseshoe rock ramp design is the current state-of-the-art measure that could be constructed at the New Savannah Bluff Lock and Dam to allow Shortnose sturgeon and other species of anadramous fish an opportunity to bypass the dam and gain access to traditional upstream spawning areas.

As required, the Corps prepared a Biological Assessment of Threatened and Endangered Species (BATES) which was included in the DEIS as Appendix B. The BATES concluded that the project may affect but is not likely to adversely affect the wood stork, Piping plover, manatee, North Atlantic right whales, humpback or sperm whales, leatherback turtles, loggerhead turtles, kemp's ridley turtles, hawksbill turtles, and green sea turtles or their critical habitats. The BATES concluded that the SHEP may affect but is not likely to adversely affect Shortnose or Atlantic sturgeon or their critical habitat.

The BATES has been furnished to the USFWS and the NMFS for their review and Biological Opinion. NMFS is the agency that oversees compliance with the Endangered Species Act for Shortnose sturgeon.

Comment: *In addition to the above list of concerns about the proposed project, the Department has not received a complete response to our previous request for information. On November 23, 2010, the Department sent a letter requesting an affidavit of public notice for the project, a list of adjacent property owners, and the application fee of $1,000.00. We received the affidavit and list of property owners, but we have not received the requested fee.*

Response. South Carolina DHEC has not traditionally charged the Corps for water quality certifications and we look forward to receiving the same courtesy with this request.

Comment. *As currently proposed, this project does not meet the requirements for issuance of a Water Quality Certification pursuant to Section 401 of the Clean Water Act, 33 U.S.C. Section 1341, and the requirements of State Regulation 61-101, Water Quality Certification. It is strongly recommended that the Corps withdraw the current application and address the issues outlined in this letter before continuing the 401 Certification process. If the Corps determines that it is necessary to move forward with a certification decision at this time, the fee should be submitted as soon as possible.*

Response. The Corps believes that the issues and concerns outlined in your March 3, 2011 letter were adequately addressed in the draft reports provided in November 2010. Construction of the SHEP and its proposed mitigation features would not adversely affect the dissolved oxygen regime in South Carolina waters nor would it adversely affect tidal freshwater wetlands or endangered species habitat in South Carolina waters. Consequently, the Corps looks forward to South Carolina issuing its Section 401 Water Certification for the Savannah Harbor Expansion Project.

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June 16, 2011

William Bailey
US Army Corps of Engineers, Savannah District
100 West Oglethorpe Avenue
Savannah, Georgia 31401

Re: P/N 2010 SHEP; Savannah Harbor Expansion Project (SHEP); Water Quality Certification

Dear Mr. Bailey:

The South Carolina Department of Health and Environmental Control (Department) sent a letter on March 3, 2011, outlining our concerns about the above referenced project. This letter also requested additional information that must be received to complete the water quality certification process. Subsequent to this letter, the Department received your response dated April 1, 2011, and attended several meetings to discuss the proposed project. After reviewing the additional information obtained in your response letter and at the meetings, the Department continues to have concerns about the project.

As discussed in the meeting held on May 12, 2011, the Department is concerned about the ability of the Speece Cones to adequately oxygenate the shallow water areas of the Back River. The Department is also concerned that the models used by the Corps do not adequately simulate flows in the Back and Middle Rivers. The Department has been working with the Corps to determine what information will be needed to address these concerns. The Corps is currently working with a contractor to develop a report to evaluate the applicability of the oxygen injection system in the shallow water areas of the Back River. The Corps is also working with the contractor to acquire updated modeling data to compare the Corps' hydrodynamic and water quality model with the Environmental Protection Agency's (EPA) revised TMDL model. The Department will require that these reports be submitted with adequate time for review prior to any decision on the Water Quality Certification.

The wetland impacts from the project and the proposed mitigation continue to be a concern of the Department. The project will substantially alter the wetlands located in the lower Savannah River estuary. Section F.(5)(a) of Regulation 61-101, Water Quality Certification, states that certification will be denied if the proposed activity alters the ecosystem in the vicinity of the project such that its functions and values are eliminated or impaired. In order to comply with the provisions in Section F of Regulation 61-101, the Department must require appropriate mitigation to ensure that functions and values in the ecosystem will be protected. Early in the development phase of this project, an Interagency Coordination Team (ICT) was established to assist in evaluating the wetland impacts and mitigation. The results of this interagency coordination lead to the mitigation proposal included in the permit application. The plan places an emphasis on minimizing the loss of freshwater tidally influenced wetlands, because these wetlands have historically been altered by past projects.

A meeting to discuss the wetland impacts and mitigation was held on June 1, 2011, in Atlanta Georgia. The exhibits presented during the meeting show significant areas of salt marsh impacts in South Carolina waters. The Corps used the Savannah District Standard Operating Procedures (SOP) as a tool to quantify the impacts and determine appropriate compensation for the salinity conversion. The reduction

in salinity will cause a vegetative shift by converting the dominant salt marsh plant species to a vegetative community dominated by more brackish species. While the Department has no objection to using the SOP to quantify the impacts from the change in salinity, the Department is concerned about the way some of the factors in the SOP were applied.

During the June 1st meeting, the Corps presented a substantial amount of scientific research to show that the reduced salinity in the salt marsh areas would have a minor effect on the vegetative community in the ecosystem. Since this change will be minimal, a dominant effect level of 0 was used in the SOP calculation sheets to determine the required credits for the salinity change in the salt marsh. Then the Corps used the highest level (1.4) for the net improvement factor to determine that 4,485.6 credits will generated by the restoration of 1,068 acres of brackish marsh. The high net improvement value is not consistent with the low dominant effect level. Furthermore, the area proposed for restoration is comprised of the same wetlands where the impacts will occur. The Corps agrees that the vegetative shift from the salinity conversion is an impact and is proposing to take restoration credit for these impacts. The Department is concerned about the precedent set by allowing the Corps to take restoration credit for wetlands that are included in the project impacts.

Another concern about the restoration component of the mitigation plan is the level of control for 1,068 acres of brackish marsh. The Corps has acknowledged that the restoration area will be preserved as wetlands included as part of the public trust. This level of control is not appropriate because many of the wetlands impacted by this project currently exist as part of the public trust. There is no mechanism to preclude impacts to these wetlands from any future harbor deepening. In order to generate mitigation credits, the restored wetlands must be preserved with a mechanism to ensure that these wetlands will be protected in perpetuity.

The approach to mitigation used by the Corps does not offset all of the project impacts since no mitigation is provided for the impacts to 730 acres of salt marsh for the 48' deepening. This plan diminishes the ecological value of salt marsh, while placing an arbitrarily elevated value to the creation of brackish marsh. Even though the vegetative shift that will occur from the change in salinity is minimal, there will be some loss to the habitat functions within the large area of converted salt marsh. This plan may have been acceptable when discussed in the early meetings of the ICT, but it is not consistent with the state's regulatory obligation to protect existing uses in the ecosystem. The plan does not meet the requirements of Regulation 61-101, since no reasonable assurance is given that the project will not eliminate or impair functions within the ecosystem.

Another regulatory obligation of the Department is to receive and acknowledge comments in response to a public notice for a water quality certification. Several comment letters were received during the public comment period. The Department received letters from resource agencies, such as the South Carolina Department of Natural Resources, and from non-governmental organizations including the Southern Environmental Law Center. These letters identified a variety of concerns about the project. The Department is requesting a response to these comment letters. The letters were addressed to the Corps and you should have received copies. If not, please let the Department know and we will forward you a copy each letter.

In our March 3rd letter the Department discussed our concern about the project's potential impacts to endangered and threatened species. Since that time, we received a copy of a letter dated April 28, 2011, from the United States Fish and Wildlife Service (USFWS). This letter gave concurrence on the Biological Assessment of Threatened and Endangered Species (BATES) included as Appendix B in the draft EIS. Some of the endangered species that might be affected by this project fall under the responsibility of the National Marine Fisheries Service (NMFS). It is our understanding that the Corps is

currently in consultation with NMFS. Regulation 61-101 states in Section 5(c) that certification will be denied if the project adversely impacts waters containing State or Federally recognized rare, threatened, or endangered species. To assure that the project complies with the Section 5(c) of the regulation, the Department will need to get concurrence from NMFS prior to making a certification decision.

As stated previously, the Department has several remaining concerns that need to be addressed before we can render a decision on the 401 Water Quality Certification. We appreciate the Corps' continued effort to resolve these concerns and we will continue to work with you through the certification process. Pursuant to Regulation 61-30, and Regulation 61-101, the Department has 180 days to complete action on an application for 401 Water Quality Certification. These 180 days include only those days in which the Department is actively reviewing the application; the clock stops when information is requested and the Department is waiting on a response. Since the Department has agreed to waive the fee for this project, the 180-day clock pursuant to Regulation 61-30 is not applicable. The 180-day clock pursuant to Regulation 61-101 will not start until all of the subsequent information is received. It should be noted that the Department must issue, waive, or deny a decision on a federal permit within one of acceptance of a complete application, so we would appreciate a timely response to this information request. Should you have any questions, you may call me at (803) 898-4261 or you may e-mail beckhajc@dhec.sc.gov.

Sincerely,

Chris Beckham, Project Manager
Water Quality Certification & Wetlands Section

Cc: Blair Williams, OCRM

DEPARTMENT OF THE ARMY
SAVANNAH DISTRICT, CORPS OF ENGINEERS
P.O. BOX 889
SAVANNAH, GEORGIA 31402-0889

REPLY TO
ATTENTION OF

Planning Division

AUG 01 2011

Mr. Chris Beckham
Project Manager
Water Quality Certification and Wetlands Section
South Carolina Department of Health
and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

Dear Mr. Beckham:

I am writing to you about the Savannah Harbor Expansion Project. You raised several issues in your June 16, 2011 letter, which I will address.

You requested the Corps' response to letters you had received as a result of the public notice for water quality certification. We provided those responses to you by email on July 13, 2011.

You requested additional information about two water quality modeling issues. The first concerned whether the oxygen injection system design would perform as intended in the shallow waters of Back River. We developed additional information on that issue and provided a report by email last week. The second issue was a comparison of the hydrodynamic model the Corps used to evaluate potential impacts from this project and a later version used by EPA in its TMDL update. We developed additional information on that issue and provided a report by email earlier today. We request a meeting the week of August 15 to discuss any remaining concerns you may have on those issues.

You commented on the values used in the wetland mitigation SOP calculations. We continue to believe the selected values are appropriate. The USFWS concurs with that position, as they adopted those values in the Fish and Wildlife Coordination Act Report that they prepared. As you stated, the values were selected based on years of discussion in the Wetland Interagency Coordination Team, which placed a higher value in this estuary on tidal freshwater wetlands than on brackish marsh or saltmarsh. Your letter correctly identified historic impacts to tidal freshwater wetlands in this estuary as the reason behind those priorities. The team expressed a preference for restoration of

wetlands in the estuary to their former states. The values the Corps used in the SOP calculations reflect those stated agency preferences. Further detailed analysis (provided at the June 1, 2011 interagency meeting) of field investigations conducted in this estuary indicates that vegetative changes identified through modeling likely overstate the effects that would be observed in the field if the harbor is deepened.

The approach the Corps used in the SOP calculations also reflects the interagency coordination that occurred on this project. The agencies requested the Corps first identify the impacts that would occur if the harbor is deepened, then evaluate mitigation measures that could be included to reduce those impacts.

Due to the unique nature of this project and its secondary effects, the impact predictions and the resulting mitigation are addressed differently than those for a Regulatory project impact or wetland mitigation bank. This application of the SOP differs from a normal Regulatory application because the natural resource agencies requested the Corps provide information on this project's impacts with and without its mitigation features. Savannah District used the SOP's restoration worksheet to capture the effects of the project's mitigation features to comply with that desire of the resource agencies. Since the District is not proposing to establish a commercial wetland mitigation bank with the acreage identified as being "restored" in the with-project but without-mitigation scenario, protection of those wetlands in perpetuity is not appropriate.

The proposed project includes mitigation for all wetland impacts, including the calculated conversion of saltmarsh to brackish marsh. Wherever practicable, in-kind mitigation is proposed. The SOP calculations include the modeled reduction in saltmarsh acreage as an impact that is subsequently compensated by either restoration of brackish marsh or preservation of freshwater wetlands. The ecological value of the saltmarsh is included in the SOP analysis.

We trust that this letter and the information we recently provided by email satisfies the Department's need for additional information. We appreciate your continued coordination throughout the certification process and look forward to receiving certification for a project of such significance to the Nation and the region's economy.

If you have any additional questions, please feel free to contact me at william.g.bailey@usace.army.mil or 912-652-5781.

William Bailey

William Bailey
Chief, Planning Division

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C. Earl Hunter, Commissioner
Promoting and protecting the health of the public and the environment

January 25, 2011

Colonel Jeffrey M. Hall, District Commander
U.S. Army Corps of Engineers, Savannah District
P.O. Box 889
Savannah, Georgia 31402-0889

Re: Savannah Harbor Expansion Project: Draft General Re-Evaluation Report and Draft Tier II Environmental Impact Statement

Dear Colonel Hall:

The South Carolina Department of Health and Environmental Control- Office of Ocean and Coastal Resource Management (SCDHEC OCRM or DHEC or the Department) has made great efforts to review the Draft General Re-Evaluation Report (DGRR) and the Tier II Draft Environmental Impact Statement (DEIS) (collectively referred to herein as the Federal Agency Consistency Determination) for the Savannah Harbor Expansion Project within the time frame provided by your letter of January 24, 2011. However, the Department disagrees with your analysis of the timeframe that the Coastal Zone Management Act provides to the Department to provide comments.

The Department received notice of the federal agency's consistency determination on November 17, 2010.[1] 15 C.F.R. § 930.41(a) provides the State agency 60 days from receipt of the Federal agency's consistency determination and supporting information to inform the federal agency of the state agency's concurrence with or objection to the Federal agency's consistency determination. In addition, 15 C.F.R. § 930.41(b) provides that state agency concurrence shall not be presumed in cases where the State agency, within the 60-day period, requests an extension of time to review the matter. This regulation requires the Federal agency to approve one request for an extension period of fifteen days or less, if requested, and authorizes the Federal agency to approve a longer or additional extension period as appropriate. Additionally, this regulation requires that the Federal agency should consider the magnitude and complexity of the information contained in the consistency determination when considering whether a longer or an additional extension period is appropriate. DHEC OCRM requested additional time to evaluate the project on Dec. 3, 2010 and again on January 21, 2011. Because there is no discretion given to the Federal Agency to deny a first request for an additional fifteen days, the federal agency may not presume state concurrence until at least seventy-five days after the State agency's

[1] In your letter dated January 24, 2011, you indicate that you provided notice to the state agency on November 15, 2010. In fact, the Department received notice of the Corps' consistency determination on November 17, 2010. 15 C.F.R. § 930.41 provides the stage agency "60 days from receipt of the Federal agency's consistency determination and supporting information" to provide notice to the Federal agency of the state agency's response.

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
Ocean and Coastal Resource Management
Charleston Office • 1362 McMillan Avenue • Suite 400 • Charleston, SC 29405 • Phone: (843) 953-0200 • Fax: (843) 953-0201 • www.scdhec.gov

receipt of notice of the federal agency's consistency determination.[2] Thus, DHEC has at least until January 31, 2011 to notify the Federal agency of its objection to the Federal agency's consistency determination.[3] Additionally, given the magnitude and complexity of the information contained in the consistency determination, the Federal agency should grant an additional or longer period and the Department again requests that the Corps exercise its discretion and authorize the Department additional time to submit further comments on the federal agency's consistency determination. The Department believes that the 15 day extension is necessary to give the public and resource agencies the proper time to evaluate the project due to the "complexity and magnitude of the information" and the timeliness of the public notice during holiday season.

Reserving the Department's rights under the Act to submit additional comments objecting to the federal agency's consistency determination within the maximum amount of time provided under 15 C.F.R. § 930.41(b), the Department objects to the federal agency's consistency determination based on the following grounds.

As an initial matter, as the Federal Consistency Determination points out, the Coastal Zone Management Act, 16 U.S.C. §§ 1451, et. seq., requires that "Each federal agency activity within or outside the coastal zone that affects any land or water use or natural resource of the coastal zone shall be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved state management programs." 16 U.S.C. § 1456(c)(1)(A). "Consistent to the maximum extent feasible" is defined in the Regulations promulgated by the Secretary of Commerce and means "fully consistent with the enforceable policies of management programs unless full consistency is prohibited by existing law applicable to the Federal Agency." 15 C.F.R. § 930.32(a)(1). The Regulations further provide that "if a Federal agency asserts that full consistency with the management program is prohibited, it shall clearly describe, in writing, to the State agency the statutory provisions, legislative history, or other legal authority which limits the Federal agency's discretion to be fully consistent with the enforceable policies of the management program." 15 C.F.R. 930.32(a)(2). Here, the Federal Agency has not identified in writing to the state agency any existing law which prohibits full consistency with South Carolina's approved management program. Therefore, because the federal agency has not identified to the state agency any existing laws which prohibit full consistency, the

[2] In your letter dated January 24, 2011, you rely on the "Corps [sic] coastal zone consistency regulations (33 C.F.R. 336.1, et. seq.)" which purport to provide a 45-day window for state agency review but also have the requirement that the Corps grant a 15-day extension if an extension is requested and which also provide the Corps with authority to grant additional or longer extensions. The Department sees no statutory authority in the Coastal Zone Management Act for the Corps of Engineers to promulgate regulations different from the regulations promulgated by the Secretary of Commerce to carry out the provisions of the Coastal Zone Management Act. The Congress specifically gave the Secretary of Commerce the authority to promulgate regulations necessary to carry out the provisions of this chapter. See 16 U.S.C. § 1463 and 16 U.S.C. § 1453(16) (defining "secretary" as the "Secretary of Commerce.") The Secretary of Commerce has promulgated these regulations under 15 C.F.R. Part 930. Therefore, though the Department is issuing this letter in accordance with the timeframe you set forth in your letter dated January 24, 2011, the Department reserves its full authority under 15 C.F.R. Part 930 et. seq., to use the full timeframe provided therein to comment on the federal agency's consistency determination.

[3] Even using the November 15, 2010 date upon which the Corps asserts that the clock begins to run, the seventy fifth day falls on Saturday, January 29, 2011.

Coastal Zone Management Act's requirement that the federal agency activity be consistent to the maximum extent practicable requires that the Federal agency activity be fully consistent with South Carolina's approved management program.

Based on staff's evaluation of the DGRR, DEIS and the Savannah District Army Corp of Engineers Federal Consistency Determination, the SCDHEC OCRM does not concur that the five dredging alternatives are consistent with the South Carolina Coastal Management Program(SCCMP) . The following specific policies and responses will inform you how the proposed activity is inconsistent with the SCCMP:

Chapter III, Section C.I. Guidelines for Evaluation of All Projects:

- (1)(b) The extent to which the project will further the policies of the South Carolina General Assembly which are mandated for OCRM in implementation of its management program these being: (b) To protect and, where possible, to restore or enhance the resources of the State's coastal zone for this and succeeding generations. (Sections 48-39-30(B)(1) and (2), S.C. Coastal Management Act of 1977).
  The project as proposed will not restore or enhance the resources of the state but will result in a degradation of coastal resources.

- (2) The extent to which the project will have adverse impacts on the "critical areas" (beach/dune system, coastal waters, tidelands).
  The project as proposed will reduce dissolved oxygen, and depends on mechanical means in an attempt to maintain current levels. This causes a net loss of degraded fisheries habitat.

- (3) The extent to which the project will protect, maintain or improve water quality, particularly in coastal aquatic areas of special resource value, for example, spawning areas or productive oyster beds.
  The proposed dredging to deepen the Savannah Harbor as set forth in the National Economic Development (NED) Plan, 47-foot Depth Alternative, and the Locally Preferred (LP) Plan, 48-foot Depth Alternative, will reduce the dissolved oxygen levels in the Savannah River from the existing state in an area utilized for spawning of important fisheries species including striped bass and shortnose sturgeon (SNS). Mitigation for this impact is to stock bass fingerlings provided by Georgia DNR and construction of a fishway for Shortnose Sturgeon at the New Savannah Bluff Lock & Dam at Augusta Georgia. Stocking of fingerlings does not eliminate impacts to spawning and nursery areas for the Striped Bass and the construction of a fishway does not assure the Shortnose Sturgeon will be able to use it. In the event low DO (Dissolved Oxygen) levels fall below current concentrations, as predicted in the DEIS, the lower part of the river may not be passable by adult or juvenile sturgeon. The shallower dredging alternatives are more desirable to both the NED and LP alternatives, however all dredging alternatives (with or without mitigation) result in a net loss of Striper and SNS habitat.

- (4) The extent to which the project will meet existing State and Federal Requirements for waste discharges, specifically point sources of air and water discharge, and for protection of inland wetlands.
  Models described in the EIS indicate impacts to large areas of freshwater marshlands including important habitat for fish, wading birds, & waterfowl. While efforts have been addressed to minimize impacts, a minimum of 337 acres of freshwater marsh will be affected by salt waters. Mitigation for this impact is to preserve additional wetlands adjacent to the Savannah River National Wildlife Refuge. Preservation does not replace the lost values and functions of the impacted freshwater marsh.

- (7) The possible long-range, cumulative effects of the project, when reviewed in the context of other possible development and the general character of the area.
  This project will result in a very large volume of spoils that will use significant areas within the exiting spoils disposal sites, located mostly in Jasper County, resulting in shorter life expectancy of the CDF (Contained Disposal Facility). This may result in the need for additional wetland impacts for expansion of the CDF in Jasper County. Additional impacts from existing port expansions, storage, and transportation facilities associated with the port will likely result in additional impacts to wetlands and water quality. The proposed disposal of spoils in the CDF will potentially eliminate the possibility of a new port in Jasper County.

- (8) The extent and significance of negative impacts on Geographic Areas of Particular Concern (GAPCs). The determination of negative impacts will be made by OCRM in each case with reference to the priorities of use for the particular GAPC. Applications which would significantly impact a GAPC will not be approved or certified unless there are no feasible alternatives or an overriding public interest can be demonstrated, and any substantial environmental impact is minimized.
  The proposed project will impact habitat for the federally endangered Shortnose Sturgeon. Endangered species habitat is considered GAPC in the SCCZMP. Mitigation offered to offset this impact is to construct a fishway at the New Savannah Bluff Lock & Dam. There is no certainty that the sturgeon will use this structure or that it will have any effect on spawning or survival of this species. Additionally, the project proposes a net loss of SNS habitat.

- (9) The extent and significance of impact on the following aspects of quality or quantity of these valuable coastal resources:
  - (i) unique natural areas—destruction of endangered wildlife or vegetation or of significant marine species (as identified in the Living Marine Resources segment), degradation of existing water quality standards.

  This project will have a significant impact on Striped Bass and Shortnose Sturgeon. Mitigation of these impacts is dependent on mechanical means (oxygen injection and release of fingerlings) that has not been adequately demonstrated to reduce or eliminate the impacts to water quality and fish survival.

Boltin-Kelly to Colonel Hall
SHEP
January 25, 2011
Page 5

Chapter III, Section C.II. In critical areas of the coastal zone, it is OCRM policy that, in determining whether a permit application is approved or denied, OCRM "shall base its determination on the individual merits of each application, the policies specified in Sections 48-39-20 and 48-39-30 (of the Act), and be guided by the following general considerations:

- (3) The extent to which the applicant's completed project would affect the production of fish, shrimp, oysters, crabs or clams or any marine life or wildlife or other natural resources in a particular area including but not limited to water and oxygen supply.
  The project as proposed will impact dissolved oxygen concentrations and finfish production. However, the DEIS states mitigation will result in a minimal net improvement. SCDHEC OCRM believes the use of mechanical oxygen injection systems may not be adequate to maintain current DO levels. Additionally, the Department has concerns regarding the maintenance and long term viability of these systems.

- (6) The extent to which the development could affect the habitats for rare and endangered species of wildlife or irreplaceable historic and archeological sites of South Carolina's coastal zone.
  The project as proposed will effect Shortnose Sturgeon spawning, juvenile, and adult habitats. Additionally, SNS habitat will result in a net loss.

- (10) The extent to which the proposed use could affect the value and enjoyment of adjacent owners. (Section 48-39-150, S.C. Coastal Management Act of 1977, as amended).
  Adjoining lands owned by the state of South Carolina are currently identified as a potential site for a new ports facility. The use of this site for spoil disposal and maintenance dredge disposal will potentially eliminate the Jasper County location as a suitable location for the Ocean Terminal.

Chapter III, Section VII. A. Wildlife and Fisheries Management

- (1) In the coastal zone, including critical areas, Council (Department) issuance or review and certification of permit applications which would impact wildlife and fisheries resources will be based on the following policies:
  - a) Activities deemed, by the South Carolina Coastal Council (now SCDHEC OCRM) in consultation with the South Carolina Wildlife and Marine Resources(now SCDNR) Department, to have a significant negative impact on wildlife and fisheries resources, whether it be on the stocks themselves or their habitat, will not be approved unless overriding socio-economic considerations are involved. In reviewing permit applications relative to wildlife and fisheries resources, social and economic impacts as well as biological impacts will be considered.

  The proposed dredging to the depths chosen for the NED and the LP would greatly reduce habitat utilized by fisheries species, Striped Bass, as well as State and Federally listed endangered species, Shortnose Sturgeon. The shallower dredging alternatives are more desirable to both the NED and LP alternatives, however all

dredging alternatives (with or without mitigation) result in a net loss of Striper and SNS habitat.

Chapter III, Policy Section VIII. Dredging

- 1(c) Dredging should not reduce water circulation, water currents, mixing, flushing or salinity in the immediate area.
  As proposed, the project will increase the salinities within the immediate and upstream areas, causing a significant impact to the freshwater marshes.

- 2(b) Dredge activities should be restricted in nursery areas, in public and private shellfish grounds during periods of migration, spawning, and early development of important sport and commercial species;
  As proposed in the DEIS, the dredging under the NEP and LP plans would negatively impact areas utilized for spawning and early development of Striped Bass. The proposed mitigation for this impact by release of hatchery raised fingerlings by Georgia DNR; however this activity does not offset the spawning or loss of essential habitat.

- 2(c) Dredging and excavation shall not create stagnant water conditions, lethal fish entrapments, or deposit sumps or otherwise contribute to water quality degradation.
  As proposed dredging under the NED and LP plans, the project will further degrade the existing water quality conditions.

- 2(e) Dredged materials shall be deposited and contained in such a manner so as to prevent dispersal into adjacent wetland areas;
  The project proposes to utilize the deposition of these dredged materials to be placed into the Middle River, Rifle Cut, and the Little Back River; this deposition is for mitigating the predicted increase in salinity.

- 2(h) a specialized form of dredging activity involves the creation and maintenance of navigational channels and access canals. These activities have a potential for severe environmental impacts and should meet a demonstrated public need.
  The proposed deepening under the NED and LP plans result in a negative impact to areas of important resources for fisheries and wildlife. The shallower dredging alternatives are more desirable to both the NED and LP alternatives. Additionally, a demonstrated public need for the citizens of South Carolina has not been sufficiently demonstrated. Also, SCDHEC OCRM believes there may be other feasible alternatives that should be explored.

Chapter III, Policy Section XII. Activities in Areas of Special Resource Significance

- C. Navigation Channels
  - 1) Development which would result in loss of navigability will be prohibited

The measures proposed to mitigate for the predicted increase in salinity are to close Rifle Cut and Little Back River. These alterations would result in a loss of navigable waters by the public in these two water bodies.

- D. Public Open Space
  - 1) Proposals which would restrict or limit the continued use of a recreational open area or disrupt the character of such a natural area (aesthetically or environmentally) will not be certified where other alternatives exist.

The project proposed to close off Rifle Cut and Little Back River to reduce the potential effects of increased salinity. This proposed activity would restrict the continued use of these water bodies as recreational open areas. The Department believes that other alternatives exist aside from the closure of Rifle Cut and Little Back River.

- E. Wetlands (Outside of Critical Areas)

Findings: In addition to the extensive areas of salt and brackish marsh within the critical areas along the South Carolina coastline, the State's coastal zone also contains over 60,000 acres of fresh-water marshes. These wetlands further up the creeks and rivers, beyond the reach of saltwater at high tides, have a great diversity of plant species. They play a vitally important role in contributing nutrients to the waters which eventually reach the estuarine system (the critical areas). Fresh-water marsh areas are active filters for improving water quality, and since they are linked with the downstream system, they affect water quality in the critical areas. The freshwater marshes are important flood buffers and also function in maintenance of salinity levels in downstream estuaries.

  - 1) Project proposals which would require fill or other significant permanent alteration of a productive freshwater marsh will not be approved unless no feasible alternative exist or an overriding public interest can be demonstrated, and any substantial environmental impact can be minimized.

The project as proposed in the preferred LP alternative will impact 1212 acres of freshwater marsh through the introduction of more saline waters. While mitigation is proposed to offset these impacts, there are other feasible alternatives to further minimize the proposed impacts. All other dredging alternatives result in a net loss of freshwater wetlands and saltmarsh, even with mitigation, except for the 44 foot dredge alternative. The 44 foot dredge alternative will result in the net gain of 332 acres of freshwater marsh due to the conversion of brackish wetlands. Additionally, there is no overriding public interest for the citizens of the State of South Carolina in this project. As proposed, all of the benefits from the deepening of the Savannah Harbor will be accrued to the State of Georgia, while the majority of the ecological impacts will occur within the State of South Carolina.

In addition to the enforceable policies of the SCCMP, the proposed project is not consistent with governing regulations for the Critical Areas. Specifically, the following regulations:

G. Dredging and Filling:

2) The specific standards are as follows:

(c) To the maximum extent feasible, dredging and filling activities should be restricted in nursery areas and shellfish grounds and during periods of migration, spawning, and early development of important sport and commercial species;

(d) Dredging and excavation shall not create stagnant water conditions, lethal fish entrapments, or deposit sumps or otherwise contribute to water quality degradation;

H. Navigation Channels and Access Canals:

(1) Certain dredging activities involve the creation and maintenance of navigation channels and access canals. These activities have a potential for severe environmental impacts and should meet a demonstrated public need.

Several of the above cited policies require a demonstration of no feasible alternatives. The Federal Consistency Determination does not sufficiently demonstrate that there are no feasible alternatives. South Carolina's coastal zone management program defines "Feasible" as used in the Coastal Management Program in the context of "unless no feasible alternative exists." "Feasibility is determined by [DHEC OCRM] with respect to individual project proposals. Feasibility in each case is based on the best available information, including technical input from relevant agencies with expertise in the subject area, and considering factors of environmental, economic, social, legal, and technological suitability of the proposed activity and its alternatives. Use of this word includes the concept of reasonableness and likelihood of success in achieving the project goal or purpose. "Feasible alternative" applies both to locations or sites and to methods of design or construction, and includes the no action alternative." Here, the Federal Consistency Determination relies on its determination that adverse impacts will be mitigated. Though the CMP requires that unavoidable impacts be mitigated, there must first be a demonstration of no feasible alternatives/unavoidability. While the Federal Consistency Determination states that there are no feasible alternatives, it does so in a conclusory fashion and does not demonstrate why the other alternatives are not feasible. The Federal Consistency Determination does not consider other locations but only looks at methods for this location. In addition, its conclusion that the no action alternative and other alternatives are not feasible is conclusory and therefore is inadequate as a matter of law.

Based upon the above SCDHEC OCRM does not concur that the five dredging alternatives are consistent with the South Carolina Coastal Management Program (SCCMP) to the maximum extent practicable because it would result in the permanent alteration of productive freshwater marshlands, a net loss in spawning and juvenile habitat for Striped bass and SNS (T&E listed species) and degradation of water quality due to a reduction in dissolved oxygen. The DEIS has not adequately demonstrated that no feasible alternatives exist since other alternatives such as the potential location of the Jasper County Ocean Terminal were not considered. In addition, the DEIS fails to demonstrate an overriding public interest for the citizens of South Carolina. Again, It is DHEC's position that additional time remains to object to the federal agency's consistency determination, and reserves the right to supplement this letter accordingly.

Sincerely,

Carolyn Boltin-Kelly

Carolyn Boltin-Kelly

cc: Earl Hunter, SCDHEC-OCRM
Barbara Neale, SCDHEC-OCRM
Heather Preston, SCDHEC-BOW
Donna Weiting, Acting Director NOAA-OCRM

DEPARTMENT OF THE ARMY
SAVANNAH DISTRICT, CORPS OF ENGINEERS
100 W. OGLETHORPE AVENUE
SAVANNAH, GEORGIA 31401-3640

REPLY TO
ATTENTION OF:

March 30, 2011

Office of Counsel

Ms. Carolyn Boltin-Kelly
Deputy Commissioner
Office of Ocean and Coastal Resource Management,
South Carolina Department of Health and Environmental Control
1362 McMillan Avenue, Suite 400
Charleston, South Carolina 29405

Dear Ms. Boltin-Kelly:

In your letters, dated January 25, 2011 and January 31, 2011, you offered comments on the Draft General Reevaluation Report (GRR) and the Tier II Draft Environmental Impact Statement (DEIS) for the Savannah Harbor Expansion Project (SHEP) objecting to the Corps' determination that the project is consistent, to the maximum extent practicable, with South Carolina's Coastal Management Program (SCCMP). Your letter enumerates the enforceable policies applicable to the SHEP as: (1) Wildlife and fisheries management; (2) dredging; (3) Navigation channels; (4) Public open space; (5) Wetlands, and (6) Areas of historic, archaeological or cultural significance. However, your letter only offers commentary on how the Department of Health and Environmental Control (DHEC) does not concur with the Corps' determination that the SHEP is consistent with the aforementioned policies, and fails to offer recommendations that could be implemented into the project to obtain DHEC's concurrence.

Your letter identified several reasons why you disagree with the Corps' determination that the SHEP is consistent with the enforceable policies in the South Carolina Coastal Management Program (SCCMP). The enclosures contain our responses to each of those reasons.

It appears that your letter is not consistent with the enforceable polices in the SCCMP because it failed to consider the national interest and regional benefits of SHEP, failed to follow your policies regarding existing versus new port facilities, and failed to substantiate your consistency review with supporting information.

Your Coastal Zone Management Act (CZMA) consistency review failed to consider the national interest and regional benefits of the SHEP. Such consideration is mandated by Federal Law and regulations, South Carolina State Law, and the SCCMP. The CZMA at 16 U.S.C. § 1454(d)(12), requires that a management plan contain "a method for assuring that local land use and water use regulations within the coastal zone do not unreasonably restrict or exclude land uses of regional benefit." The National Oceanic and Atmospheric Administration (NOAA), CZMA regulations at 15 C.F.R 923.12 state that in accordance with this statutory requirement a management program must "identify what constitutes uses of regional benefit" 15 C.F.R § 923.12(a) and "identify and utilize one or a combination of methods, consistent with the control

techniques employed by the State, to assure local land and water use regulations do not unreasonably restrict or exclude uses of regional benefit." 15 C.F.R § 923.12(b). Also, 15 C.F.R § 923.52(a) states that a "management program must provide for adequate consideration of the national interest involved in planning for, and managing the coastal zone, including the siting of facilities...which are of greater than local significance." To this end, S.C. Code. Ann. § 48-39-80(B)(6) states that the management program shall "provide for adequate consideration of the local, regional, state, and national interest involved in the siting of facilities for...adequate transportation facilities and other public services necessary to meet requirements which are other than local in nature."

The SCCMP defines activities considered to be of regional benefit as those that "1) have been identified as Activities Subject to Management, that is, those determined to have direct and significant impact on coastal waters, and 2) result in a multi-county environmental, economic, social, or cultural benefit." SCCMP at III-8. The SCCMP explicitly states that "Activities of Regional Benefit in the South Carolina coastal zone are: 1) Transportation facilities – including...ports". Id. The SCCMP also states that the "following concerns are considered by South Carolina to be of such long-range, comprehensive importance as to be in the national interest: 1. National Defense" and "3. Maintenance of Navigation". SCCMP at III-5. The SCCMP goes on to state that "Resource Policies of particular interest for national defense are: Transportation a) Ports" and "Dredging, a) Dredging, b) Dredge Material Disposal." SCCMP at III-6.

The SHEP is a substantial navigation project that involves both dredging and dredge material disposal that our studies indicate will produce well over $100 million a year in national economic benefits. The SCCMP explicitly states that port projects are activities of regional benefit. The SCCMP explicitly states the maintenance of navigation is a concern of national interest. The SCCMP explicitly states that national defense is a concern of national interest and that ports, dredging, and dredge material disposal are of particular interest for National defense. Federal and State laws require that your consistency determinations adequately consider the national interest and regional benefits of projects submitted for your review. However, your review did not recognize the national interest or regional benefits of the SHEP. Your consistency review contains statements that directly contradict your policies. The Garden City Terminal, the facility that will receive most of the more efficiently received cargo, is sited only miles from the border of South Carolina. The SCCMP states that the ports and commercial waterways of South Carolina "have a major National impact by providing a means of access to international and domestic markets." SCCMP at III-19. Yet, your letter of January 25, 2011, at pp. 7, states that "all of the benefits from the deepening of the Savannah Harbor will be accrued to the state of Georgia..." In light of the SCCMP statements regarding the great importance of South Carolina ports, all of which handle substantially less cargo than Savannah Harbor, and are not located as close to any bordering state, your conclusion doesn't appear to be supported or enforceable.

The next area where your consistency review is inconsistent with the SCCMP is in its discussion of a Jasper Ocean Terminal. The SCCMP states that "new port development should take place in existing industrialized areas where sufficient support facilities are available

including public utilities, rail and highway transportation access, and navigation channels which are already maintained, unless there are no feasible alternatives or an overriding public interest can be demonstrated, and any substantial environment damage can be minimized." SCCMP at III- 19-20. The SCCMP also states that when considering port and harbor development projects in the coastal zone a policy of "maximizing the use of existing developed port areas, when feasible, before establishing new facilities in relatively undeveloped areas" should be considered. SCCMP at III-21. Thus, it is apparent that the SCCMP strongly supports the development of existing port facilities in favor of constructing new ports. Also, as you are aware, there is no current utility, highway, or rail access to a potential Jasper Ocean Terminal site.

Finally your consistency review failed to provide any supporting information upon which your determination is based. The SCCMP states that "should the State agency disagree with the Federal agency's determination, it must accompany its response with the reasons for disagreement as well as supporting information upon which its decision is based." SCCMP at V-16. Your review was not accompanied by information providing a basis for your decision.

In conclusion, the SCCMP itself summarizes the principle that underpins the CZMA consistency requirement; that "national interests must be taken into consideration by coastal states, and in return for this concession, the states are allowed a greater say in the future of their coastal zones." SCCMP at V-15. We continue to believe that the SHEP is consistent, to the maximum extent practicable, with SCCMP. We trust these explanations will allow you to concur in our determination.

I look forward to receiving your recommendations and appreciate and look forward to our continued collaboration on this project. If you would like to meet to discuss these matters, please let me know.

Sincerely,

Jeffrey M. Hall
Colonel, US Army
Commanding

Enclosures

South Carolina Department of Health and Environmental Control, Ocean and Coastal Resource Management

These responses have been updated from those which accompanied the USACE Letter to SCDHEC dated 30 March 2011.

Page 1

763-BB-28-EV01

Comment: *The South Carolina Department of Health and Environmental Control- Office of Ocean and Coastal Resource Management (SCDHEC OCRM or DHEC or the Department) has made great efforts to review the Draft General Re-Evaluation Report (DGRR) and the Tier II Draft Environmental Impact Statement (DEIS) (collectively referred to herein as the Federal Agency Consistency Determination) for the Savannah Harbor Expansion Project within the time frame provided by your letter of January 24, 2011. However, the Department disagrees with your analysis of the timeframe that the Coastal Zone Management Act provides to the Department to provide comments.*

Response: The timeframe for a State's review of a US Army Corps of Engineers Coastal Zone Management Consistency Determination varies depending on the regulation consulted. As noted in your letter of January 25, 2011, the NOAA Regulations [15 CFR 930.41] provide a State with a 60-day review period from receipt of the Federal agency's Consistency Determination. As explained in the District's letter of January 24, 2011, the Corps of Engineers must operate under its regulations (33 CFR 336.1 et seq), which provide a 45-day review period for the States. The Corps regulations include a 15-day extension of this review period if requested by a State. When the extension is included, a 60-day review period results.

Based on subsequent events, there is no issue concerning time to comment. The Corps extended the Draft EIS public comment period until January 25, 2011. The Corps received some comments even after that deadline, and they were accepted and considered in the Final EIS preparation. SCDHEC-OCRM submitted another comment letter on January 31, 2011 which was accepted and considered. On March 30, 2011, the Corps sent a letter to SCDHEC-OCRM responding to points raised in the SCDHEC-OCRM January 25 and 31, 2011 letters. As noted in more detail below, there was then further dialogue between the agencies and additional explanatory information was provided by the Corps to SCDHEC-OCRM. On May 27, 2011, SCDHEC-OCRM sent a letter replying to the Corps's March 30, 2011 letter. The Corps accepted SCDHEC-OCRM's additional comments after January 31, 2011.

763-BB-28-EV02

Comment: *The Department received notice of the federal agency's consistency determination on November 17, 2010.1 15 C.F.R. § 930.41(a) provides the State agency 60 days from receipt of the Federal agency's consistency determination and supporting information to inform the federal agency of the state agency's concurrence with or objection to the Federal agency's consistency determination. In addition, 15 C.F.R. § 930.41(b) provides that state agency concurrence shall not be presumed in cases where the State agency, within the 60-day period, requests an extension of time to review the matter. This regulation requires the Federal agency to approve one request for an extension period of fifteen days or less, if requested, and authorizes the Federal agency to approve a longer or additional extension period as appropriate. Additionally, this regulation requires that the Federal agency should consider the magnitude and complexity of the information contained in the consistency determination when considering whether a longer or an additional extension period is appropriate. DHEC OCRM requested*

additional time to evaluate the project on Dec. 3, 2010 and again on January 21, 2011. Because there is no discretion given to the Federal Agency to deny a first request for an additional fifteen days, the federal agency may not presume state concurrence until at least seventy-five days after the State agency's receipt of notice of the federal agency's consistency determination.2 Thus, DHEC has at least until January 31, 2011 to notify the Federal agency of its objection to the Federal agency's consistency determination.3 Additionally, given the magnitude and complexity of the information contained in the consistency determination, the Federal agency should grant an additional or longer period and the Department again requests that the Corps exercise its discretion and authorize the Department additional time to submit further comments on the federal agency's consistency determination. The Department believes that the 15 day extension is necessary to give the public and resource agencies the proper time to evaluate the project due to the "complexity and magnitude of the information" and the timeliness of the public notice during holiday season.

Response: See previous and subsequent responses.

Page 2

763-88-28-EV03

Comment: *As an initial matter, as the Federal Consistency Determination points out, the Coastal Zone Management Act, 16 U.S.C. §§ 1451, et. seq., requires that "Each federal agency activity within or outside the coastal zone that affects any land or water use or natural resource of the coastal zone shall be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved state management programs." 16 U.S.C. § 1456(c)(1)(A). "Consistent to the maximum extent feasible" is defined in the Regulations promulgated by the Secretary of Commerce and means "fully consistent with the enforceable policies of management programs unless full consistency is prohibited by existing law applicable to the Federal Agency." 15 C.F.R. § 930.32(a)(1). The Regulations further provide that "if a Federal agency asserts that full consistency with the management program is prohibited, it shall clearly describe, in writing, to the State agency the statutory provisions, legislative history, or other legal authority which limits the Federal agency's discretion to be fully consistent with the enforceable policies of the management program." 15 C.F.R. 930.32(a)(2). Here, the Federal Agency has not identified in writing to the state agency any existing law which prohibits full consistency with South Carolina's approved management program. Therefore, because the federal agency has not identified to the state agency any existing laws which prohibit full consistency, the Coastal Zone Management Act's requirement that the federal agency activity be consistent to the maximum extent practicable requires that the Federal agency activity be fully consistent with South Carolina's approved management program.*

Response: Under the Coastal Zone Management Act and Corps' regulations, the SHEP must be consistent with South Carolina's approved Coastal Zone Management Program (the South Carolina Coastal Management Program or SCCMP) to the maximum extent practicable, and that standard is met. In addition, as explained in the EIS, Section 5.0, and Appendix J, and the Corps' Federal Consistency Determination for South Carolina, the project with its associated mitigation is fully consistent with the enforceable provisions of the SCCMP. This determination is supported by the project's mitigation plan, including monitoring and adaptive management, which would ensure that the resources of South Carolina's coastal zone are protected.

Page 3

763-BB-28-EV04

Comment: *The project as proposed will not restore or enhance the resources of the state but will result in a degradation of coastal resources.*

Response: SHEP clearly meets the primary criterion of protecting the State's coastal resources, even if it may not restore/enhance all of the environmental resources of the State's coastal zone. It is doubtful that many of the large development projects that SCDHEC-OCRM reviews and approves meet the secondary restore and enhance criterion. SCDHEC-OCRM's letter regarding the guidelines for evaluating all projects states the applicable criteria as follows: "The extent to which the project will further the policies of the State of South General Assembly which are mandated for OCRM in implementation of its program these being: (b) to protect and where possible, to restore and enhance the resources of the State's coastal zone for this and succeeding generations." The SHEP meets the protection criterion since the project's design was repeatedly modified to minimize adverse impacts as well as include features to mitigate for unavoidable adverse effects. The Monitoring and Adaptive Management Plans detail the measures which will be implemented to protect the sensitive resources of coastal South Carolina.

763-BB-28-EV05

Comment: *The project as proposed will reduce dissolved oxygen, and depends on mechanical means in an attempt to maintain current levels. This causes a net loss of degraded fisheries habitat.*

Response: The impacts of the SHEP on the dissolved oxygen regime in the Savannah Harbor estuary are discussed in the EIS and in greater detail in the Engineering Appendix of the GRR. Based on the potential impacts to dissolved oxygen that would be caused by implementation of the SHEP, the project's mitigation plan includes an oxygen injection system. This system has been designed to remove the incremental impacts of the SHEP on the dissolved oxygen regime in the harbor. Due to the spacing of the system, the dissolved oxygen regime would be improved in over 90 percent of the estuary, when compared to existing conditions. The mitigation plan also includes various flow re-routing features in McCoy's Cut, Middle River, and Back River to supply that portion of the estuary with additional freshwater to reduce salinity levels. The project also includes a feature in the lower end Back River to reduce the amount of saltwater that would move up the Back River.

Even with the injection of oxygen and the flow diversion features of the mitigation plan, there would still be residual impacts to Shortnose sturgeon and Striped bass habitat. The Fisheries Interagency Coordination Team (of which SC DNR was a member) could not identify any mitigation features in the estuary that would be effective in replacing those lost habitats over the full range of river flow conditions. The team determined that annual funding for stocking Striped bass fingerlings and constructing a fish bypass at the New Savannah Bluff Lock and Dam to expand Shortnose sturgeon spawning habitat would be appropriate mitigation for their loss of habitat. The National Marine Fisheries Service (NMFS) approved and required the fish passage in its November 4, 2011 Biological Opinion. The SHEP is fully consistent with the SCCMP because the project provides adequate mitigation to offset the adverse effects on dissolved oxygen. Additionally, implementation of the Monitoring and Adaptive Management Plan would ensure that dissolved oxygen impacts due to dredging are mitigated in South Carolina waters after construction of the project is completed.

763-BB-28-EV06, 763-BB-28-EV07, 763-BB-28-EV08

Comment: *The proposed dredging to deepen the Savannah Harbor as set forth in the National Economic Development (NED) Plan, 47-foot Depth Alternative, and the Locally Preferred (LP) Plan, 48-foot Depth Alternative, will reduce the dissolved oxygen levels in the Savannah River from the existing state in an area utilized for spawning of important fisheries species including striped bass and shortnose sturgeon (SNS). Mitigation for this impact is to stock bass fingerlings provided by Georgia DNR and construction of a fishway for Shortnose Sturgeon at the New Savannah Bluff Lock & Dam at Augusta Georgia. Stocking of fingerlings does not eliminate impacts to spawning and nursery areas for the Striped Bass and the construction of a fishway does not assure the Shortnose Sturgeon will be able to use it. In the event low DO (Dissolved Oxygen) levels fall below current concentrations, as predicted in the DEIS, the lower part of the river may not be passable by adult or juvenile sturgeon. The shallower dredging alternatives are more desirable to both the NED and LP alternatives, however all dredging alternatives (with or without mitigation) result in a net loss of Striper and SNS habitat.*

Response: Shortnose sturgeon do not spawn in the estuary, but upstream in the Savannah River well outside the project effect's area. Low dissolved oxygen levels are not a concern in these upstream habitats during the spring spawning season for this species.

The Fisheries Interagency Coordination Team (of which SC DNR was a member) identified conditions to differentiate between areas that serve as suitable and unsuitable spawning habitats for Striped bass. Dissolved oxygen levels were included in the criteria of suitable habitat for Striped bass. The project's mitigation plan includes an oxygen injection system. The system has been designed to remove the incremental impacts of the SHEP on the dissolved oxygen regime in the harbor. Due to the spacing of the system, the dissolved oxygen regime would be incidentally improved in over 90 percent of the estuary, when compared to existing conditions.

As a result, the SHEP is fully consistent with the South Carolina Coastal Zone Management Plan in that it includes effective measures to protect and maintain water quality and provides adequate offsetting mitigation for significant adverse effects. Additionally, implementation of the Monitoring and Adaptive Management Plan would ensure that important fisheries species of South Carolina are protected during and after construction of the project.

The SHEP's mitigation does not eliminate the impacts to Striped bass spawning habitat. However, when it is not possible to avoid an impact, mitigation is used to lessen its importance. This objective would be realized via annual stocking of Striped bass fingerlings which will ensure the continued health and viability of this fishery in the lower Savannah River.

Construction of a fish bypass at New Savannah Bluff Lock and Dam will expand the Shortnose sturgeon's spawning habitat. The adverse impacts of reservoir and other construction which blocked sturgeon's access to historical upriver spawning areas are well-documented. Once constructed, Shortnose sturgeon use of the fish way would be monitored to determine its effectiveness. Adaptive Management funds would be available to modify the structure if the monitoring indicates that is required. Other anadromous species (American shad, Atlantic sturgeon, etc.) are also likely to benefit from the fish way. Successful fish passage at New Savannah Bluff Lock and Dam would result in fish passage structures being installed at the Augusta Diversion and Stevens Creek Dams, which will allow access to even more spawning habitat for anadromous fish. Restoring access to the traditional spawning habitat above the New Savannah Bluff Lock and Dam has been a high priority of NMFSs, US Fish and Wildlife Service, and SC DNR.

Since the proposed dissolved oxygen system would restore [and incrementally increase] dissolved oxygen levels in the estuary, there is no indication from the hydrodynamic and water quality model studies that the Shortnose sturgeon would not be able to use the lower reaches of the Savannah River from the standpoint of dissolved oxygen after harbor deepening.

The OCRM's preference for the project alternatives less than the 47-foot [or 48-foot] depth is acknowledged. Further, it is correct that some impacts to Striped bass and Shortnose sturgeon would remain despite extensive changes to the harbor deepening design and development of a comprehensive mitigation plan. Appendix C details why these apparent shortcomings are not significant.

Page 4

763-BB-28-EV09

Comment: *Models described in the EIS indicate impacts to large areas of freshwater marshlands including important habitat for fish, wading birds, & waterfowl. While efforts have been addressed to minimize impacts, a minimum of 337 acres of freshwater marsh will be affected by salt waters. Mitigation for this impact is to preserve additional wetlands adjacent to the Savannah River National Wildlife Refuge. Preservation does not replace the lost values and functions of the impacted freshwater marsh.*

Response: With the exception of the 44-foot alternative, all channel depths evaluated in the SHEP would affect some of the tidal freshwater marshes (via increased salinity levels) located in the estuary. This would be the case irrespective of the proposed mitigation features (flow rerouting). However, the SHEP would not result in the actual destruction [or even degradation] of these marshes. Instead, an increase in upstream salinity levels would cause areas of tidal freshwater marsh (223 acres with the 47-foot project) to transition into a brackish marsh community. Nonetheless, many of the emergent plant species associated with the tidal freshwater marsh communities would still flourish after project implementation. In fact, emergent plant species often associated with freshwater plant communities are readily observed in environments that have been defined as brackish marsh (Latham et. al., 1994).

Although the composition of tidal freshwater marshes would change with brackish marsh species becoming more prevalent, the basic wetland functions associated with these plant communities would not be materially transformed. A comparison of potential changes in wetland function after conversion of freshwater wetlands to brackish wetlands (shown in the following table) reveals there are only negligible alteration to functions such as water purification, flood protection, shoreline stabilization, groundwater recharge, stream flow maintenance, retention of particles, surface water storage, subsurface storage, nutrient cycling, and values to society.

Changes in Wetland Function as a Result of Wetland Conversion

Elements of Wetland Function	Freshwater to Brackish Marsh (Approximately 223 acres)	Saltmarsh to Brackish Marsh (Approximately 740 acres)
Water Purification	Negligible	Negligible
Flood Protection	Negligible	Negligible
Shoreline Stabilization	Negligible	Negligible
Groundwater Recharge	Negligible	Negligible
Stream flow Maintenance	Negligible	Negligible
Retention of Particles	Negligible	Negligible
Surface Water Storage	Negligible	Negligible
Subsurface Storage	Negligible	Negligible
Nutrient Cycling	Negligible	Negligible
Values to Society	Negligible	Negligible
Fish and Wildlife Habitat	Minor Adverse	Negligible

Likewise, the 47-foot depth would have a similar effect on 740 acres of saltmarsh which would also change through time into a brackish marsh. Dominant saltmarsh species like Spartina alterniflora would still be observed in areas which have salinities that define a brackish marsh. However, the overall basic wetland functions typically associated with these systems would not change. A comparison of potential changes in elements of wetland function for both conversion scenarios is shown in the table below.

As illustrated in the table, the only indirect effect the 47-foot project would have on the function of these wetlands systems would be associated with fish and wildlife habitat. All other elements of wetland function associated with predicted shifts in wetlands categorization would be negligible as a result of the anticipated salinity changes. It should be noted that areas of the Savannah Harbor identified as saltmarsh or brackish marsh support similar fish and wildlife species (Jennings, 2003). Any anticipated conversion of saltmarsh to a brackish marsh system would have a negligible impact on the overall function of the wetland system. The Corps recognizes that a comparison of fish and wildlife habitat between freshwater and brackish marsh systems yields fewer similarities. However, the conversion in fish and wildlife habitat would still be minor when considering the total function of the wetland and continued existence of some freshwater vegetation after deepening in wetland areas that would be viewed as brackish marsh.

The Wetlands Interagency Coordination Team (which included a representative of the South Carolina Department of Natural Resources) concluded that there were no opportunities either to restore or create substantial acreages of tidal freshwater marsh in the estuary. Consequently, preservation of lands that are ecologically valuable and add to the purposes of the Savannah National Wildlife Refuge was identified as appropriate mitigation for the remaining wetland impacts. These would be properties already identified in the Savannah National Wildlife Refuge Acquisition Plan. Vegetation-wise they consist of freshwater wetlands including bottomland hardwoods, maritime forest, and uplands dominated by deciduous forest and re-growth. The bottom land hardwoods are classified as palustrine forested, broad-leaved deciduous communities that are both temporarily and seasonally flooded. Preserving these areas would ensure their wildlife habitat value is protected in perpetuity. It was the consensus of the team that acquisition/preservation of these lands would serve as mitigation for reducing the only wetland function (fish and wildlife habitat value of freshwater marsh) materially

changed by SHEP. It is important to observe that the subject conversion impacts to tidal freshwater marsh would only occur in the State of Georgia. With the flow diversion measures in place, the amount of tidal freshwater marsh in South Carolina should increase along the Little Back River in the vicinity of the Savannah National Wildlife Refuge.

The proposed preservation parcel[s] to mitigate for the above vegetative changes consist of 2,245 acres of bottomland hardwoods, maritime forest and uplands dominated by deciduous forest and re-growth. The bottomland hardwoods are classified as palustrine, forested, broad-leaved deciduous systems that are both temporarily and seasonally flooded. Preserving these areas would ensure wildlife habitat is protected in perpetuity. Moreover, the additional lands would buffer the SNWR from future threats of development such that changes in land use would not occur immediately adjacent to existing areas of the Refuge that do contain emergent wetland characteristics. Thus, the acquisition and preservation of 2,245 acres of wetland and upland buffer provides a functional replacement for the conversion of the only wetland function (i.e., fish and wildlife habitat) that would be expected as a result of the 223 acre freshwater to brackish marsh conversion (See table above). Thus, the functional assessment conducted for all wetland areas proposed for impact and mitigation satisfies the intent of the no-net-loss criterion.

The Corps made use of a Wetland Interagency Coordination Team (ICT) [consisting of technical expert representatives from USACE, Federal natural resource agencies, and State natural resource agencies representatives] to identify acceptable mitigation for the proposed project. At that time, USFWS stated that mitigation actions must be performed within the basin for impacts to the SNWR wetlands. The Service recommended preservation as a possible solution and proposed sites that are part of its long-term acquisition strategy to compliment the SNWR. The Corps also consulted with the Stakeholder Evaluation Group, including its Non-governmental Organizations (NGOs) members, to identify any other suitable mitigation alternatives. Over the ten-year study period, no agency or organization could identify another feasible alternative as mitigation for impacts that would occur as a result of wetland conversion. Therefore, the Corps proceeded with the identification of preservation sites.

763-BB-28-EV10, 763-BB-28-EV11

Comment: *This project will result in a very large volume of spoils that will use significant areas within the exiting spoils disposal sites, located mostly in Jasper County, resulting in shorter life expectancy of the CDF (Contained Disposal Facility). This may result in the need for additional wetland impacts for expansion of the CDF in Jasper County. Additional impacts from existing port expansions, storage, and transportation facilities associated with the port will likely result in additional impacts to wetlands and water quality. The proposed disposal of spoils in the CDF will potentially eliminate the possibility of a new port in Jasper County.*

Response: The CDFs bordering Savannah Harbor [including those in South Carolina] are designated to receive sediment dredged from the Savannah Harbor Navigation Project. The environmental impacts associated with using these sites for dredged material disposal were addressed in the Long-Term Management Strategy EIS completed in 1996. Although the US Government does not own these sites in fee, the Corps of Engineers maintains easements to permit deposition of dredged sediments. These diked CDFs have been used for dredged material disposal for many years. Their continued use for disposal is considered the least environmentally damaging option for sediment placement in Savannah Harbor. When the perimeter dikes are raised, the existing CDFs could be used beyond the 50-year project evaluation period. Using the existing CDFs for new work material excavated during harbor deepening would not markedly decrease their useful life or lead to an earlier need to locate any new CDFs.

The Georgia Department of Transportation has requested that the Corps relinquish its sediment disposal rights for Disposal Areas 14A and 14B, the sites presently being considered for a container terminal in Jasper County. The Corps is providing technical information to the Joint Project Office to identify a disposal site to replace this lost capacity for Savannah Harbor, as well as a means to replace the existing mitigation features [from previous projects] located within those Areas. The Corps has advised GA DOT and the Joint Project Office that it would not release the disposal easements until development of a Jasper Container Terminal is imminent, i.e. the developer obtains a Section 404 permit. The JPO's consultant observed that placing new work sediments on Areas 14A and 14B would save the terminal development project over $200 million by raising its elevation to a workable height. Therefore, if SHEP is constructed, it would benefit the development of a container terminal in Jasper County by significantly reducing its initial construction costs.

763-BB-28-EV12

Comment: *The proposed project will impact habitat for the federally endangered Shortnose Sturgeon. Endangered species habitat is considered GAPC in the SCCZMP. Mitigation offered to offset this impact is to construct a fishway at the New Savannah Bluff Lock & Dam. There is no certainty that the sturgeon will use this structure or that it will have any effect on spawning or survival of this species. Additionally, the project proposes a net loss of SNS habitat.*

Response: The Monitoring and Adaptive Management Plan contain provisions to monitor the success of the proposed fish bypass at the New Savannah Bluff Lock and Dam in passing Shortnose sturgeon. The structure was specifically designed to accommodate passage of this species to its historic upstream spawning habitats. Consultation with relevant natural resource agencies was conducted to ensure a state of the art design for the structure. Other than removal of the dam, none could identify a better design for the conditions at this site. During the plans and specifications phase of the project, the Corps will consult with the resource agencies again to finalize the design. The Adaptive Management Plan includes funds to modify the fish way in the future if that proves necessary.

763-BB-28-EV13

Comment: *This project will have a significant impact on Striped Bass and Shortnose Sturgeon. Mitigation of these impacts is dependent on mechanical means (oxygen injection and release of fingerlings) that has not been adequately demonstrated to reduce or eliminate the impacts to water quality and fish survival.*

Response: The proposed DO system employs technology widely used in industrial settings. This long-term use has demonstrated its effectiveness in adding dissolved oxygen to all volumes of water. The Monitoring- and Adaptive Mitigation Plan provides for five years of post-construction monitoring to determine the efficiency/effectiveness of the oxygen injection system. The adaptive management plan provides the means to make any required modification to the oxygen injection system. Harbor deepening would adversely affect habitat of Shortnose sturgeon and Striped bass in the estuary. As noted above repeatedly, the proposed measures of mitigating for those impacts were deemed appropriate/acceptable by the Fisheries Interagency Coordination Team, of which SC DNR was a member. The survival of stocked Striped bass fingerlings in the Savannah River Estuary has been well documented by researchers from the University of Georgia.

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763-BB-28-EV14

Comment: *The project as proposed will impact dissolved oxygen concentrations and finfish production. However, the DEIS states mitigation will result in a minimal net improvement. SCDHEC OCRM believes the use of mechanical oxygen injection systems may not be adequate to maintain current DO levels. Additionally, the Department has concerns regarding the maintenance and long term viability of these systems.*

Response: Each of the proposed harbor deepening alternatives includes a dissolved oxygen improvement system to mitigate its adverse DO effects. The Corps' projections for dissolved oxygen levels in the harbor and the project's impacts to those levels are based on the hydrodynamic and water quality models that SC DHEC approved for the Corps to use on this project. EPA used a variation of those models in development of its April 2010 Draft Revised Dissolved Oxygen TMDL for Savannah Harbor. It is our understanding that SC DHEC concurred in EPA's use of that model. The models that the Corps used to predict impacts to dissolved oxygen are the same ones it used to design the DO improvement systems. The predictions from the models should be as reliable for impact determinations as they are for mitigation design and effectiveness. Use of Speece Cone injection along with other mitigation measures is expected to incrementally improve dissolved oxygen conditions in over 90 percent of the estuary compared to existing conditions. To ensure the DO systems function as intended, monitoring and adaptive management is a component of the post-construction commitments. The Corps intends to include operation of the mitigation features (including the DO systems) in the Record of Decision as a requirement for maintenance of the navigation channel. Successful installation, operation, and maintenance of the oxygen injection system is a requirement of several environmental approvals for the project, including Georgia and South Carolina's water quality certifications and the National Marine Fisheries Service Biological Opinion. On November 15, 2011, SC DHEC issued a Section 401 water quality certification that included, among other things, a condition requiring the project to mitigate for dissolved oxygen impacts that is protective of South Carolina waters.

763-BB-28-EV15

Comment: *The project as proposed will effect Shortnose Sturgeon spawning, juvenile, and adult habitats. Additionally, SNS habitat will result in a net loss.*

Response: There would be a reduction in Shortnose sturgeon habitat in the estuary as a result of the project. However, the proposed fish bypass would provide access to additional upstream sturgeon spawning habitats which will more than compensate for the losses in the estuary. See also other responses on these issues.

763-BB-28-EV16

Comment: *Adjoining lands owned by the state of South Carolina are currently identified as a potential site for a new ports facility. The use of this site for spoil disposal and maintenance dredge disposal will potentially eliminate the Jasper County location as a suitable location for the Ocean Terminal.*

Response: The Corps does not concur with the allegation that construction of the SHEP project effectively eliminates the Jasper County location as a candidate site for an ocean terminal. The Corps agrees with the engineering consultant to the Joint Project Office that placement of new work sediments on Areas 14A and 14B would reduce the terminal development costs by raising the site's elevation to a workable height. The Corps has advised GA DOT and the Joint Project Office that it would

not release its disposal easements on the property until development of the Jasper Container Terminal is imminent, i.e. the developer obtains a Section 404 permit. In addition, the Joint Project Office has stated that a terminal at Jasper would also require a navigation channel deeper that the present 42-foot depth.

763-BB-28-EV17

Comment: *The proposed dredging to the depths chosen for the NED and the LP would greatly reduce habitat utilized by fisheries species, Striped Bass, as well as State and Federally listed endangered species, Shortnose Sturgeon. The shallower dredging alternatives are more desirable to both the NED and LP alternatives, however all dredging alternatives (with or without mitigation) result in a net loss of Striper and SNS habitat.*

Response: The OCRM's preference for the project alternatives less than the 47-foot [or 48-foot] depth is acknowledged. Further, it is correct that some impacts to Striped bass and Shortnose sturgeon will remain [despite extensive changes to the harbor deepening design and development of a comprehensive mitigation plan]. Appendix C of the EIS describes the mitigation that would be performed to compensate for those remaining impacts. See also other responses on these issues.

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763-BB-28-EV18

Comment: *As proposed, the project will increase the salinities within the immediate and upstream areas, causing a significant impact to the freshwater marshes.*

Response: The EIS fully discusses the impacts of the SHEP on tidal freshwater marsh in the estuary. The project includes measures to minimize impacts to tidal freshwater marsh and compensate for those impacts that cannot be avoided. See also other responses on these issues.

763-BB-28-EV19

Comment: *As proposed in the DEIS, the dredging under the NEP and LP plans would negatively impact areas utilized for spawning and early development of Striped Bass. The proposed mitigation for this impact by release of hatchery raised fingerlings by Georgia DNR; however this activity does not offset the spawning or loss of essential habitat.*

Response: The Fisheries Interagency Coordination Team (which included the SC DNR) agreed that annual stocking of fingerling Striped bass in the lower Savannah River would be an appropriate mitigation technique for the loss of an increment of its spawning, egg, and larvae habitat. The fingerlings would replace juvenile fish that might not reach this life cycle stage because of SHEP's impacts on their habitat. Historically, the GA DNR-WRD stocked this species in the estuary for similar reasons. The recent growth in the Savannah River Striped bass population indicates that stocking is effective in addressing many life cycle problems. In fact, annual stocking of fingerling Striped bass would ensure that this sport fishery continues to prosper.

763-BB-28-EV20

Comment: *As proposed dredging under the NED and LP plans, the project will further degrade the existing water quality conditions.*

Response: The proposed project would not create stagnant water conditions, lethal fish entrapments, or deposit sumps. The use of Speece Cone injection along with other mitigation measures will incrementally improve dissolved oxygen conditions in over 90 percent of the estuary compared to existing conditions. See also other responses on these issues.

763-BB-28-EV21

Comment: *The project proposes to utilize the deposition of these dredged materials to be placed into the Middle River, Rifle Cut, and the Little Back River; this deposition is for mitigating the predicted increase in salinity.*

Response: None of the material [rock, stone, and sandy sediments] used to construct the closure structures in McCoy's Cut and Rifle Cut, , and the flow diversion structure at McCoy's Cut to increase the flow of freshwater downstream or restrict the flow of saltwater upstream would be placed in wetland areas in South Carolina. Rather, it would be placed in open water in Georgia. Materials used to construct the sill in Back River (in open water) would be deposited in ways that do not allow their dispersal into wetland areas.

763-BB-28-EV22

Comment: *The proposed deepening under the NED and LP plans result in a negative impact to areas of important resources for fisheries and wildlife. The shallower dredging alternatives are more desirable to both the NED and LP alternatives. Additionally, a demonstrated public need for the citizens of South Carolina has not been sufficiently demonstrated. Also, SCDHEC OCRM believes there may be other feasible alternatives that should be explored.*

Response: With regard to fisheries and wildlife impacts, see other responses to comments on these issues. As discussed in other responses and more fully in EIS, Section 5.0 and Appendix J, the SHEP is fully consistent with the South Carolina Coastal Zone Management Plan because it includes effective measures to protect and maintain water quality and provides adequate offsetting/compensatory mitigation for significant adverse effects. Additionally, implementation of the Monitoring and Adaptive Management Plan would ensure that important fisheries species of South Carolina are protected during and after construction of the project. Navigation studies undertaken by the US Army Corps of Engineers evaluate the benefits of a proposed project from a national perspective and do not focus on an individual state [or even region] when selecting the National Economic Development Plan. The SHEP evaluated a full range of alternatives and determined that deepening of Savannah Harbor to allow vessels to use it without light loading and/or tidal constraints is in the national interest. The screening of potential management measures to address the identified navigation needs is contained in Appendix O of the EIS. The majority of the construction activities and the environmental impacts would occur within the State of Georgia. With regard to feasible alternatives and public need, please see other responses to comments, i.e., 763-BB-28-EV27 and EV28, below.

763-BB-28-EV23

Comment: *The measures proposed to mitigate for the predicted increase in salinity are to close Rifle Cut and Little Back River. These alterations would result in a loss of navigable waters by the public in these two water bodies.*

Response: The public would not lose access to navigable waters as a result of the proposed mitigation features. Closures would occur at Rifle Cut (a man-made passage in Georgia) and the western end of McCoys Cut (South Carolina). Both of these areas are within the Savannah National Wildlife Refuge and

are not used by commercial traffic. Closing Rifle Cut would lengthen the transit of recreational boaters using the existing boat ramp at the Houlihan Bridge who travel to Back River. Constructing a new boat ramp on Hutchinson Island would provide more direct access to Back River for recreational boaters and addresses this issue (Appendix C-Figure 46). Chatham County would be given the ramp and operate the facility in perpetuity. The project does not include any closure structures on Little Back River.

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763-BB-28-EV24

Comment: *The project proposed to close off Rifle Cut and Little Back River to reduce the potential effects of increased salinity. This proposed activity would restrict the continued use of these water bodies as recreational open areas. The Department believes that other alternatives exist aside from the closure of Rifle Cut and Little Back River.*

Response: Extensive modeling of the Savannah Harbor was conducted to determine the most practicable means of avoiding/minimizing aquatic impacts to the maximum extent practicable while still achieving the project's purpose and need. Ultimately, implementation of flow routing measures proved to be the best way to achieve this objective [especially minimization of wetland impacts - see Appendix C]. Closing the western end of McCoys Cut is designed to bring more freshwater into Little Back and Middle Rivers while closing Rifle Cut would reduce the amount of salty water entering Little Back River via Middle River. Without the flow alteration structures, approximately 1,177 acres of freshwater marsh would be converted to brackish marsh by the 47-feet SHEP project. By implementing flow rerouting measure 6A, only 223 acres of freshwater marsh would be similarly converted. Thus, flow rerouting measure 6A satisfies both avoidance and minimization elements by maintaining 954 acres of freshwater marsh that would otherwise experience some degree of vegetative succession. Waters in the vicinity of the flow diversion structures would still be available for recreational use.

763-BB-28-EV25, 763-BB-28-EV26

Comment: *The project as proposed in the preferred LP alternative will impact 1212 acres of freshwater marsh through the introduction of more saline waters. While mitigation is proposed to offset these impacts, there are other feasible alternatives to further minimize the proposed impacts. All other dredging alternatives result in a net loss of freshwater wetlands and saltmarsh, even with mitigation, except for the 44 foot dredge alternative. The 44 foot dredge alternative will result in the net gain of 332 acres of freshwater marsh due to the conversion of brackish wetlands. Additionally, there is no overriding public interest for the citizens of the State of South Carolina in this project. As proposed, all of the benefits from the deepening of the Savannah Harbor will be accrued to the State of Georgia, while the majority of the ecological impacts will occur within the State of South Carolina.*

Response: With regard to marsh impacts, see other responses to comments on these issues, including response to comment 763-BB-28-EV09. As discussed in other responses and more fully in EIS, Section 5.0 and Appendix J, the SHEP is fully consistent with the South Carolina Coastal Zone Management Plan because it includes effective measures to protect and maintain water quality and provides adequate offsetting/compensatory mitigation for indirect impacts to salt marsh. Additionally, implementation of the Monitoring and Adaptive Management Plan would ensure that flow rerouting and marsh conversion is monitored and adaptively managed to protect South Carolina waters during and after construction of the project. It should also be noted that the majority of the construction activities and the environmental impacts would occur within the State of Georgia. With regard to public interest, please see other responses to comments, i.e., 763-BB-28-EV27 and EV28, below.

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763-BB-28-EV27

Comment: *Several of the above cited policies require a demonstration of no feasible alternatives. The Federal Consistency Determination does not sufficiently demonstrate that there are no feasible alternatives. South Carolina's coastal zone management program defines "Feasible" as used in the Coastal Management Program in the context of "unless no feasible alternative exists." "Feasibility is determined by [DHEC OCRM] with respect to individual project proposals. Feasibility in each case is based on the best available information, including technical input from relevant agencies with expertise in the subject area, and considering factors of environmental, economic, social, legal, and technological suitability of the proposed activity and its alternatives. Use of this word includes the concept of reasonableness and likelihood of success in achieving the project goal or purpose. "Feasible alternative" applies both to locations or sites and to methods of design or construction, and includes the no action alternative." Here, the Federal Consistency Determination relies on its determination that adverse impacts will be mitigated. Though the CMP requires that unavoidable impacts be mitigated, there must first be a demonstration of no feasible alternatives/unavoidability. While the Federal Consistency Determination states that there are no feasible alternatives, it does so in a conclusory fashion and does not demonstrate why the other alternatives are not feasible. The Federal Consistency Determination does not consider other locations but only looks at methods for this location. In addition, its conclusion that the no action alternative and other alternatives are not feasible is conclusory and therefore is inadequate as a matter of law.*

Response: The SHEP NEPA alternatives analysis ranged from considering other potential options or sites for the project, including other South Atlantic ports, to evaluating potential specific locations for disposal of dredged or fill material along Savannah Harbor and in the Atlantic Ocean along the entrance channel. The SHEP NEPA alternatives analysis is found in various places in the Environmental Impact Statement (EIS) and General Re-Evaluation Report (GRR) , including EIS Section 2.0, Purpose and Need for Action; EIS Section 3.0, Alternatives; EIS Appendix O, Formulation of Alternatives; GRR Section 6, Formulation of Alternatives; various other sections in the GRR; GRR Appendix A, Economics; GRR Appendix A, Attachment 6 (Regional Port Analysis); GRR Appendix A, Attachment 4 (Multiport Analysis); and GRR Appendix D, Plan Formulation Appendix.

The SHEP NEPA alternatives analysis includes the following key elements: (1) the statement of project purpose and need (EIS Section 2.0); (2) a Regional Port Analysis (GRR, Appendix A, Attachment 6); (3) a Multiport Analysis (GRR, Appendix A, Attachment 4); (4) analysis of various structural and non-structural alternatives (EIS, Section 3.0; GRR, Appendix D); (5) analysis of eight alternative locations or sites for a port/terminal along the Savannah River (EIS, Section 3.0 and Appendix O; GRR Section 6 and Appendix D); (6) analysis of six different depths of harbor deepening along the Savannah River (EIS, Section 3.0 and Appendix O; GRR, various sections); (7) analysis of alternative disposal sites, methods, or beneficial use of dredged sediments (EIS, Section 3.01.1 and 3.07); (8) analysis of related maintenance dredging requirements (EIS, Section 3.08-3.10); and (9) analysis of the no-action alternative (EIS, Section 3.01.1 and Appendix O; GRR Section 6.12.1).

The Regional Port Analysis specifically evaluated current and projected port capacity, demand, and growth, and environmental impacts and constraints for other South Atlantic ports (Norfolk, VA; Wilmington, NC; Charleston, SC; Savannah, GA; and Jacksonville, FL) and a proposed Jasper County Marine Terminal. GRR, Appendix A, Attachment 6, Final Report, pp. 1-20, and Interim Reports. In addition, the information regarding a Jasper County Marine Terminal from the Regional Port Analysis

was further analyzed in a study of the potential costs and environmental impacts of locating the project at one of eight different sites along the Savannah River (four on the South Carolina side, four on the Georgia side). EIS Sec. 3.0 and Appendix O; GRR Section 6.8 and Appendix D.

Among the conclusions reached as a result of the Regional Port Analysis, the Multiport Analysis, and the analysis of eight alternative sites for the project along the Savannah River were the following: (1) no one port could accommodate all the growth in container volume expected in the region, (2) all the major South Atlantic ports will experience so much cargo growth from 2005 to 2050 that they will all need deepening or improvement currently planned, (3) the proposed deepening of Savannah Harbor would not take business from another port because the shipping cost efficiencies would not outweigh the additional landside transportation costs (largely due to the longer distances from each port to and from population centers that are outside its primary service area), and (4) a Jasper County Marine Terminal would not be cost effective when compared to improving Savannah Harbor based on the high cost involved (now estimated by the Jasper terminal Joint Project Office at more than $4 billion including the cost of constructing the new transportation infrastructure that would have to be built), and the timing (Jasper does not exist at present and cannot be constructed in time to meet the growth in demand occurring through Savannah Harbor).

According to South Carolina's criteria, the SHEP NEPA alternatives analysis demonstrates there is no feasible alternative to deepening Savannah Harbor. In South Carolina, a feasible alternative must be reasonable, taking into account the likelihood that it will achieve the project purpose, the cost of the alternative, and other factors – and it must reduce adverse consequences on water quality. A proper feasible alternatives analysis includes analysis of alternative locations and sites, analysis of methods of design or construction, and analysis of the no-action alternative. The Corps's alternatives analysis for SHEP fully complied with these principles.

Originally, the local sponsor proposed the project with the purpose of improving navigation in Savannah Harbor. The Corps had a duty to take that project purpose into account. In addition, the US Congress then authorized the specific project (subject to further study and approval by other federal agencies). 1999 Water Resources Development Act, Pub. L. No. 106-53, sec. 101(b)(9). Despite the specific Congressional authorization, the Corps still undertook a wide-ranging, multi-level alternatives analysis as described.

It should be noted that South Carolina's Coastal Management Plan (SCCMP) specifically establishes a strong preference for developing ports in industrialized areas with existing infrastructure. See SCCMP, Part III, Transportation Facilities, at III-19 – III-20. This preference plus the high cost associated with developing a Jasper Terminal and the twenty years that will be required to study, permit, and construct that project, weigh heavily against finding a Jasper Terminal alternative to be feasible.

A March 11, 2011 "Update" from the Jasper Ocean Terminal project office, contains numerous statements that SHEP is necessary and beneficial for a Jasper Terminal project ("The development of the Jasper site is predicated on the success of ports in Savannah and Charleston. A completed SHEP and the planned expansion of Charleston are the first steps . . . ."). The Update states that a Jasper Terminal will handle container volumes in excess of what an improved (deepened) Savannah Harbor or Charleston Harbor could handle. The Update also confirms that a Jasper Terminal will cost $4 billion (a more recent estimate by the SCSPA is $5 billion).

In light of the information provided in the Update, combined with the fact that a Jasper Terminal would have its own environmental impacts requiring mitigation (Regional Port Analysis, DGRR, Appendix A, Attachment 6, Final Report, at 14-20, and associated Interim Reports), a Jasper Terminal is not presently a feasible alternative to SHEP. After extensive study, no other specific feasible alternative was identified or found.

The no-action or "without project" alternative was thoroughly considered in the GRR/EIS as well, but was not selected because it would not fulfill the project purpose and need, which are to address navigation inefficiencies in Savannah Harbor. The no-action alternative would not allow deepening the harbor so that larger and/or more fully loaded vessels could use it. By not enabling more efficient navigation in the harbor, the no-action alternative would not realize more than $170 million in net annual economic benefits that could be achieved with harbor deepening, even after taking the total project cost of SHEP into account. And while it is true that with the no-action alternative there would be no additional environmental impacts, the total project cost of SHEP includes comprehensive avoidance and mitigation that would reduce any potential impacts to natural resources to an acceptable level.

763-BB-28-EV28

Comment: *Based upon the above SCDHEC OCRM does not concur that the five dredging alternatives are consistent with the South Carolina Coastal Management Program (SCCMP) to the maximum extent practicable because it would result in the permanent alteration of productive freshwater marshlands, a net loss in spawning and juvenile habitat for Striped bass and SNS (T&E listed species) and degradation of water quality due to a reduction in dissolved oxygen. The DEIS has not adequately demonstrated that no feasible alternatives exist since other alternatives such as the potential location of the Jasper County Ocean Terminal were not considered. In addition, the DEIS fails to demonstrate an overriding public interest for the citizens of South Carolina. Again, it is DHEC's position that additional time remains to object to the federal agency's consistency determination, and reserves the right to supplement this letter accordingly.*

Response: The components of this summary comment have been addressed in various previous responses. As with any water resource development project having a large scope, the SHEP will have adverse impacts on the environment. Harbor deepening was evaluated from an impact and mitigation standpoint using the standard process which is (1) avoid impacts where possible (maintaining the existing side slopes of the channel to avoid additional wetland impacts), (2) minimize impacts that cannot be avoided (flow rerouting measures to reduce upstream salinity levels) and (3) compensate for the remaining impacts. Based on this evaluation process, the project's mitigation plan, including the Monitoring and Adaptive Management Plan provide appropriate compensation for the remaining impacts of the project in regards to direct wetland impacts, indirect impacts to tidal freshwater marsh, dissolved oxygen, Striped bass, and Shortnose sturgeon. The mitigation measures for these resources have been discussed in previous responses.

As to the feasible alternatives issue, see previous response. In addition, SCDHEC-OCRM's initial consistency review did not adequately consider the national interest and regional benefits of the SHEP. Such consideration is mandated by federal law and regulations, South Carolina state law, and the SCCMP. The CZMA at 16 U.S.C. § 1455(d)(12) requires that a management plan contain "a method for assuring that local land use and water use regulations within the coastal zone do not unreasonably restrict or exclude land uses of regional benefit." NOAA's CZMA regulations at 15 CFR 923.12 state that in accordance with this statutory requirement a management program must "identify what constitutes uses of regional benefit" 15 CFR § 923.12(a) and "identify and utilize one or a combination of methods,

consistent with the control techniques employed by the State, to assure local land and water use regulations do not unreasonably restrict or exclude uses of regional benefit." 15 C.F.R § 923.12(b). Also, 15 CFR § 923.52(a) states that a "management program must provide for adequate consideration of the national interest involved in planning for, and managing the coastal zone, including the siting of facilities...which are of greater than local significance." To this end, S.C. Code. Ann. § 48-39-80(B)(6) states that the management program shall "provide for adequate consideration of the local, regional, state, and national interest involved in the siting of facilities for...adequate transportation facilities and other public services necessary to meet requirements which are other than local in nature."

The SCCMP defines activities considered to be of regional benefit as those that "1) have been identified as Activities Subject to Management, that is, those determined to have direct and significant impact on coastal waters, and 2) result in a multi-county environmental, economic, social, or cultural benefit." SCCMP at III-8. The SCCMP explicitly states that "Activities of Regional Benefit in the South Carolina coastal zone are: 1) Transportation facilities – including...ports". Id. The SCCMP also states that the "following concerns are considered by South Carolina to be of such long-range, comprehensive importance as to be in the national interest: 1. National Defense" and "3. Maintenance of Navigation". SCCMP at III-5. The SCCMP goes on to state that "Resource Policies of particular interest for national defense are: Transportation a) Ports" and "Dredging, a) Dredging, b) Dredge Material Disposal. SCCMP at III-6.

The SHEP is a substantial navigation project that involves both dredging and dredged material disposal that our studies indicate will produce well over $150 Million a year in national economic benefits. The SCCMP explicitly states that port projects are activities of regional benefit. The SCCMP explicitly states the maintenance of navigation is a concern of national interest. The SCCMP explicitly states that national defense is a concern of national interest and that ports, dredging, and dredged material disposal are of particular interest for national defense. Federal and state laws require that consistency determinations adequately consider the national interest and regional benefits of projects submitted for review. However, SCDHEC-OCRM's initial review does not recognize the national interest or regional benefits of the SHEP. In fact, the initial SCDHEC-OCRM consistency review contains statements that directly contradict the SCCMP. The Garden City Terminal, the facility that will receive most of the more efficiently received cargo, is sited only miles from the border of South Carolina. The SCCMP states that the ports and commercial waterways of South Carolina "have a major national impact by providing a means of access to international and domestic markets." SCCMP at III-19. Yet, SCDHEC-OCRM's letter of January 25, 2011 states that "all of the benefits from the deepening of the Savannah Harbor will be accrued to the state of Georgia . . . ." Since South Carolina residents comprise 40% of the longshoremen working at the Garden City Terminal, the statement regarding the effect of SHEP on the citizens of South Carolina is unfounded.

Navigation studies undertaken by the US Army Corps of Engineers evaluate the benefits of a proposed project from a national perspective and do not focus on an individual state [or even region] when selecting the National Economic Development Plan. The SHEP evaluated a full range of alternatives and determined that deepening of Savannah Harbor to allow vessels to use it without light loading and/or tidal constraints is in the national interest.

D H E C
PROMOTE PROTECT PROSPER
C. Earl Hunter, Commissioner
Promulgating and protecting the health of the public and the environment

January 31, 2011

Colonel Jeffrey M. Hall, District Commander
U.S. Army Corps of Engineers, Savannah District
P.O. Box 889
Savannah, Georgia 31402-0889

Re: Savannah Harbor Expansion Project: Draft General Re-Evaluation Report and Draft Tier II Environmental Impact Statement

Dear Colonel Hall:

The South Carolina Department of Health and Environmental Control- Office of Ocean and Coastal Resource Management (SCDHEC OCRM) offers the following supplemental comments to our January 25, 2011 letter on the Draft General Re-Evaluation Report (DGRR) and the Tier II Draft Environmental Impact Statement (DEIS) for the Savannah Harbor Expansion Project. As stated previously SCDHEC-OCRM maintains that the time period allowed for the State to comment on this direct federal activity is a total of 75 days. Therefore, SCDHEC-OCRM maintains that the close of the comment period is close of business January 31, 2011.

Chapter IV Special Management Areas

A. Geographic Areas of Particular Concern (GAPC)

- (8)(c) Areas of Historic, Archeological or Cultural Significance: The extent and significance of negative impacts on Geographic Areas of Particular Concern (GAPCs). The determination of negative impacts will be made by OCRM in each case with reference to the priorities of use for the particular GAPC. Applications which would significantly impact a GAPC will not be approved or certified unless there are no feasible alternatives or an overriding public interest can be demonstrated, and any substantial environmental impact is minimized.

  The proposed project may potentially impact archeological resources which are potentially eligible, eligible or listed on the National Register. Specifically, two anomalies within SC waters between Stations 41+500 – 49+500 , two confederate crib obstructions within GA and SC waters between stations 55+000 – 68+500 and the CSS Georgia. SCDHEC OCRM staff has coordinated with the South Carolina Department of Archives and History (SHPO) and re-enforce their concerns in a letter to you dated December 7, 2010. SCDHEC OCRM has the responsibility to consider the impacts to the extent to which the proposed project will have on these resources.

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
Ocean and Coastal Resource Management
Charleston Office • 1362 McMillan Avenue • Suite 400 • Charleston, SC 29405 • Phone: (843) 953-0200 • Fax: (843) 953-0201 • www.scdhec.gov

Boltin-Kelly to Colonel Hall
SHEP
January 31, 2011

SCDHEC OCRM does not concur that the five dredging alternatives are consistent with the South Carolina Coastal Management Program (SCCMP) to the maximum extent practicable because it will potentially result in the adverse impact to GAPCs. However, SCDHEC-OCRM could find this aspect of the federal activity consistent if properly mitigated to SHPOs satisfaction.

Sincerely,

Carolyn Boltin-Kelly

Carolyn Boltin-Kelly

cc: Earl Hunter, SCDHEC-OCRM
Barbara Neale, SCDHEC-OCRM
Heather Preston, SCDHEC-BOW
Donna Weiting, Acting Director NOAA-OCRM

South Carolina Department of Health and Environmental Control, Ocean and Coastal Resource Management

These responses accompanied the USACE Transmittal Letter dated 30 March 2011

Page 1

1116-BB-02-EV01

Comment: *The proposed project may potentially impact archeological resources which are potentially eligible, eligible or listed on the National Register. Specifically, two anomalies within SC waters between Stations 41+500 – 49+500 , two confederate crib obstructions within GA and SC waters between stations 55+000 – 68+500 and the CSS Georgia. SCDHEC OCRM staff has coordinated with the South Carolina Department of Archives and History (SHPO) and re-enforce their concerns in a letter to you dated December 7, 2010. SCDHEC OCRM has the responsibility to consider the impacts to the extent to which the proposed project will have on these resources.*

Response: All cultural resource issues with South Carolina have been resolved. See SC DHEC Board Final Agency Decision, Nov. 15, 2011, SC DHEC-OCRM letter same date removing objection to Federal Consistency Determination, and EIS Appendix G (cultural resources Programmatic Agreement for SHEP signed by South Carolina SHPO and other parties).

Page 2

1116-BB-02-EV02

Comment: *SCDHEC OCRM does not concur that the five dredging alternatives are consistent with the South Carolina Coastal Management Program (SCCMP) to the maximum extent practicable because it will potentially result in the adverse impact to GAPCs. However, SCDHEC-OCRM could find this aspect of the federal activity consistent if properly mitigated to SHPOs satisfaction.*

Response: All cultural resource issues with South Carolina have been resolved. See SC DHEC Board Final Agency Decision, Nov. 15, 2011, SC DHEC-OCRM letter same date removing objection to Federal Consistency Determination, and EIS Appendix G (cultural resources Programmatic Agreement for SHEP signed by South Carolina SHPO and other parties).

D H E C

C. Earl Hunter, Commissioner

May 27, 2011

Colonel Jeffrey M. Hall, District Commander
U.S. Army Corps of Engineers, Savannah District
P.O. Box 889
Savannah, Georgia 31402-0889

Re: Coastal Zone Consistency Determination for SHEP

Dear Colonel Hall:

I want to thank you and your staff for meeting with my staff in Charleston on April 21, 2011, to discuss the Savannah Harbor Expansion Project (SHEP). We appreciated the opportunity to further discuss some of the aspects of this project which could potentially have a significant impact on coastal resources and uses. As outlined in our letters dated January 25 and 31, 2011, South Carolina Department of Health and Environmental Control, Office of Ocean and Coastal Resource Management (SCDHEC-OCRM) does not concur with the Corps' finding of consistency for SHEP. SCDHEC-OCRM has objected to the Corps finding of Consistent to the Maximum Extent Practicable as well as the expressed opinion that SHEP is fully consistent.

We have received the additional information from Mr. Bailey on May 13th and will review and provide additional feedback as needed.

As a threshold matter, I believe it is important to ensure there is a mutual understanding on where we are in the Federal Consistency process as stated in §§ 1451, et. Seq., and 15 C.F.R § 930 Subpart C. The Corps of Engineers found SHEP consistent with South Carolina's Coastal Program to the maximum extent practicable. In fact the Corps asserts that SHEP is fully consistent. SCDHEC-OCRM objects to this finding. The Federal Consistency process allows for the State and the federal agency (in this case the Corps of Engineers) to attempt to resolve those differences either informally or formally or via mediation (15 C.R.R. § 930.112) or judicial review (15 C.F.R. §930.116). However, before we attempt to more 'formally' resolve our agencies' different positions on consistency, it is important for the Corps to understand that positions and/or outcomes can potentially change.

In response to your letter dated March 30, 2011, I'd like to address a few issues. SCDHEC-OCRM did consider the national interest of SHEP as well as the potential regional benefits of this project as they relate to South Carolina's Coastal Program. The fundamental principle that underpins both the State and the federal Coastal Zone Management Act (CZMA) is the importance of our nation's coastal resources. Sections 302 and 303 of the federal CZMA detail the congressional findings and declaration of policy for the nation as it relates to coastal resources. In evaluating SHEP, SCDHEC-OCRM found that it contravened the State's applicable resource policies resulting in potential significant negative effects on coastal resources and uses which have been determined to be in the national interest to preserve and protect. However, with respect to the national interest in port related activities, SCDHEC-OCRM has carefully evaluated and weighed the potential significant negative environmental effects from SHEP and found that these negative impacts outweighed any benefits that might be in the national interest.

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
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As to activities of Regional Benefit, South Carolina's federally approved Coastal Program identified two categories of activities of Regional Benefit, transportation facilities and parks. Activities of regional benefit must also be found consistent with SC's CZMP. SCDHEC-OCRM finds SHEP to be inconsistent with the applicable resource policies even when given full consideration of any potential regional benefit. It is worth re-stating that the benefits to South Carolina from this project are minimal in light of the direct and indirect impacts.

Finally, SCDHEC-OCRM clearly articulated our reasons for objecting to the Corps' consistency determination and provided supporting information in our letters of January 25 and 31, 2010. Specifically, the potential impacts to the resources under the proposed plan would be excessive and without adequate opportunities to avoid or minimize such impacts. Furthermore, the plan's proposed mitigation would also be inconsistent with the regulations and policies of South Carolina's Coastal Program. Of particular note is the proposal to mitigate a significant amount of wetland impacts (both direct and indirect) with out-of-kind mitigation. Of the 2,683 acres proposed to be acquired and preserved as mitigation, it is unknown how much of this land is in fact wetlands versus uplands. Furthermore, other identified mitigation techniques rely on elaborate flow modifications to and mechanical injection of oxygen with Speece cones into the Savannah River. Even though this technology has not been shown to be effective in tidal systems it is being relied upon as the single best management practice to restore dissolved oxygen (DO) to pre-project conditions in this highly altered and impacted river system. Perhaps the most troubling aspect of the mitigation proposal is the reliance on annual appropriations to fund the purchase of the 2,683 acres of land for 'mitigation', construction, operation and maintenance of flow modifications, as well as Speece cone installation, operations and maintenance. The flow modifications will require on-going maintenance and the Speece cones are highly mechanized systems and if used, should require a dedicated source of funding as well as contingencies in the event these systems do not perform as predicted. SCDHEC-OCRM does not concur that relying on annual federal budget appropriations is an adequate mechanism for ensuring the successful mitigation for a project of this large nature and scope. For projects of similar scope found consistent with South Carolina's coastal program, SCDHEC-OCRM required a showing of an on-going financial commitment to operate and maintain such a system/structure. Additionally, projects of similar scope that SCDHEC-OCRM found consistent with the Coastal program required an identifiable financially binding commitment such as a performance bond or letter of credit to cover the cost of maintenance, operation, reconstructing or removal of structures that do not perform as predicted as well as restoring the affected area.

As mentioned previously, SCDHEC-OCRM would welcome continued discussions with the Corps regarding this project to discuss a potential outcome that reduces the impacts of the project as well as modifications to the proposed mitigation. If this is an option to which the Corps is agreeable, I will have my staff set up a meeting to facilitate further discussion. However, if this is not a viable option, then SCDHEC-OCRM will consider other pathways to ensure consistency with our State's Coastal program.

Sincerely,

Carolyn Boltin-Kelly
Deputy Commissioner, SCDHEC-OCRM

cc: Earl Hunter, Commissioner, SCDHEC
Donna Welting, Acting Director NOAA-OCRM

South Carolina Department of
Natural Resources
DNR

John E. Frampton
Director

January 25, 2011

Col. Jeffrey M. Hall
US Army Corps of Engineers
Savannah District
100 West Oglethorpe Avenue
Savannah, GA 31401-3640

REFERENCE: Draft General Re-Evaluation Report and Tier II Draft Environmental Impact Statement for the Savannah Harbor Expansion Project Chatham County, Georgia and Jasper County, South Carolina

Dear Col. Hall,

Personnel with the South Carolina Department of Natural Resources (DNR) have attempted to review in a timely fashion both the Draft General Re-Evaluation Report (DGRR) and the Tier II Draft Environmental Impact Statement (DEIS) for the Savannah Harbor Expansion Project. It should be noted that I formally requested a 120-day public comment period by letter to you dated November 18, 2010. Without direct reply to my request, the US Army Corp of Engineers (USACE) extended the initial 45-day comment period by 15 days, for a total public comment period of only 60 days.

These documents were released for public review immediately preceding the holiday period further burdening reviewers. Given the lengthy delays in final internal USACE review of these documents, I cannot help but believe that it would have been more appropriate to wait until the new year for their public release. There is the appearance that the timing of their release was a deliberate attempt to minimize thorough public and scientific scrutiny. DNR continues to assert that a 60-day period is insufficient to conduct a thorough review of the DEIS and DGRR and provide detailed comments on these large and complex documents. Therefore, DNR intends to submit additional comments following our continuing review of these documents or if new information becomes available regarding the proposed project.

Based on our assessment of the environmental impacts as presented in the DEIS and DGRR, and on the adequacy of the mitigation proposed, DNR has concluded that the only deepening alternatives that could be considered minimally environmentally acceptable are the 44-ft alternative or the 45-ft alternative, provided the proposed mitigation for each of these alternatives proves to be successful. Although, DNR does not support any deepening scenario greater than the 45-ft alternative, it should be noted that comments made by members of the South Carolina Maritime Commission (SRMC) indicate that even the 48-ft alternative would result in a channel that is shallower and narrower than USACE design standards for fully loaded Post-Panamax

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ships. This would result in a lower margin of safety and, by extension, a higher risk to the environment from potential vessel groundings. Therefore, none of the alternatives considered would accomplish the goal of ensuring navigational efficiency or safety for these larger vessels. The documents cite the preferred alternative provides "an acceptable level of risk" with respect to under-keel clearance. The SRMC analysis concludes USACE has applied this same level of "acceptable risk" to the narrow passage and passing lanes in the proposed channel. The DNR position is that there is no acceptable level of risk associated with environmental damage that could result from vessel grounding, hull breaching and a catastrophic spill endangering natural resources, public interests, commerce and tourism.

Our analysis concludes that the majority of benefits associated with the project occur in the state of Georgia while the majority of environmental impacts occur in South Carolina or in the Savannah River which is a shared tributary whose natural resources must be apportioned equitably, managed appropriately and respected by the leadership and people of both states.

In view of these concerns, DNR has concluded that a better alternative to consider is to conduct minimal deepening of the channel now and to a depth of -44 or -45 ft in order to alleviate draft restrictions on the existing fleet of vessels, and then to conduct additional studies and hydrodynamic modeling to evaluate the economic and environmental impacts of deepening to a greater depth only as far as the site of proposed Jasper Port Terminal. Since this site is several miles closer to the ocean than the Garden City Terminal, this alternative could potentially reduce the environmental impacts and cost of deepening, while increasing navigational safety and efficiency for the next generation of vessels predicted to call on the proposed Jasper Port Terminal. DNR recommends that this alternative be given serious consideration.

Specific comments on the DEIS appear in the attachment to this letter. Many of these comments apply to the DGRR as well; therefore a copy of this letter and attachment should be included in the administrative record for each of these documents. If you or any member of your staff has any questions regarding DNR comments, please contact Bob Perry of my staff at 803.734.3766 or perryb@dnr.sc.gov.

Very truly yours,

John E. Frampton
Director

Attachment as stated
c: Hon. Nikki R. Haley – Governor of the State of South Carolina
Hon. Lawrence K. Grooms – Senator SC District 37
C. Earl Hunter – Commissioner SC DHEC
Dean Moss – SRMC Chairman
Michael G. McShane – DNR Board Chairman
LTC Jason A. Kirk – USACE Charleston District Commander
William G. Bailey – USACE Savannah District Planning Chief

South Carolina Department of Natural Resources

Analysis of the

DRAFT TIER II ENVIRONMENTAL IMPACT STATEMENT FOR THE SAVANNAH HARBOR EXPANSION

Major Points Addressed in the DEIS:

The stated purpose of the proposed Savannah Harbor Expansion Project (SHEP) is to save current and future shipping costs due to draft restrictions on larger vessels. The DEIS presents an incremental analysis of the impacts of project depth alternatives ranging from 42 ft, the "no action" alternative through 48 ft. The Maximum Authorized Plan of -48 ft is supported by the non-Federal cost share sponsor. The US Army Corps of Engineers (USACE) has tentatively identified the 47-ft depth alternative as the National Economic Development (NED) Plan. The NED Plan is defined as:

> . . . *the plan that maximizes net economic benefits to the Nation and fully complies with Army policy.*

Although it is acknowledged in the DEIS that environmental impacts associated with shallower depths would be less than those associated with the NED Plan, the USACE concludes that:

> . . . *the lesser impacts of the 44-foot depth, 45-foot depth, and 46-foot depth alternatives are not considered sufficient to justify recommendation of these alternatives instead of the NED Plan.*

The DEIS further concludes that all depth alternatives, with the inclusion of proposed mitigation features, are:

> . . . *environmentally acceptable.*

DNR Summary Comment:

DNR disagrees with the conclusions reached in the DEIS and believes that the only 2 deepening alternatives that are environmentally acceptable are the 44-ft and the 45-ft alternatives, provided the proposed mitigation is effective in minimizing any adverse impacts of these alternatives. Obviously, the "no action" alternative, maintaining the channel at the currently authorized depth of 42 ft, would have the fewest adverse environmental impacts.

The NED Plan, the 47-ft alternative, would involve the initial excavation of about 28 million yd^3 of dredged sediment, and would result in both direct and indirect impacts to natural resources. Direct impacts would result from the physical removal and disposal of sediments, while indirect impacts would result from increased salinity intrusion and reduced dissolved oxygen (DO) levels. Overall impacts include adverse effects on managed freshwater wetlands in the Savannah

National Wildlife Refuge (SNWR), loss of tidal freshwater wetlands, impacts to public use of the estuarine/riverine system, loss of foraging and nursery habitat for the endangered shortnose sturgeon (*Acipenser brevirostrum*) (SNS), loss of salt and brackish marsh and loss of habitat for Striped bass (*Morone saxatilis*).

DNR Specific Comments:

Sediment Disposal and Associated Impacts:

Approximately 13 million yd^3 of sediment from the Entrance Channel would be placed in nearshore "feeder berms" off Tybee Island, "submerged berms" near the ocean bar entrance channel or in the EPA-approved Savannah Ocean Dredged Material Disposal Site (ODMDS). Since all of the proposed nearshore and offshore disposal sites are located either in federal waters south of the Entrance Channel or in state waters off the coast of Georgia (GA), DNR will defer to the federal agencies and state of GA regarding the potential environmental impacts of sediment disposal in those areas. DNR generally opposes open-water disposal of dredged material, except in an approved ODMDS or for the purpose of nourishing seriously eroding beaches with beach-compatible sand. Channel and harbor sediments may not be of the quality and size suitable for future beach nourishment.

Approximately 15 million yd^3 of sediment from the Inner Harbor, including new work material, would be disposed in the 8 existing upland confined disposal facilities (CDFs), 6 of which are on the South Carolina (SC) side of the river. Use of specific CDFs would be determined based on their availability and planned maintenance and improvement activities. Sediments collected from the project area in 1997 were tested for contaminants as part of the Tier I EIS. Parameters analyzed included metals, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), phenols, pesticides, dioxin/furan congeners, cyanide, organotins, and nutrients. Sampling conducted in 2005, and again in 2007, indicated the only analyte of significant ecological concern was cadmium, which occurs naturally in high concentrations in the Miocene clays that would be excavated and/or exposed as part of the deepening project. Bioaccumulation studies suggested that the risk to aquatic organisms exposed to these cadmium-laden sediments is low. The potentially greater risk to avian and terrestrial species foraging in the CDFs where these sediments would be disposed of would be mitigated by "capping" these sediments with a 2-ft layer of comparatively clean sediments from another part of the channel. A detailed protocol for sampling the surficial sediments and vegetation in the CDFs before and after capping is described in Appendix M of the DEIS. Should the project go forward, DNR concurs with this approach to managing the cadmium-laden sediments, and believes the proposed monitoring and contingency plans are adequate to ensure a minimal risk to wildlife.

Wetlands Impacts:

As stated in Section 5.1 of the DEIS, the extent of direct wetland impacts resulting from excavation of channel bend wideners, enlarging Kings Island Turning Basin and removing the Tidegate, would not differ substantially among the 5 deepening alternatives considered. In each

case, a total of 14.08 acres of salt and brackish marsh would be affected.[1] In the absence of an approved saltwater mitigation bank in the Savannah River Basin, USACE proposes to mitigate for these direct losses by grading down approximately 42 acres of a former confined dredge spoil disposal site (CDF 1S) near the confluence of the Front and Middle rivers to an elevation that would support *Spartina alterniflora*. A "feeder" creek system also would be constructed toward the interior of the restored marsh. This area would then be allowed to revegetate naturally. Active planting of *Spartina* would be conducted only if the area did not revegetate naturally at a rate that would provide 15% vegetative cover after 1 year and 80% vegetative cover after 5 years (with interim goals of 25, 40, and 60% cover at the end of 2, 3 and 4 years, respectively). Conceptually, DNR concurs with this approach to mitigating for the direct loss of brackish and saltwater wetlands resulting from any of the deepening alternatives; however, the DNR overriding concern about the indirect effects of harbor deepening on tidal freshwater marsh should be given greater weight.

As stated in Chapter 5 of the DEIS:

> *All of the deepening alternatives would adversely impact tidal freshwater marsh.*

Model predictions indicate that, without mitigation, deepening the harbor would result in the conversion of tidal freshwater marsh to brackish marsh as a result of increased salinity intrusion. Under conditions of average flow and low sea level rise, the acreage of freshwater marsh that would be lost as a result of deepening is predicted to range from 551 acres for the 44-ft alternative to 1,212 acres for the 48-ft alternative, assuming no mitigation is implemented. With the flow-altering modifications proposed as mitigation by USACE, the acreage of freshwater marsh is projected to increase by 332 acres with the 44-ft alternative; whereas, a net loss of freshwater marsh (ranging from 32 acres for the 45-ft alternative to 337 acres for the 48-ft alternative) would still result from the other deepening alternatives, even with mitigation. Considering the substantial loss of tidal freshwater wetlands that has already occurred as a result of past dredging operations and other modifications to the system, DNR considers anything more than a *de minimis* loss of freshwater wetlands to be a significant adverse impact of the proposed deepening project.

USACE proposes to minimize indirect impacts to tidal freshwater wetlands due to increased salinity intrusion by implementing several flow-altering modifications of the Savannah River system. These include diverting more fresh water from the Front River down the Middle and Little Back rivers at McCoy Cut, closing the lower, western arm of McCoy cut, removing the Tidegate abutments and piers from the lower Back River, constructing a broad berm at the lower end of the sediment basin located below the Tidegate, filling in the sediment basin using "new work" material, constructing a submerged sill at the mouth of the Middle River and closing Rifle Cut. USACE used the results of hydrodynamic modeling to develop a flow-alteration plan for each depth alternative and has determined that Plan 6B is the most "cost-effective" plan for the 44-ft depth alternative; whereas, Plan 6A is more "cost-effective" for all of the other depth

[1] It should be noted that this number differs from that cited elsewhere in the DEIS. The acreage of estuarine emergent marsh that would be lost as a direct result of excavation is given as 15.48 acres in Section 6.04, and as 15.68 acres in Appendix C. This apparent discrepancy should be corrected or clarified in the text of the DEIS.

alternatives analyzed including the 45-, 46-, 47- and 48-foot alternatives. Both Plans 6A and 6B would incorporate all flow-altering modifications described above, except that Plan 6A also would include deepening McCoy Cut and the upper portions of the Little Back and Middle rivers; whereas, Plan 6B would not include any such deepening.

USACE proposes to provide compensatory mitigation for unavoidable impacts to tidal freshwater wetlands. Initially, an attempt was made to identify other sites in the Savannah River estuary that could be used for restoration or creation of tidal freshwater marsh; however, neither the USACE nor any of the stakeholders could locate any suitable sites available within the Savannah River Basin. In the absence of any such sites, USACE, in consultation with US Fish and Wildlife Service (USFWS) and other natural resource agencies, used the Savannah District Mitigation Standard Operating Procedure to calculate the minimum acreage required to be acquired and preserved to acceptably mitigate for unavoidable freshwater wetland impacts. Using this procedure, it was determined that the total acreage of wetlands necessary to be preserved ranged from 0 acres for the 44-ft deepening alternative, with flow-altering mitigation, to 2,683 acres for the 48-ft alternative, with flow-altering mitigation. USACE proposes to acquire lands identified in the latest version of the Savannah National Wildlife Refuge (SNWR) Acquisition Plan (dated July 2007), and provide this acreage to the USFWS to manage as additions to SNWR as compensatory mitigation for unavoidable wetland impacts from the deepening project. USACE proposes to give priority to acquiring ecologically valuable properties that provide positive contributions to the goals of SNWR, that enhance fish and wildlife resources and that are dominated by freshwater wetlands. DNR concurs with this approach to mitigating for any unavoidable impacts to tidal freshwater wetlands, particularly since most of the indirect impacts of deepening would occur within the SNWR. However, DNR acknowledges the proposed philosophy of mitigating for loss of one type of wetland that is being converted to another by protecting wetlands which are under no threat of development or degradation is in direct contravention with national policy of no-net loss of wetlands [Executive Order 11988].

Water Quality Impacts:

As discussed in the DEIS, there are significant concerns related to the predicted decrease in DO that would result from the proposed deepening project. Degradation of the DO regime in Savannah Harbor has the potential to adversely affect numerous aquatic species. The primary area of concern for DO is the portion of the Savannah River between Fort Pulaski (river mile 0.0) and the Seaboard Coastline Railroad Bridge (river mile 27.4). This section of the Savannah River estuary would be directly affected by the deepening project. As noted in the DEIS, this segment of the river is on GA's Section 303(d) list as impaired for DO. Modeling studies conducted in support of the development of a Total Maximum Daily Load (TMDL) for DO in Savannah Harbor estimate that the existing DO concentration in Savannah Harbor is 1 mg/l lower than it was during the baseline year (1854) and condition (12-foot controlling depth) because of dredging operations that have been conducted since then. Model predictions from SHEP studies indicate that further deepening will cause additional impacts on the DO regime in Savannah Harbor.

USACE proposes to minimize impacts due to the incremental decrease in DO levels by installing several land-based oxygen injection systems, individual units of Speece Cones, at 3 locations in the estuary where DO levels are predicted to be lower as a result of deepening. The number of oxygen injection units installed would range from 8 to 10, depending on the depth alternative selected. Water would be withdrawn from the river through pipes, then super-saturated with oxygen and returned to the river. The systems would be operated to provide the needed amount of oxygen for the depth alternative selected during July, August and September. The DO system configuration is designed to remove the incremental effect of a deeper channel in 97% of the cells in the hydrodynamic model. As reported in the DEIS, hydrodynamic and water quality modeling conducted in support of the deepening project suggest that the proposed mitigation features, the flow-altering plans and the DO injection systems, would substantially reduce project impacts to tidal freshwater wetlands and certain species of fish including American shad (*Alosa sapidissima*) and Southern flounder (*Paralichthys lethostigma*).

DNR is concerned that a substantial amount of uncertainty remains regarding the predicted magnitude of adverse impacts and the effectiveness of the proposed mitigation measures. While DNR does not necessarily dispute the hydrodynamic and water quality modeling results, it should be noted that stakeholders have not conducted nor can any stakeholder conduct an independent review of all of the modeling assumptions or input parameters based on the documents and time provided for review. In addition, although we have been assured by USACE that the hydrodynamic and water quality models used to predict the impacts of deepening do, in fact, account for the effects of overdepth and advance maintenance dredging, we could locate no specific statement to this effect in either the DGRR or the DEIS. At the request of DNR, SCDHEC provided an analysis of the bathymetry used in developing the base model. This analysis suggests that the base model did not fully account for the combined effect of overdepth and advance maintenance dredging. Therefore, the model used to predict project impacts on salinity, DO, and loss of tidal freshwater wetlands may have underestimated those impacts. This possibility should be fully addressed in the text of both the DGRR and the DEIS. In addition, all assumptions and input parameters used in developing the hydrodynamic and water quality models should be discussed in detail and in layman's terms in both documents.

DNR also is concerned about the effectiveness of the proposed mitigation measures, particularly, the oxygen injection system. The results of a demonstration project conducted to determine the effectiveness of the system in Savannah Harbor were inconclusive. The slight increase in dissolved oxygen in the vicinity of the oxygen injection system was shown to be within the normal range of natural variability due to tidal influences and could not be definitively attributed to the oxygen injection system itself. Furthermore, the long-term effectiveness and viability of a mechanical oxygen injection system in a tidal brackish water environment is highly questionable. The minimal net improvement in DO predicted by the model may not be sufficient to warrant the initial cost of the system or the long-term maintenance costs. Additionally, DNR believes DO levels may deteriorate more than expected after the proposed deepening of the channel and require operation of the oxygen injection system for a longer period of time than the proposed 3-month interval during late summer-early fall. Longer periods of low flow and high temperature are anticipated in an era of climate change and will be magnifiers of the already existing water quality problems. Instead of reliance on an oxygen injection system, DNR recommends that adverse impacts to DO levels be minimized by deepening the project to no more than -45 ft.

SNS Habitat Impacts, Unintended Consequences and Proposed Mitigation:

DNR also is concerned that some or all of the flow-altering modifications could have unintended consequences that result in additional adverse impacts to natural resources. Significantly, the modifications proposed to reduce salinity intrusion into the Back River to protect tidal and managed freshwater wetlands could result in increased salinity intrusion into the Front and lower Middle rivers, where both juvenile and adult SNS are known to concentrate, particularly during the winter when temperatures are below 22° C.[2] [3] In fact, Table 5-30 shows that the loss of adult SNS habitat in winter would be much greater with the flow alterations (maximum loss of 439 acres for the 48-ft alternative) than without them (maximum loss of 44 acres for the 48-ft alternative). Conversely, the loss of adult SNS habitat in summer and juvenile SNS habitat in winter is predicted to be less with the proposed flow-alterations than without them.

The deepening alternative that is predicted to have the least negative impact on SNS habitat overall, including adults and juveniles during winter and summer, is the 44-ft alternative, which would result in a net loss of approximately 60 acres of SNS habitat with flow-altering mitigation, and 151 acres without flow alterations. By comparison, the NED Plan, the 47-ft alternative, is predicted to result in a net loss of 473 acres of SNS habitat overall with the proposed flow alterations, or a loss of 545 acres without flow alterations. The locally preferred plan, the 48-ft alternative, would result in even greater net losses of SNS habitat overall. DNR considers the magnitude of these impacts to the habitat of shortnose sturgeon to be unacceptable, with or without mitigation.

Other unintended consequences of flow alterations also are likely. Recent and ongoing tagging studies suggest that SNS may move freely between the Front, Middle and Back rivers via Steamboat Cut and Rifle Cut.[4] If this proves to be the case, closing Rifle Cut could impede this movement, and limit SNS access to suitable foraging and nursery habitat. In addition, DNR field biologists recently have reported that the upper end of the sediment basin immediately below the Tidegate has already filled in to a large extent, particularly along the sides of the basin, and that any further deposition of sediments in this area could present another impediment to SNS migration throughout the system.[5] Furthermore, DNR is concerned about the potential impact of open-water disposal of dredged material on water quality in the Back River. This could exacerbate recurring episodes of hypoxia in this area, and worsen shoaling in upstream portions of Back River by increasing the deposition of fine-grained sediments there.

As noted above, USACE also proposes to construct a sill near the mouth of the Middle River to protect important nursery habitat for juvenile SNS from adverse impacts. The intended purpose of this sill is to minimize the predicted increase in salinity in the lower portion of Middle River as a result of deepening. USACE proposes to provide compensatory mitigation for unavoidable

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[2] Collins, M.R., W. C. Post, and D. Russ. 2001. Distribution of shortnose sturgeon in the lower Savannah River: Results of research from 1999-2000. Final Report to Georgia Ports Authority. 21 pp plus appendices.

[3] Collins, M. R., W. C. Post, D. Russ, and T. I. J. Smith. 2002. Habitat use and movements of juvenile shortnose sturgeon in the Savannah River, Georgia/South Carolina. Trans. Am. Fish. Soc. 131:975-979.

[4] Meadows, A. W., W. C. Post, and J. Moak. *In prep.* Draft report on the movements of shortnose sturgeon in the Savannah River, GA/SC: 2006-2009.

[5] W. C. Post, Personal communication.

impacts to SNS foraging and nursery habitat by constructing a fish passage structure around the New Savannah Bluff Lock and Dam (NSBLD) near Augusta, GA, at a projected cost of $6.3 million. The structure described in section 5.3.2 as "a rock ramp fishway" would be located on the SC side of the river, and would theoretically provide SNS access to approximately 20 miles of upstream spawning habitat. DNR believes the likelihood that this approach would be successful in passing SNS is highly doubtful. While such a fish passage structure might benefit other migratory fish, its success in passing SNS has never been demonstrated. Because of its unproven success, DNR is opposed to implementing active fish passage as mitigation for unavoidable impacts to SNS habitat, and believes that the best approach to protecting SNS habitat would be to minimize those impacts by selecting either the "no action" alternative or the 44-ft deepening alternative with flow-altering mitigation.

Striped Bass Impacts:

While impacts to SNS would be minimized by selecting either the "no action" alternative or the 44-ft alternative, modeling results presented in the DEIS Table 5-36 suggest that the overall net loss of striped bass habitat including suitable habitat for spawning, eggs and larvae would be less with the 45-ft alternative (net loss of 0 acres for all life stages combined) than with the 44-ft alternative (net loss of 219 acres for all life stages combined). This seeming anomaly is a result of the proposal to increase freshwater flow down the Middle and Back rivers by dredging McCoy Cut and the upper reaches of the Middle and Little Back rivers as part of the flow-altering mitigation plan for the 45-ft alternative (Plan 6A), but not for the 44-ft alternative (Plan 6B). Striped bass is an important recreational species whose population in the lower Savannah River has been drastically reduced by earlier dredging operations and flow-altering modifications to the system. Because of the predicted increase in suitable habitat for the survival of striped bass eggs and larvae, DNR would consider the 45-ft alternative, with the proposed flow-alterations, to be environmentally acceptable, as well – provided USACE contributes supplemental funding to GA Department of Natural Resources (GADNR) ongoing striped bass stocking program in order to adequately compensate for all unavoidable impacts to striped bass habitat as described in Appendix C.

Public Use Issues:

As noted in the DEIS, closing Rifle Cut would lengthen the transit time and distance travelled by recreational boaters currently using Rifle Cut to reach the Back River from the only public boat ramp in this area at Houlihan Bridge on the Front River. USACE proposes to mitigate for this impact on recreational boating by constructing a new boat ramp on the north side of Hutchinson Island on the Back River. USACE then would turn over the site to Chatham County, which would operate the facility in perpetuity. If the deepening project is approved in some form and Rifle Cut is, in fact, closed as one of the flow-altering modifications, DNR would support the boat ramp proposal; however, our greater concern is that the indirect impacts to natural resources be minimized by limiting any deepening to no more than -44 or -45 ft. However, DNR is concerned about the proposal to turn the boat ramp over to the local county without providing continuing funding for maintenance, especially during a period when local governments are struggling financially. A funding mechanism to support the local government's operation of the boat ramp in perpetuity should be identified.

7

Potential for Invasive Species:

The DEIS acknowledges ballast water is:

> . . . *a major source for introducing non-native species into aquatic ecosystems where they would not otherwise be present.*

It is also acknowledged that invasive, non-native species can adversely impact the environment, the economy and, in some cases, human health. Nevertheless, the DEIS concludes that there would be no additional risk from the introduction of invasive species through ballast water since there is no projected increase in the number of vessels expected to call on the port of Savannah as a result of the proposed deepening. This conclusion is apparently based on the unsubstantiated assumption that the volume of ballast water is related only to the number of vessels calling on the port. Absent a comparison of the volume of ballast water currently carried and discharged into the port by the smaller vessels (in aggregate) vs. the volume of ballast water projected to be carried and discharged into the port by the fewer larger vessels (in aggregate) that are expected, the conclusion of "no additional risk" is without any rational basis. The possibility that larger vessels might actually carry and discharge more ballast water than smaller vessels would seem to further weaken that conclusion. In addition to any change in the volume of ballast water expected, other factors that should be considered are any projected changes in vessel speed and origin of ballast water. Any increase in vessel speed would presumably result in decreased transit time, thus increasing the probability of survival and delivery of invasive species propagules. Any projected change in the origin of ballast water also could affect propagule survival, as well as determine which species might be introduced. In summary, DNR believes the conclusion of "no additional risk" is not substantiated by evidence presented in the DEIS, and recommends that further analysis and discussion of the ballast water issue be included in the Final Environmental Impact Statement.

The DEIS states that, currently:

> . . . *ballast water exchange is the only effective management tool to reduce the risk of ballast-mediated invasion.*

However, it is widely acknowledged that ballast water exchange is not completely effective in eliminating the risk of introducing non-native species.[6] Other treatment technologies, such as filtration, heating, ultraviolet light and certain biocides (used either alone or in combination with ballast water exchange) have the potential to be more effective in reducing this risk. These technologies and the feasibility of implementing them should be discussed in greater detail in the DEIS.

It is stated in the DEIS that the University of Georgia, Marine Extension Service (MES) has completed a study designed to monitor for aquatic invasive species in the Port of Savannah, and that the MES was:

[6] National Research Council. 1996. Stemming the tide: Controlling introductions of nonindigenous Species by ships' ballast water. 141 pp.

> . . . *expected to release an Invasive Species Management Plan for the State of Georgia later in 2008.*

No further mention is made of this plan in the DEIS, however. This plan should be discussed with respect to its implications for SHEP.

Impacts on Essential Fish Habitat:

It is acknowledged in Section 5.04, that:

> . . . *the proposed action would adversely impact habitat of Striped Bass and the endangered Shortnose sturgeon.*

In section 5.15, however, USACE concludes that, with mitigation and monitoring:

> . . . *the proposed action is not expected to cause significant adverse impacts to Essential Fish Habitat or EFH species.*

This conclusion is repeated in Appendix S (Essential Fish Habitat). Similarly, it is stated in Appendix B (Threatened and Endangered Species) that with the implementation of certain conservation measures and the proposed mitigation plan for SNS, specifically the sill in Middle River and fish passage at New Savannah Bluff Lock and Dam:

> . . . *the proposed project may affect, but is not likely to adversely affect Shortnose or Atlantic sturgeon or their critical habitat.*

DNR believes that all of these statements are misleading and should be qualified. Specifically, it should be noted that the proposed mitigation for SNS (providing fish passage at New Savannah Bluff Lock and Dam), even if successful in providing access to upstream spawning habitat, would not replace the critical nursery and foraging habitat that would be lost as a result of harbor deepening. Similarly, while the proposed funding of the GADNR striped bass stocking program would help offset losses to striped bass habitat, it would not replace that lost habitat.

Monitoring and Adaptive Management Plan (Appendix D)

As stated in the first paragraph of Appendix D:

> *The Savannah Harbor Expansion Project . . . has the potential to adversely affect nationally important resources. In addition, since predictions are made about future effects to biological resources, there is a degree of uncertainty about the impacts which the recommended action would actually produce. Those uncertainties include both the accuracy of the predictive impact tools and the biological responses that will occur as a result of changes in the environment.*

DNR concurs with this assessment of the uncertainty regarding the accuracy of the hydrodynamic and water quality models used to predict the physical, chemical and biological

impacts of the proposed project and constructed mitigation features. DNR also agrees there is considerable uncertainty regarding the biological responses to these impacts. Because of this uncertainty, it is imperative that a comprehensive monitoring and adaptive management strategy be developed, implemented, and adequately funded, if the deepening project goes forward.

USACE defines "adaptive management" as:

> . . . *evaluating the accuracy of the predicted environmental impacts, assessing the effectiveness of the mitigation features, and modifying the project as needed to ensure the levels of environmental effects predicted in the Environmental Impact Statement (EIS) are not exceeded.*

As part of the EIS process, field investigations were conducted to identify important resources in the project area and obtain data from which the hydrodynamic and water quality models were developed. In order to determine the accuracy of these models in predicting the environmental impacts of the project, as well as the effectiveness of the constructed mitigation features, USACE proposes to conduct additional field studies before, during, and after construction (for a period of 5 years following construction). In addition, USACE proposes to conduct long-term post-construction monitoring "over the life of the project."

DNR generally concurs with the proposed pre-construction monitoring of physical characteristics and biological resources, in order to update existing information and provide a baseline for comparison with post-construction monitoring results; however, we question whether the intensive monitoring of hydrologic parameters within the lower estuary over one lunar cycle, will be sufficient to evaluate hourly, daily and, especially, monthly variations in the aquatic environment. DNR suggests that intensive hydrologic monitoring be conducted over a period of at least 2, and preferably 3, lunar cycles. The estimated cost of any such additional monitoring should be factored into the total pre-construction monitoring cost.

The proposed monitoring of biological resources would focus on impacts to tidal wetlands and shortnose sturgeon (SNS), which are described as:

> . . . *the two most critical resources that could be or are expected to be impacted by the project.*

DNR recommends that Atlantic sturgeon (*Acipenser oxyrinchus*), recently proposed to be listed as an endangered species, and striped bass be added to the list of biological resources to be monitored. If monitoring of striped bass is already included as a component of the GADNR striped bass stocking program, which USACE proposes to partially fund as compensatory mitigation for impacts to this species, this monitoring plan and its relevance to the deepening project should be described in Appendix D of the DEIS. Development of a monitoring protocol for Atlantic sturgeon should be closely coordinated with federal and state natural resource agencies. The estimated cost of adding these monitoring components should be factored into the total monitoring cost of the project.

No mention is made in Appendix D of a specific monitoring plan, or any associated costs, to evaluate vegetative species composition and percent cover at the brackish marsh creation site that is proposed as compensatory mitigation for direct impacts to fringing saltmarsh. This is one of the few proposed mitigation measures that actually has well-defined success criteria, based on percent cover, and an identified adaptive management strategy if the success criteria are not met (e.g., planting *Spartina alterniflora*). A monitoring plan designed to evaluate the progress and ultimate success of this project should be included in the "Post-Construction Monitoring" section of this appendix. The estimated cost of this monitoring component, conducted over a 5-yr period, should be added to the total monitoring costs.

As stated in Appendix D, current estimates for the project construction period range from 3 to 6 years, and that USACE would perform monitoring during construction "for whatever length of time it takes to construct the project." The cost estimates, however, assume only a 3-year construction period. DNR is concerned that the project may take considerably longer than 3 years to construct, and that the cost estimates for this phase of the monitoring plan may be too low. DNR recommends that the cost estimates for this monitoring phase be based on the maximum estimated duration of construction (6 years).

It is stated on p. 18 of Appendix D:

> *The Sediment Basin would be allowed to fill naturally after construction of the submerged sill at its lower end.*

Earlier in the main body of the DEIS, however, it is stated that the sediment basin would be actively filled in with dredged material. This discrepancy should be rectified and explained. In addition, it should be noted that DNR already has expressed its opposition to using the sediment basin for dredge spoil disposal because of its potential to further degrade water quality in the Back River.

DNR recommends that post-construction monitoring of: (1) nearshore benthic communities, (2) fish utilization of oceanward sediment placement sites, and (3) fish distribution and abundance along the marsh edges be extended from 3 years to 5 years. Cost estimates should be adjusted accordingly.

Depending on the results of the proposed monitoring studies, USACE in consultation with the federal and state natural resources agencies, may undertake appropriate adaptive management measures to ensure that the environmental impacts remain within the range predicted by the models, and that the constructed mitigation features perform as expected and adequately compensate for any unanticipated impacts. Appendix D lists several adaptive management measures that could be undertaken, depending on which environmental impact or mitigation feature might require corrective action. For most of the potential adaptive management measures listed, USACE proposes to allocate funds equal to 10% (or in some cases, only 5%) of the initial construction cost to the implementation of these corrective measures.

DNR is concerned that the amount of money proposed to be allocated for these, or other, adaptive management measures may be insufficient, particularly for those mitigation measures

that have a high degree of uncertainty associated with their success such as the oxygen injection system, the flow-altering modifications to the system and the fish passage structure at NSBLD. DNR recommends that funding for these adaptive management measures be increased to at least 15% of the initial cost of construction, and that funding for this purpose be secured prior to starting the project.

If corrective action is required, USACE proposes to conduct post-construction monitoring for only 1 year after implementing the adaptive management feature. DNR believes monitoring for only 1 year may be insufficient to determine the effectiveness of the corrective action, and recommends that dedicated funding be provided for monitoring the effects of any adaptive management feature for a minimum of 3 years.

The proposed long-term monitoring plan which is the plan to monitor certain aspects of the project on an annual basis beyond the initial 5-year post-construction monitoring period seems inadequate in that the cost of this monitoring component is only projected for one year, with funding in subsequent years presumably dependent on annual appropriations. DNR recommends that the total cost of long-term monitoring, as well as the cost of continued operation and maintenance for each mitigation component, be projected over the entire life of the project, and that this funding be secured prior to starting the deepening project.

South Carolina Department of Natural Resources

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759-BB-48-EV01

Comment: *These documents were released for public review immediately preceding the holiday period further burdening reviewers. Given the lengthy delays in final internal USACE review of these documents, I cannot help but believe that it would have been more appropriate to wait until the new year for their public release. There is the appearance that the timing of their release was a deliberate attempt to minimize thorough public and scientific scrutiny. DNR continues to assert that a 60-day period is insufficient to conduct a thorough review of the DEIS and DGRR and provide detailed comments on these large and complex documents. Therefore, DNR intends to submit additional comments following our continuing review of these documents or if new information becomes available regarding the proposed project.*

Response: Based on the request for an extension of time from SC DNR as well as from other reviewers, the District Commander extended the public comment period until January 25, 2011 which provided a total of 70 days for the public review period. The District received some comments after January 25 which will be made part of the record, and those comments will receive consideration in the preparation of the Final EIS.

759-BB-48-EV02, 759-BB-48-EV03, 759-BB-48-EV04

Comment: *Based on our assessment of the environmental impacts as presented in the DEIS and DGRR, and on the adequacy of the mitigation proposed, DNR has concluded that the only deepening alternatives that could be considered minimally environmentally acceptable are the 44-ft alternative or the 45-ft alternative, provided the proposed mitigation for each of these alternatives proves to be successful. Although, DNR does not support any deepening scenario greater than the 45-ft alternative, it should be noted that comments made by members of the South Carolina Maritime Commission (SRMC) indicate that even the 48-ft alternative would result in a channel that is shallower and narrower than USACE design standards for fully loaded Post-Panamax ships. This would result in a lower margin of safety and, by extension, a higher risk to the environment from potential vessel groundings. Therefore, none of the alternatives considered would accomplish the goal of ensuring navigational efficiency or safety for these larger vessels. The documents cite the preferred alternative provides "an acceptable level of risk" with respect to under-keel clearance. The SRMC analysis concludes USACE has applied this same level of "acceptable risk" to the narrow passage and passing lanes in the proposed channel. The DNR position is that there is no acceptable level of risk associated with environmental damage that could result from vessel grounding, hull breaching and a catastrophic spill endangering natural resources, public interests, commerce and tourism.*

Response: The position of the SC DNR that only the 44-foot project or the 45-foot project can be considered minimally environmentally -acceptable provided the proposed mitigation proves successful is acknowledged.

The preliminary channel design was determined using the Corps of Engineers' design standards and procedures outlined in EM-1110-2-1613, Hydraulic Design of Deep Draft Navigation Projects. In accordance with ER-1110-2-1403, the District developed final channel dimensions and navigation requirements using the Corps' state-of-the-art Ship Simulator, with input from the Savannah Harbor Pilots Association (SHPA). The use of ship simulators to establish final design parameters for deep-draft

navigation channels is standard practice worldwide. It ensures that channels are safe and economical and minimizes environmental impact and long term maintenance requirements. The use of ship simulators also provides the harbor pilots who will actually use the channel with the opportunity to provide input into the design and ensure the navigability and safety of the channel.

The existing channel dimensions can accommodate meeting the deepening design vessel (post-panamax Generation 2; 140' beam) and a smaller vessel. Ship simulation verified that the channel could be deepened and widened at 2 bends in the inner harbor and 1 bend in the entrance channel to maintain two-way traffic capability for the design vessel and a smaller vessel. Two meeting areas are also included to provide for meeting of two design vessels.

In reference to "Army Corps design standards" for depth of channel, the Corps, ASCE, and PIANC recommend a preliminary or concept design of channel depth in exposed entrance channels using the ratio of channel depth(h) to ship draft (T)of at least h/T =1.2. For Savannah Harbor, a detailed design study was performed using extensive laboratory models, field measurements, site-specific factors, numerical model simulations, and probabilistic models to refine the required channel depths. Currently the Savannah Harbor Pilots safely bring in vessels with a minimum of 4-foot underkeel clearance (UKC). This practice would continue with the deepened channel. Depending on the draft of the vessel, use of tide may be required to maintain that UKC throughout transit. The vertical ship motion study conducted for this study used a ratio channel depth h to ship draft T of h/T =1.09, which for the light-loaded vessel drafting 45-feet corresponds to a channel depth of 49'. This condition matches the SHPA policy of 4-foot UKC. The vertical motion study confirmed that the light-loaded vessel would not touch bottom if sailing with 4-foot UKC and if vessel speed does not exceed 12 knots (kt). The study also showed that given additional water depth, and therefore higher h/T values, ships could travel at higher speeds without causing enough squat to cause grounding.

For the fully loaded 47.5-foot draft, using a channel depth (h) to ship draft (T) of h/T =1.09, would correspond to a water depth of 52-feet requiring at least a 3' tidal advantage for the 49-foot entrance channel depth (47-foot project). The vertical motion study showed that a ship speed of 14 kts or less would not cause grounding due to squat for this condition. Greater speeds would require additional depth to prevent grounding due to squat.

Documentation for both the ship simulation and vertical motion studies can be found in Engineering Appendix Supplemental Materials.

The margin of safety for the project is in accordance with Corps of Engineers Guidance for Channel Design. We do not agree that there is a greater than normal risk for the project. Although there is always a degree of "risk" inherent with any project, this project was designed using sound engineering practices to minimize the risk to the maximum extent practicable.

The Corps understands SC DNR's concern about the risk of environmental damage that could result from a vessel accident in the harbor that damages or endangers natural resources. The US Coast Guard has similar concerns and oversees vessel movements in the harbor to ensure they are conducted in a safe manner. The Coast Guard has participated in the SHEP and provided the study team with valuable information about channel design and vessel operations. In their official comments on the Draft documents, the US Coast Guard raised no issues with the proposed channel design.

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759-BB-48-EV05

Comment: *Our analysis concludes that the majority of benefits associated with the project occur in the state of Georgia while the majority of environmental impacts occur in South Carolina or in the Savannah River which is a shared tributary whose natural resources must be apportioned equitably, managed appropriately and respected by the leadership and people of both states.*

Response: Actually, the majority of the construction activities and the environmental impacts would occur within the State of Georgia, not South Carolina. Important mitigation, including flow rerouting to maximize protection of freshwater tidal marsh in the Savannah National Wildlife Refuge, would benefit South Carolina natural resources. Regardless, the Savannah River is indeed a shared resource. The SHEP has been designed to avoid, minimize, and compensate for adverse environmental impacts to the Savannah River and its natural resources based on good science without regard to State boundaries or considerations of which State might be most affected.

759-BB-48-EV06

Comment: *In view of these concerns, DNR has concluded that a better alternative to consider is to conduct minimal deepening of the channel now and to a depth of -44 or -45 ft in order to alleviate draft restrictions on the existing fleet of vessels, and then to conduct additional studies and hydrodynamic modeling to evaluate the economic and environmental impacts of deepening to a greater depth only as far as the site of proposed Jasper Port Terminal. Since this site is several miles closer to the ocean than the Garden City Terminal, this alternative could potentially reduce the environmental impacts and cost of deepening, while increasing navigational safety and efficiency for the next generation of vessels predicted to call on the proposed Jasper Port Terminal. DNR recommends that this alternative be given serious consideration.*

Response: The SHEP Draft EIS and GRR were prepared as directed by the authorization for the project which was included in the Water Resources Development Act of 1999 (Public Law 106-53, Section 102(b)(9)). The project was approved to include (1) an analysis of the impacts of project depth alternatives ranging from 42 through 48 feet, and (2) a selected plan for navigation and an associated mitigation plan as required under Section 906(a) of the Water Resources Development Act of 1986 (33 U.S.C. 2283 (a)).

As directed by the authorization, the Corps prepared a DEIS that analyzes the impacts of the five alternative channel depths and then presents a mitigation plan for each alternative depth. The Corps also evaluated non-structural alternatives to meet the project needs, including consideration of alternative terminal locations. The 47-foot project is the alternative that has been identified as the plan with the most net benefits. Consequently, it is designated as the National Economic Development Plan and also the recommended plan. The actual selected plan will be determined after decision makers have reviewed the documents and had the opportunity to review the impacts, mitigation plan and benefits for each alternative. The Secretary of the Interior, the Secretary of Commerce, the Administrator of the Environmental Protection Agency, and the Secretary of the Army must approve the selected plan and determine that the associated mitigation plan adequately addresses the potential environmental impacts of the project.

The study included an extensive evaluation of users and facilities in regards to Savannah Harbor. The proposed Jasper County Terminal was not included as a without or with project condition due to the high level of uncertainty concerning the proposed terminal. Much of the uncertainty centered around

whether a terminal may be constructed in Jasper County, and if it is constructed, when will it be constructed and how would it operate. Although the proposed Jasper terminal was not considered in the detailed analyses, a series of sensitivity analyses were conducted to identify the potential impact that a Jasper County Terminal might have on the justification and recommendation of a proposed channel deepening to GPA's Garden City Terminal if the Jasper facility was constructed. Please see GRR Section 12. Overall, this analysis showed that economic justification for construction of the channel increment between a Jasper County Terminal and the Garden City Terminal is not particularly sensitive to the development of a terminal in Jasper County. In other words, if the Jasper County Terminal was already constructed, deepening the channel to GPA's Garden City Terminal would still be economically justified.

For additional information concerning the wide range of alternatives considered, including a proposed Jasper Terminal, see responses to comments 763-BB-28-EV27 and EV28.

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759-BB-48-EV07

Comment: *DNR disagrees with the conclusions reached in the DEIS and believes that the only 2 deepening alternatives that are environmentally acceptable are the 44-ft and the 45-ft alternatives, provided the proposed mitigation is effective in minimizing any adverse impacts of these alternatives. Obviously, the "no action" alternative, maintaining the channel at the currently authorized depth of 42 ft, would have the fewest adverse environmental impacts.*

Response: The 47-foot channel can be designated as the NED Plan (maximizes net benefits to the nation) despite having greater environmental impacts than the 44-foot, 45-foot, and 46-foot projects, because project plans for the 47-foot project include measures to avoid and minimize adverse impacts to the maximum extent practicable and then mitigation measures for remaining unavoidable impacts. Information (environmental impacts, economic benefits, and costs) is provided in the EIS for all five channel depths evaluated so decision makers can have the data to decide if the benefits of a particular alternative outweigh the associated environmental impacts and costs to minimize and mitigate those impacts.

759-BB-48-EV08, 759-BB-48-EV09

Comment: *The NED Plan, the 47-ft alternative, would involve the initial excavation of about 28 million yd3 of dredged sediment, and would result in both direct and indirect impacts to natural resources. Direct impacts would result from the physical removal and disposal of sediments, while indirect impacts would result from increased salinity intrusion and reduced dissolved oxygen (DO) levels. Overall impacts include adverse effects on managed freshwater wetlands in the Savannah National Wildlife Refuge (SNWR), loss of tidal freshwater wetlands, impacts to public use of the estuarine/riverine system, loss of foraging and nursery habitat for the endangered shortnose sturgeon (Acipenser brevirostrum) (SNS), loss of salt and brackish marsh and loss of habitat for Striped bass (Morone saxatilis).*

Response: This is a broad general comment raising a variety of issues regarding direct and indirect impacts to wetlands and fisheries. EIS Section 5.0 contains a detailed discussion of the expected impacts and the proposed mitigation. See also other responses to comments on these issues.

The SHEP would not have adverse effects on the managed wetlands in the Savannah National Wildlife Refuge. Based on evaluations conducted during the SHEP, none of the five deepening alternatives with mitigation in place would increase salinity levels at the Savannah National Wildlife Refuge diversion

canal entrance. With the proposed mitigation, salinity levels are projected to decrease in that portion of Back River.

Shortnose sturgeon spawning habitat is located well above Savannah Harbor. Thus, the SHEP would have no impacts on nursery habitat. As discussed in the DEIS, there would be impacts to adult and juvenile Shortnose sturgeon habitat.

The project will result in the loss of brackish marsh in the areas of excavation required for the Kings Island Turning Basin expansion, meeting lane construction and Tidegate abutment removal. Project plans provide for 28+ acres of former Disposal Site 1S to be restored as mitigation for these losses. It should be noted that the flow diversion aspects of the mitigation plan would provide indirect beneficial impacts where saltmarsh is converted to brackish marsh. (Brackish marsh is considered more productive from a wildlife standpoint).

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759-BB-48-EV10

Comment: *Approximately 15 million yd3 of sediment from the Inner Harbor, including new work material, would be disposed in the 8 existing upland confined disposal facilities (CDFs), 6 of which are on the South Carolina (SC) side of the river. Use of specific CDFs would be determined based on their availability and planned maintenance and improvement activities. Sediments collected from the project area in 1997 were tested for contaminants as part of the Tier I EIS. Parameters analyzed included metals, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (P AHs), phenols, pesticides, dioxinlfuran congeners, cyanide, organotins, and nutrients. Sampling conducted in 2005, and again in 2007, indicated the only analyte of significant ecological concern was cadmium, which occurs naturally in high concentrations in the Miocene clays that would be excavated and/or exposed as part of the deepening project. Bioaccumulation studies suggested that the risk to aquatic organisms exposed to these cadmium-laden sediments is low. The potentially greater risk to avian and terrestrial species foraging in the CDFs where these sediments would be disposed of would be mitigated by "capping" these sediments with a 2-ft layer of comparatively clean sediments from another part of the channel. A detailed protocol for sampling the surficial sediments and vegetation in the CDFs before and after capping is described in Appendix M of the DEIS. Should the project go forward, DNR concurs with this approach to managing the cadmium-laden sediments, and believes the proposed monitoring and contingency plans are adequate to ensure a minimal risk to wildlife.*

Response: The Corps has worked with the US Fish and Wildlife Service to develop the appropriate sampling protocol. Monitoring of the disposal areas where cadmium-laden sediments are placed would include sediment sampling, wildlife use monitoring, bird tissue analysis, vegetation sampling (if cadmium levels dictate such monitoring to be appropriate), and analysis of effluent from the CDFs.

759-BB-48-EV11

Comment: *As stated in Section 5.1 of the DEIS, the extent of direct wetland impacts resulting from excavation of channel bend wideners, enlarging Kings Island Turning Basin and removing the Tidegate, would not differ substantially among the 5 deepening alternatives considered. In each case, a total of 14.08 acres of salt and brackish marsh would be affected.' In the absence of an approved saltwater mitigation bank in the Savannah River Basin, USACE proposes to mitigate for these direct losses by grading down approximately 42 acres of a former confined dredge spoil disposal site (CDF 1 S) near the confluence of the Front and Middle rivers to an elevation that would support Spartina alterniflora. A "feeder" creek system also would be constructed toward the interior of the restored marsh. This area*

would then be allowed to revegetate naturally. Active planting of Spartina would be conducted only if the area did not revegetate naturally at a rate that would provide 15% vegetative cover after 1 year and 80% vegetative cover after 5 years (with interim goals of 25, 40, and 60% cover at the end of 2, 3 and 4 years, respectively). Conceptually, DNR concurs with this approach to mitigating for the direct loss of brackish and saltwater wetlands resulting from any of the deepening alternatives; however, the DNR overriding concern about the indirect effects of harbor deepening on tidal freshwater marsh should be given greater weight.

Response: The support of the SC DNR for marsh restoration in Disposal Area 1S for mitigation of the direct losses of brackish marsh is acknowledged. With regard to indirect impacts to tidal freshwater marsh, the Corps has clarified the Final EIS to show that the acreage of tidal freshwater marsh in South Carolina is predicted to increase as a result of the project construction activities. For additional information regarding mitigation for indirect impacts to tidal freshwater marsh, see response to comment 763-BB-28-EV09.

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759-BB-48-EV12

Comment: *Model predictions indicate that, without mitigation, deepening the harbor would result in the conversion of tidal freshwater marsh to brackish marsh as a result of increased salinity intrusion. Under conditions of average flow and low sea level rise, the acreage of freshwater marsh that would be lost as a result of deepening is predicted to range from 551 acres for the 44-ft alternative to 1,212 acres for the 48-ft alternative, assuming no mitigation is implemented. With the flow-altering modifications proposed as mitigation by US ACE, the acreage of freshwater marsh is projected to increase by 332 acres with the 44-ft alternative; whereas, a net loss of freshwater marsh (ranging from 32 acres for the 45-ft alternative to 337 acres for the 48-ft alternative) would still result from the other deepening alternatives, even with mitigation. Considering the substantial loss of tidal freshwater wetlands that has already occurred as a result of past dredging operations and other modifications to the system, DNR considers anything more than a de minimis loss of freshwater wetlands to be a significant adverse impact of the proposed deepening project.*

Response: All alternative channel depths evaluated in the SHEP (except for the 44-foot project) would have impacts on freshwater tidal marsh even with the proposed flow diversion measures. These impacts, as well as the proposed mitigation (purchase of lands for preservation), are fully discussed and quantified in the EIS so that decision makers can weigh the benefits of a particular channel depth alternative with these adverse impacts. For additional information regarding mitigation for indirect impacts to tidal freshwater marsh, see responses to comments 763-BB-28-EV09 and 759-BB-48-EV14/15.

759-BB-48-EV13

Comment: *USACE proposes to minimize indirect impacts to tidal freshwater wetlands due to increased salinity intrusion by implementing several flow-altering modifications of the Savannah River system. These include diverting more fresh water from the Front River down the Middle and Little Back rivers at McCoy Cut, closing the lower, western arm of McCoy cut, removing the Tidegate abutments and piers from the lower Back River, constructing a broad berm at the lower end of the sediment basin located below the Tidegate, filling in the sediment basin using "new work" material, constructing a submerged sill at the mouth of the Middle River and closing Rifle Cut. USACE used the results of hydrodynamic modeling to develop a flow-alteration plan for each depth alternative and has determined that Plan 6B is*

the most "cost-effective" plan for the 44-ft depth alternative; whereas, Plan 6A is more "cost-effective" for all of the other depth alternatives analyzed including the 45-, 46-, 47- and 48-foot alternatives. Both Plans 6A and 6B would incorporate all flow-altering modifications described above, except that Plan 6A also would include deepening McCoy Cut and the upper portions of the Little Back and Middle rivers; whereas, Plan 6B would not include any such deepening.

Response: The Sediment Basin would not be filled in with new work material. A sill would be constructed in Back River in the lower part of the Sediment Basin which would include rock and sandy dredged sediments. The Sediment Basin would then be allowed to fill through natural sediment deposition. The sill in Middle River has also been eliminated from the project because it was determined that construction of this feature would provide very little environmental benefit for the costs involved to implement it.

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759-88-48-EV14, 759-88-48-EV15

Comment: *USACE proposes to provide compensatory mitigation for unavoidable impacts to tidal freshwater wetlands. Initially, an attempt was made to identify other sites in the Savannah River estuary that could be used for restoration or creation of tidal freshwater marsh; however, neither the USACE nor any of the stakeholders could locate any suitable sites available within the Savannah River Basin. In the absence of any such sites, USACE, in consultation with US Fish and Wildlife Service (USFWS) and other natural resource agencies, used the Savannah District Mitigation Standard Operating Procedure to calculate the minimum acreage required to be acquired and preserved to acceptably mitigate for unavoidable freshwater wetland impacts. Using this procedure, it was determined that the total acreage of wetlands necessary to be preserved ranged from 0 acres for the 44-ft deepening alternative, with flow-altering mitigation, to 2,683 acres for the 48-ft alternative, with flow-altering mitigation. USACE proposes to acquire lands identified in the latest version of the Savannah National Wildlife Refuge (SNWR) Acquisition Plan (dated July 2007), and provide this acreage to the USFWS to manage as additions to SNWR as compensatory mitigation for unavoidable wetland impacts from the deepening project. USACE proposes to give priority to acquiring ecologically valuable properties that provide positive contributions to the goals of SNWR, that enhance fish and wildlife resources and that are dominated by freshwater wetlands. DNR concurs with this approach to mitigating for any unavoidable impacts to tidal freshwater wetlands, particularly since most of the indirect impacts of deepening would occur within the SNWR. However, DNR acknowledges the proposed philosophy of mitigating for loss of one type of wetland that is being converted to another by protecting wetlands which are under no threat of development or degradation is in direct contravention with national policy of no-net loss of wetlands [Executive Order 11988].*

Response: The Corps acknowledges the support of the SC DNR with respect to acquiring ecologically valuable lands as mitigation for unavoidable impacts to freshwater tidal wetlands.

First of all, it is important to note that any conversion of tidal freshwater marsh to a brackish marsh does not result in a loss of wetlands or a significant decline in wetland function. Many of the emergent plant species associated with freshwater marsh systems would still be readily observed in environments that have been defined as brackish marsh (Leatham et.al., 1994). However, the overall basic wetland functions typically associated with these systems would not change. A comparison of wetland function elements for freshwater marsh versus brackish marsh indicate that there are only negligible differences with respect to water purification, flood protection, shoreline stabilization, groundwater recharge,

streamflow maintenance, retention of particles, surface water storage, subsurface storage, nutrient cycling, and values to society.

The only indirect impact on the function of these wetland systems would be associated with fish and wildlife habitat. While the comparison of fish and wildlife of fish and wildlife habitat between freshwater and brackish marsh systems yield fewer similarities, the conversion in fish and wildlife habitat would still be minor when considering the total function of the wetland and continued existence of some freshwater vegetation in the brackish marsh.

The proposed preservation lands consist of bottomland hardwoods, and uplands dominated by deciduous forest and regrowth. The bottomland hardwoods are classified as palustrine, forested, broad-leaved deciduous systems that are both temporarily and seasonally flooded. Preserving these areas would ensure wildlife habitat is preserved in perpetuity. The sites to be protected are under threat of development or degradation. The USFWS has noted the extensive development immediately adjacent to the Refuge on lands such as these in recent years. Some of these lands are owned by timber companies which periodically harvest the timber, resulting in losses of wildlife habitat. Moreover, the additional lands would buffer the Savannah National Wildlife Refuge from future threats of development such that changes in land use would not occur immediately adjacent to existing areas of the Refuge that contain emergent wetland characteristics. Thus, the acquisition and preservation of wetland and upland buffer would provide a functional replacement for the minor conversion of the only wetland function (fish and wildlife habitat) that would be expected when freshwater marsh is converted to a brackish marsh. Based on these determinations, the Corps has concluded that the functional assessment conducted for all wetland areas proposed for impact and mitigation satisfies the no-net loss of function criterion.

Second, the evaluation and determination of appropriate mitigation for the tidal freshwater marsh that would be impacted by the SHEP was conducted in accordance with the provisions of the 2008 USACE/USEPA Mitigation Rule.

Third, it should also be noted that all adverse impacts to tidal freshwater marsh would occur in the State of Georgia. With the flow diversion measures in place, the State of South Carolina should actually see an increase in tidal freshwater marsh along Little Back River in the vicinity of the SNWR.

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759-BB-48-EV16, 759-BB-48-EV17, 759-BB-48-EV18, 759-BB-48-EV19, 759-BB-48-EV20

Comment: *DNR is concerned that a substantial amount of uncertainty remains regarding the predicted magnitude of adverse impacts and the effectiveness of the proposed mitigation measures. While DNR does not necessarily dispute the hydrodynamic and water quality modeling results, it should be noted that stakeholders have not conducted nor can any stakeholder conduct an independent review of all of the modeling assumptions or input parameters based on the documents and time provided for review. In addition, although we have been assured by USACE that the hydrodynamic and water quality models used to predict the impacts of deepening do, in fact, account for the effects of overdepth and advance maintenance dredging, we could locate no specific statement to this effect in either the DGRR or the DEIS. At the request of DNR, SCDHEC provided an analysis of the bathymetry used in developing the base model. This analysis suggests that the base model did not fully account for the combined effect of overdepth and advance maintenance dredging. Therefore, the model used to predict project impacts on salinity, DO, and loss of tidal freshwater wetlands may have underestimated those impacts. This possibility should be fully addressed in the text of both the DGRR and the DEIS. In addition, all*

assumptions and input parameters used in developing the hydrodynamic and water quality models should be discussed in detail and in layman's terms in both documents.

Response: The uncertainty of various model impact predictions and the effectiveness of the proposed mitigation features are discussed in the Risk and Uncertainty Analysis which is in Appendix Q of the DEIS. The Monitoring Plan and the Adaptive Management Plan are designed to evaluate the accuracy of impact determinations reached during the SHEP as well as the effectiveness of the mitigation features. The project allows for modification of mitigation features if data from the monitoring efforts determine that to be required.

Development of the hydrodynamic and water quality models including model assumptions, input parameters, etc. occurred over many years of coordination between the members of the interagency coordination group responsible for that work. Members of this interagency team included representatives of the involved Federal and State resource agencies. A detailed description of development of the models is included in the Engineering Appendix in the Draft General Reevaluation Report which was made available for the public comment period. The public comment period for the Draft EIS was extended an additional 25 days past the normal 45 day review period to allow additional time for review in consideration of the quantity and complexity of the material to be reviewed.

Contrary to the analysis you received of the bathymetry used in developing the base model, the hydrodynamic modeling did indeed include fully account for the combined effect of overdepth and advance maintenance dredging. Typical existing channel depths were used in the modeling for the base condition. Those depths reflect a snapshot in time of the condition of the overdepth and advance maintenance dredging sections. Dredging occurs essentially year-round in Savannah Harbor. At any given point in time, maintenance dredging would have just concluded in one reach and it would simultaneously be needed in another reach. The channel conditions evident with a "snapshot in time" approach reflect the full range of channel conditions that is typically present, from fully maintained sections to those greatly needing maintenance. Channel deepening alternatives were evaluated by uniformly decreasing the elevation of the channel bottom by the amount of deepening being considered. Please see Section 7 of the Engineering Appendix in the GRR.

The EIS includes sufficient information concerning the development of the various models and the results of the model investigations to permit the reviewer to understand the conclusions reached in the EIS. As discussed in a previous response, more details concerning model use and development are provided in Chapter 7 of the Engineering Appendix in the GRR for those reviewers who need or desire that level of information.

759-BB-48-EV21, 759-BB-48-EV22, 759-BB-48-EV23

Comment: *DNR also is concerned about the effectiveness of the proposed mitigation measures, particularly, the oxygen injection system. The results of a demonstration project conducted to determine the effectiveness of the system in Savannah Harbor were inconclusive. The slight increase in dissolved oxygen in the vicinity of the oxygen injection system was shown to be within the normal range of natural variability due to tidal influences and could not be definitively attributed to the oxygen injection system itself. Furthermore, the long-term effectiveness and viability of a mechanical oxygen injection system in a tidal brackish water environment is highly questionable. The minimal net improvement in DO predicted by the model may not be sufficient to warrant the initial cost of the system or the long-term maintenance costs. Additionally, DNR believes DO levels may deteriorate more than expected after the proposed deepening of the channel and require operation of the oxygen injection system for a longer period of time than the proposed 3-month interval during late summer-early fall. Longer periods of low*

flow and high temperature are anticipated in an era of climate change and will be magnifiers of the already existing water quality problems. Instead of reliance on an oxygen injection system, DNR recommends that adverse impacts to DO levels be minimized by deepening the project to no more than -45 ft.

Response: While the injection of oxygen into an estuary to improve dissolved oxygen levels is a relatively new concept, the technology involved in the oxygen injection process is not. The Corps believes that oxygen injection can be used to eliminate the incremental effects of harbor deepening on the dissolved oxygen regime in Savannah Harbor. This belief is based on both the field demonstration of the oxygen injection equipment that would be used in Savannah Harbor and the subsequent water quality modeling of the effects of oxygen injection on dissolved oxygen levels throughout the water column. The Monitoring Plan provides for an evaluation of the predictions made with respect to the effects of harbor deepening on dissolved oxygen levels as well as an evaluation (Transfer Efficiency Study) of how well the oxygen injection system is performing. The Adaptive Management Plan would permit modifications to the oxygen injection system if that is determined to be required. Modifications to the oxygen injection system could include changes to the amount of oxygen that is injected, modification of the equipment, changes in the locations of the oxygen injections sites, changes in the number of oxygen injection sites, etc.

The oxygen injection system is not designed to produce a large net increase in dissolved oxygen levels in the harbor. The system is designed to ameliorate the adverse effects of harbor deepening on dissolved oxygen levels in Savannah Harbor by raising dissolved oxygen levels approximately 0.36-0.43 mg/l. The costs to construct and operate the oxygen injection system were included in the project costs.

The dissolved oxygen system is designed to only mitigate the impacts of harbor deepening, not to address changes in the estuary over time caused by other factors.

See also other responses to comments regarding dissolved oxygen issues.

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759-BB-48-EV24

Comment: *DNR also is concerned that some or all of the flow-altering modifications could have unintended consequences that result in additional adverse impacts to natural resources. Significantly, the modifications proposed to reduce salinity intrusion into the Back River to protect tidal and managed freshwater wetlands could result in increased salinity intrusion into the Front and lower Middle rivers, where both juvenile and adult SNS are known to concentrate, particularly during the winter when temperatures are below 22° C. In fact, Table 5-30 shows that the loss of adult SNS habitat in winter would be much greater with the flow alterations (maximum loss of 439 acres for the 48-ft alternative) than without them (maximum loss of 44 acres for the 48-ft alternative). Conversely, the loss of adult SNS habitat in summer and juvenile SNS habitat in winter is predicted to be less with the proposed flow-alterations than without them.*

Response: Concur. The Corps evaluated the potential flow-altering features across and their effects across all environmental resources, substantially increasing the complexity of the analysis. Features were evaluated for their potential effects on, among others, salinity, dissolved oxygen, and habitat of four representative species. The proposed flow diversions would provide a gain in Shortnose sturgeon summer habitat while there would be a loss in winter habitat. While there would be a loss of Shortnose sturgeon winter habitat, the flow diversions would create beneficial conditions from an overall fishery

standpoint. The final impact evaluation for the mitigation plan identified the effects of the proposed action on all significant resources.

759-BB-48-EV25

Comment: *The deepening alternative that is predicted to have the least negative impact on SNS habitat overall, including adults and juveniles during winter and summer, is the 44-ft alternative, which would result in a net loss of approximately 60 acres of SNS habitat with flow-altering mitigation, and 151 acres without flow alterations. By comparison, the NED Plan, the 47-ft alternative, is predicted to result in a net loss of 473 acres of SNS habitat overall with the proposed flow alterations, or a loss of 545 acres without flow alterations. The locally preferred plan, the 48-ft alternative, would result in even greater net losses of SNS habitat overall. DNR considers the magnitude of these impacts to the habitat of shortnose sturgeon to be unacceptable, with or without mitigation.*

Response: The opposition of the SC DNR to the 47-foot and 48-foot projects even with mitigation – as a result of adverse impacts on Shortnose sturgeon habitat -- is acknowledged.

759-BB-48-EV26, 759-BB-48-EV27, 759-BB-48-EV28

Comment: *Other unintended consequences of flow alterations also are likely. Recent and ongoing tagging studies suggest that SNS may move freely between the Front, Middle and Back rivers via Steamboat Cut and Rifle Cut. If this proves to be the case, closing Rifle Cut could impede this movement, and limit SNS access to suitable foraging and nursery habitat. In addition, DNR field biologists recently have reported that the upper end of the sediment basin immediately below the Tidegate has already filled in to a large extent, particularly along the sides of the basin, and that any further deposition of sediments in this area could present another impediment to SNS migration throughout the system. Furthermore, DNR is concerned about the potential impact of open-water disposal of dredged material on water quality in the Back River. This could exacerbate recurring episodes of hypoxia in this area, and worsen shoaling in upstream portions of Back River by increasing the deposition of fine-grained sediments there.*

Response: Closure of Rifle Cut is part of the flow diversion mitigation and is designed to impede the flow of salty water from Middle River into Little Back River. Although Shortnose sturgeon would be blocked from using this passage from Middle River to Little Back River, they would still have access to all waterways in the study area.

The sill in Back River would not impede the movement of fish. The sill would be gradually sloping (not a vertical wall) and have approximately 6-10 feet of water over it at low tide.

Material used to construct the sill in Back River would be clean dredged material low in fines (silt). Construction of the sill would occur outside of the fish spawning season, especially the Striped bass spawning season (1 April-15 May).

759-BB-48-EV29, 759-BB-48-EV30

Comment: *As noted above, USACE also proposes to construct a sill near the mouth of the Middle River to protect important nursery habitat for juvenile SNS from adverse impacts. The intended purpose of this sill is to minimize the predicted increase in salinity in the lower portion of Middle River as a result of deepening. USACE proposes to provide compensatory mitigation for unavoidable impacts to SNS foraging and nursery habitat by constructing a fish passage structure around the New Savannah Bluff Lock and Dam (NSBLD) near Augusta, GA, at a projected cost of $6.3 million. The structure described in section 5.3.2 as "a rock ramp fishway" would be located on the SC side of the river, and would*

theoretically provide SNS access to approximately 20 miles of upstream spawning habitat. DNR believes the likelihood that this approach would be successful in passing SNS is highly doubtful. While such a fish passage structure might benefit other migratory fish, its success in passing SNS has never been demonstrated. Because of its unproven success, DNR is opposed to implementing active fish passage as mitigation for unavoidable impacts to SNS habitat, and believes that the best approach to protecting SNS habitat would be to minimize those impacts by selecting either the "no action" alternative or the 44-ft deepening alternative with flow-altering mitigation.

Response: The Fishery Interagency Coordination Team concluded that construction of a fish bypass at the New Savannah Bluff Lock and Dam was an acceptable means of mitigation in regards to the adverse impacts of the SHEP on the Shortnose sturgeon. The Off-Channel Rock Ramp design was selected as the best alternative to provide opportunity for Shortnose sturgeon to navigate the river past the dam. The Corps has not seen any scientific literature that suggests that this structure would not provide such opportunity. The Monitoring Plan includes provisions to monitor Shortnose sturgeon use of the structure as well as their success in moving to upstream spawning grounds. The Adaptive Management Plan provides the means to modify the fishway if required, or evaluate other mitigation measures if necessary.

Additional evaluations that the Corps performed since release of the DEIS has led Savannah District to conclude that the Middle River sill would not be cost effective. The structure would provide no adult summer or winter SNS habitat benefits, and only benefit juvenile SNS winter habitat on some depth alternatives. As a result of this new information and after coordination with NOAA Fisheries, the District deleted the Middle River sill from the proposed mitigation plan.

The position of the SC DNR that selection of the No Action or the 44-foot project is the best approach to protecting Shortnose sturgeon habitat is acknowledged. As explained in a previous response, the EIS must present a discussion of all five deepening alternatives including their environmental impacts and associated mitigation plans so decision makers can compare this information to the project costs and benefits for each alternative.

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759-BB-48-EV31

Comment: *While impacts to SNS would be minimized by selecting either the "no action" alternative or the 44-ft alternative, modeling results presented in the DEIS Table 5-36 suggest that the overall net loss of striped bass habitat including suitable habitat for spawning, eggs and larvae would be less with the 45-ft alternative (net loss of 0 acres for all life stages combined) than with the 44-ft alternative (net loss of219 acres for all life stages combined). This seeming anomaly is a result of the proposal to increase freshwater flow down the Middle and Back rivers by dredging McCoy Cut and the upper reaches of the Middle and Little Back rivers as part of the flow altering mitigation plan for the 45-ft alternative (Plan 6A), but not for the 44-ft alternative (Plan 6B). Striped bass is an important recreational species whose population in the lower Savannah River has been drastically reduced by earlier dredging operations and flow-altering modifications to the system. Because of the predicted increase in suitable habitat for the survival of striped bass eggs and larvae, DNR would consider the 45-ft alternative, with the proposed flow alterations, to be environmentally acceptable, as well - provided USACE contributes supplemental funding to GA Department of Natural Resources (GADNR) ongoing striped bass stocking program in order to adequately compensate for all unavoidable impacts to striped bass habitat as described in Appendix C.*

Response: The potential acceptability of the 45-foot project to the SC DNR based on the predicted increase in suitable habitat for Striped bass eggs and larvae is acknowledged. This potential acceptability is based on implementation of the mitigation plan for the project including flow diversion and payment to GA DNR for stocking Striped bass fingerlings.

759-88-48-EV32, 759-88-48-EV33

Comment: *As noted in the DEIS, closing Rifle Cut would lengthen the transit time and distance travelled by recreational boaters currently using Rifle Cut to reach the Back River from the only public boat ramp in this area at Houlihan Bridge on the Front River. USACE proposes to mitigate for this impact on recreational boating by constructing a new boat ramp on the north side of Hutchinson Island on the Back River. USACE then would turn over the site to Chatham County, which would operate the facility in perpetuity. If the deepening project is approved in some form and Rifle Cut is, in fact, closed as one of the flow-altering modifications, DNR would support the boat ramp proposal; however, our greater concern is that the indirect impacts to natural resources be minimized by limiting any deepening to no more than -44 or -45 ft. However, DNR is concerned about the proposal to turn the boat ramp over to the local county without providing continuing funding for maintenance, especially during a period when local governments are struggling financially. A funding mechanism to support the local government's operation of the boat ramp in perpetuity should be identified.*

Response: The support of the SC DNR for construction of the boat ramp on Hutchinson Island on Back River as mitigation for loss of recreational boating access due to the closure of Rifle Cut is acknowledged.

The boat ramp would be turned over to Chatham County for operation and maintenance. Chatham County has not requested any compensation for maintenance of the boat ramp.

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759-88-48-EV34

Comment: *It is also acknowledged that invasive, non-native species can adversely impact the environment, the economy and, in some cases, human health. Nevertheless, the DEIS concludes that there would be no additional risk from the introduction of invasive species through ballast water since there is no projected increase in the number of vessels expected to call on the port of Savannah as a result of the proposed deepening. This conclusion is apparently based on the unsubstantiated assumption that the volume of ballast water is related only to the number of vessels calling on the port. Absent a comparison of the volume of ballast water currently carried and discharged into the port by the smaller vessels (in aggregate) vs. the volume of ballast water projected to be carried and discharged into the port by the fewer larger vessels (in aggregate) that are expected, the conclusion of "no additional risk" is without any rational basis. The possibility that larger vessels might actually carry and discharge more ballast water than smaller vessels would seem to further weaken that conclusion. In addition to any change in the volume of ballast water expected, other factors that should be considered are any projected changes in vessel speed and origin of ballast water; Any increase in vessel speed would presumably result in decreased transit time, thus increasing the probability of survival and delivery of invasive species propagules. Any projected change in the origin of ballast water also could affect propagule survival, as well as determine which species might be introduced. In summary, DNR believes the conclusion of "no additional risk" is not substantiated by evidence presented in the DEIS, and recommends that further analysis and discussion of the ballast water issue be included in the Final Environmental Impact Statement.*

Response: Concur. The discussion in the FEIS has been revised to more adequately assess the possibility of non-native species being introduced into Savannah Harbor as result of ballast water discharges.

759-BB-48-EV35

Comment: *The DEIS states that, currently:. . . ballast water exchange is the only effective management tool to reduce the risk of ballast-mediated invasion. However, it is widely acknowledged that ballast water exchange is not completely effective in eliminating the risk of introducing non-native species.6 Other treatment technologies, such as filtration, heating, ultraviolet light and certain biocides (used either alone or in combination with ballast water exchange) have the potential to be more effective in reducing this risk. These technologies and the feasibility of implementing them should be discussed in greater detail in the DEIS.*

Response: Concur. The language in the FEIS has been revised to indicate that ballast water exchange is then most cost effective management tool to reduce the risk of ballast mediated invasion. Discussion has also been added to the text to address other potential technologies.

759-BB-48-EV36

Comment: *It is stated in the OEIS that the University of Georgia, Marine Extension Service (MES) has completed a study designed to monitor for aquatic invasive species in the Port of Savannah, and that the MES was:... expected to release an Invasive Species Management Plan for the State of Georgia later in 2008. No further mention is made of this plan in the DEIS, however. This plan should be discussed with respect to its implications for SHEP.*

Response: Concur. Discussion has been added to the text to address the major conclusions in the report "Invasive Species Management Plan for the State of Georgia" and how those conclusions apply to the SHEP.

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759-BB-48-EV37

Comment: *This conclusion is repeated in Appendix S (Essential Fish Habitat). Similarly, it is stated in Appendix B (Threatened and Endangered Species) that with the implementation of certain conservation measures and the proposed mitigation plan for SNS, specifically the sill in Middle River and fish passage at New Savannah Bluff Lock and Dam: .. the proposed project may affect, but is not likely to adversely affect Shortnose or Atlantic sturgeon or their critical habitat. DNR believes that all of these statements are misleading and should be qualified. Specifically, it should be noted that the proposed mitigation for SNS (providing fish passage at New Savannah Bluff Lock and Dam), even if successful in providing access to upstream spawning habitat, would not replace the critical nursery and foraging habitat that would be lost as a result of harbor deepening. Similarly, while the proposed funding of the GADNR striped bass stocking program would help offset losses to striped bass habitat, it would not replace that lost habitat.*

Response: The Corps, through the Fisheries ICT of which SC DNR was a participating member, sought the views of fisheries experts on potential avenues to restore or create Shortnose sturgeon habitat in the Savannah Harbor estuary. After extensive coordination, the team could not identify any feasible measures to implement within the estuary. The team then agreed that restoring access to historic spawning areas upstream would benefit the population and mitigate for expected habitat losses in the estuary.

The statement in Appendix B that "the proposed project may affect but is not likely to adversely affect Shortnose or Atlantic sturgeon or their critical habitat" refers to the overall population of the species in the Savannah River. The SHEP with implementation of the mitigation plan is not expected to adversely affect those species. There is no designated critical habitat for the Shortnose sturgeon or the Atlantic sturgeon in the Savannah River.

The NMFS prepared a Biological Opinion (BO) which addressed SHEP impacts to Shortnose sturgeon and Atlantic sturgeon. The NMFS determined that the SHEP was likely to adversely affect both the Shortnose and Atlantic sturgeon. However, their Jeopardy Analysis concluded that implementation of the SHEP is not likely to jeopardize the survival of either species in the Savannah River.

NMFS expects that construction of the fish passage facility at the NSBL&D will result in access to historic spawning habitat upstream of the dam that is expected to increase spawning activity over the long-term. Based on these determinations, the NMFS concluded that construction of the SHEP is not likely to jeopardize the survival and recovery of the Shortnose sturgeon in the Savannah River. With implementation of the Reasonable and Prudent Measures NMFS identified to protect this species, NMFS concluded that the overall effect on the species would be acceptable.

The "likely to adversely affect" determination for Atlantic sturgeon is primarily based on NMFS' estimated incidental take of four Atlantic sturgeon during hopper dredging operations necessary to construct the SHEP and adverse effects (increase in salinity) to important estuarine foraging habitat for juveniles and adults. The estimated incidental take of four Atlantic sturgeon during entrance channel construction would not decrease the overall population of this species in the South Atlantic DPS (Distinct Population Segment) as there are significant numbers of fish found in the rivers comprising the South Atlantic DPS range of Atlantic sturgeon. The effects of SHEP on foraging habitat and spawning success of Atlantic sturgeon are similar to those for the Shortnose sturgeon. Based on these determinations, the NMFS concluded that construction of the SHEP would not appreciably reduce the likelihood of the Atlantic sturgeon's survival in the Savannah River and that the project's overall effect on the species would be acceptable.

759-BB-48-EV38

Comment: *As stated in the first paragraph of Appendix D: The Savannah Harbor Expansion Project . . . has the potential to adversely affect nationally important resources. In addition, since predictions are made about future effects to biological resources, there is a degree of uncertainty about the impacts which the recommended action would actually produce. Those uncertainties include both the accuracy of the predictive impact tools and the biological responses that will occur as a result of changes in the environment. DNR concurs with this assessment of the uncertainty regarding the accuracy of the hydrodynamic and water quality models used to predict the physical, chemical and biological impacts of the proposed project and constructed mitigation features. DNR also agrees there is considerable uncertainty regarding the biological responses to these impacts. Because of this uncertainty, it is imperative that a comprehensive monitoring and adaptive management strategy be developed, implemented, and adequately funded, if the deepening project goes forward.*

Response: Concur. The SHEP includes a comprehensive Monitoring Plan and Adaptive Management Plan.

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759-BB-48-EN01

Comment: *DNR generally concurs with the proposed pre-construction monitoring of physical characteristics and biological resources, in order to update existing information and provide a baseline for comparison with post-construction monitoring results; however, we question whether the intensive monitoring of hydrologic parameters within the lower estuary over one lunar cycle, will be sufficient to evaluate hourly, daily and, especially, monthly variations in the aquatic environment. DNR suggests that intensive hydrologic monitoring be conducted over a period of at least 2, and preferably 3, lunar cycles. The estimated cost of any such additional monitoring should be factored into the total pre-construction monitoring cost.*

Response: The proposed intense monitoring over a 28-day lunar cycle would provide sufficient information to add to the existing dataset to update, review and refine (if necessary) the hydrodynamic and water quality models for the pre-construction phase of the project.

759-BB-48-EV39

Comment: *DNR recommends that Atlantic sturgeon (Acipenser oxyrinchus), recently proposed to be listed as an endangered species, and striped bass be added to the list of biological resources to be monitored. If monitoring of striped bass is already included as a component of the GADNR striped bass stocking program, which USACE proposes to partially fund as compensatory mitigation for impacts to this species, this monitoring plan and its relevance to the deepening project should be described in Appendix D of the DEIS. Development of a monitoring protocol for Atlantic sturgeon should be closely coordinated with federal and state natural resource agencies. The estimated cost of adding these monitoring components should be factored into the total monitoring cost of the project.*

Response: As requested by the USDI, the Monitoring Plan has been modified to include an assessment of post-project impacts on the Striped bass. The monitoring data that is collected and the updated models would be used to evaluate impacts to the Striped bass during years 2,4, and 9 of the Post-Construction Monitoring. The Atlantic sturgeon was not identified by the Interagency Coordination Team as a species of concern that should be included in the SHEP monitoring plan. If the Atlantic sturgeon becomes listed as an endangered species, the Corps would consider including this species in the monitoring plan.

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759-BB-48-EV40

Comment: *No mention is made in Appendix D of a specific monitoring plan, or any associated costs, to evaluate vegetative species composition and percent cover at the brackish marsh creation site that is proposed as compensatory mitigation for direct impacts to fringing saltmarsh. This is one of the few proposed mitigation measures that actually has well-defined success criteria, based on percent cover, and an identified adaptive management strategy if the success criteria are not met (e.g., planting Spartina alterniflora). A monitoring plan designed to evaluate the progress and ultimate success of this project should be included in the "Post-Construction Monitoring" section of this appendix. The estimated cost of this monitoring component, conducted over a 5-yr period, should be added to the total monitoring costs.*

Response: Appendix D addresses the monitoring of the marsh restoration site (Disposal Area 1S) to determine the success of establishing wetland vegetation on the site. This discussion has been revised to include more details on the monitoring of this site. Additionally, the discussion has been revised to include evaluation of invasive species that may inhabit the site as well as measures to remove these species if necessary.

759-BB-48-EV41

Comment: *As stated in Appendix D, current estimates for the project construction period range from 3 to 6 years, and that USACE would perform monitoring during construction "for whatever length of time it takes to construct the project." The cost estimates, however, assume only a 3-year construction period. DNR is concerned that the project may take considerably longer than 3 years to construct, and that the cost estimates for this phase of the monitoring plan may be too low. DNR recommends that the cost estimates for this monitoring phase be based on the maximum estimated duration of construction (6 years).*

Response: The Corps concurs that the project my take longer than 3 years to construct. However, the Corps believes 4 years is a realistic timeframe for construction. Consequently, the Monitoring Plan has been revised to reflect a four-year monitoring plan for the construction phase. If the construction extends beyond that period, additional funds would be obtained to continue monitoring during the construction phase.

759-BB-48-EV42

Comment: *Earlier in the main body of the DEIS, however, it is stated that the sediment basin would be actively filled in with dredged material. This discrepancy should be rectified and explained. In addition, it should be noted that DNR already has expressed its opposition to using the sediment basin for dredge spoil disposal because of its potential to further degrade water quality in the Back River.*

Response: Please see previous response to this issue. Some dredged sediment would be deposited in the lower part of the Sediment Basin to construct the broad berm at the lower end of the basin. Originally, consideration was given to filling in the Sediment Basin with dredged sediment, but plans were revised to include a sill at the lower end of the basin, followed by natural sedimentation in the remaining portion.

759-BB-48-EV43

Comment: *DNR recommends that post-construction monitoring of: (1) nearshore benthic communities, (2) fish utilization of oceanward sediment placement sites, and (3) fish distribution and abundance along the marsh edges be extended from 3 years to 5 years. Cost estimates should be adjusted accordingly.*

Response: Monitoring of benthic community recovery at the nearshore placement sites and fish use of the oceanward placement sites will not be required since placement of dredged sediment at these sites has been removed from the project. All new work sediment removed from the entrance channel would be deposited in the Jones/Oysterbed CDF or the approved Offshore Dredged Material Disposal Site (ODMDS). The fish abundance and distribution study would be conducted during years 1, 3, 5, and 9 of the Post-Construction Monitoring program and is considered sufficient.

759-BB-48-EV44, 759-BB-48-EV45

Comment: *DNR is concerned that the amount of money proposed to be allocated for these, or other, adaptive management measures may be insufficient, particularly for those mitigation measures that have a high degree of uncertainty associated with their success such as the oxygen injection system, the*

flow-altering modifications to the system and the fish passage structure at NSBLD. DNR recommends that funding for these adaptive management measures be increased to at least 15% of the initial cost of construction, and that funding for this purpose be secured prior to starting the project.

Response: The use of 5 percent and 10 percent of the initial construction costs to estimate the costs to modify the mitigation features of the project, if required, is considered a reasonable amount. The adaptive management funds would be used as a group, such that whatever funds are needed to implement a specific adaptive management action could be used up to the total amount available for adaptive management.

The various funding mechanisms that could be used to secure upfront contingency funds are being evaluated. The non-Federal sponsor and the District intend to have adaptive management funds available if/when they are needed. If the needs exceed the budgeted amounts, the District could seek additional funds through the normal annual budget process The non-Federal sponsor, acting through the Georgia Ports Authority, has agreed to set aside, in advance, their cost-shared portion of the adaptive management funds in an escrow account upon approval of the project. Further explanation of funding mechanisms is provided in Appendix D.

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759-BB-48-EV46

Comment: *If corrective action is required, USACE proposes to conduct post-construction monitoring for only 1 year after implementing the adaptive management feature. DNR believes monitoring for only 1 year may be insufficient to determine the effectiveness of the corrective action, and recommends that dedicated funding be provided for monitoring the effects of any adaptive management feature for a minimum of 3 years.*

Response: The Adaptive Management Plan has been revised to indicate that any adaptive management modification to a SHEP mitigation feature would be monitored for two years after completion of the modification. Also, the plan provides for monitoring of an adaptive management feature for even longer should the Corps and the resource agencies determine that to be prudent. See previous response regarding funding of adaptive management features.

759-BB-48-EV47

Comment: *The proposed long-term monitoring plan which is the plan to monitor certain aspects of the project on an annual basis beyond the initial 5-year post-construction monitoring period seems inadequate in that the cost of this monitoring component is only projected for one year, with funding in subsequent years presumably dependent on annual appropriations. DNR recommends that the total cost of long-term monitoring, as well as the cost of continued operation and maintenance for each mitigation component, be projected over the entire life of the project, and that this funding be secured prior to starting the deepening project.*

Response: All long-term monitoring as well as maintenance of the various mitigation features would become part of the Operation and Maintenance Program for the Savannah Harbor Navigation Project. Operation and Maintenance funds are requested annually two years ahead of the year in which the funds would be received. It is not possible to obtain "upfront" Operation and Maintenance funds.

File

DNR Historic
Preservation Div

2010 DEC -9 PM 2:49

December 7, 2010

South Carolina Archives & History Center
History & Heritage For All Generations

Mr. William Bailey
ATTN: PD
Corps of Engineers, Savannah District
100 W. Oglethorpe Ave.
Savannah, GA 31401-3640

Re: Savannah Harbor Deepening
Tier II Environmental Impact Statement, draft
Jasper County, South Carolina
SHPO Project No. 03-VM0063

Dear Mr. Bailey:

Thank you for your letter of November 15, which we received on November 17, regarding the above-referenced project. We also received a copy of the draft Tier II Environmental Impact Statement (DEIS) as supporting documentation for this undertaking. The State Historic Preservation Office is providing comments to the Corps of Engineers pursuant to Section 106 of the National Historic Preservation Act and its implementing regulations, 36 CFR 800. Consultation with the SHPO is not a substitution for consultation with Tribal Historic Preservation Offices, other Native American tribes, local governments, or the public.

As the proposed project will occur in both South Carolina and Georgia, we understand that all Section 106 consultation will be coordinated between our office and the Georgia State Historic Preservation Office (SHPO). Therefore, the comments in this letter only reference those portions of the overall project that have an area of potential effect (APE) in South Carolina.

Our office concurs with the determination in the DEIS on the "Previously Disturbed Areas within the Area of Potential Effect for which No Historic Property Investigations are Proposed" (sections 4.10.3 and 5.12.2). We understand that the following cultural resources investigations will be coordinated with our office:

- Full-channel-width Dredging Area (SC waters)—Stations +41+500 to +49+500: Previous underwater archaeological survey identified two anomalies/targets that will be relocated and assessed for their eligibility for the National Register of Historic Places. These targets are SH-R16-2 and SH-R17N-1.
- Meeting Areas (GA and SC Waters—Stations +55+000 to +68+500): Two Confederate crib obstructions were identified in a 2005 underwater archaeological survey of this portion of the project. Our office concurs that these crib obstructions are eligible for listing in the National Register. It is not clear from the DEIS if these historic properties will be affected by the project. Additional consultation with our office is needed on this portion of the project.

S. C. Department of Archives & History • 8301 Parklane Road • Columbia • South Carolina • 29223-4905 • (803) 896-6100 • http://scdah.sc.gov

- New Savannah Bluff Lock and Dam Fish Ladder: The Corps will construct a fish ladder at the New Savannah Bluff Lock and Dam as part of the environmental mitigation of this project. The Corps will conduct a cultural resources survey prior to construction. Additional consultation with our office is needed on this portion of the project.

Our office concurs with the determination that the proposed Savannah Harbor Deepening project will have an adverse effect on the *CSS Georgia*, a Confederate naval vessel listed in the National Register and located in the waters of both Georgia and South Carolina. We also concur with the Corps' proposal to mitigate the adverse effects on the *CSS Georgia* by conducting data recovery and conservation of the ship and associated artifacts. A draft timeline of the steps in mitigation is included in the DEIS.

In preparation for this complex undertaking, our office consulted with the Corps of Engineers in 2005 and 2006 on a programmatic agreement designed to manage the effects to historic properties. We request that the Corps update our office and consult with us on a revised programmatic agreement that encompasses the studies and the revised project area.

We look forward to continuing to work with the Corps on this project. If you have any questions, please contact me at (803) 896-6183 or dobrasko@scdah.state.sc.us.

Sincerely,

Rebekah Dobrasko

Rebekah Dobrasko
Supervisor of Compliance, Tax Incentives, and Survey
State Historic Preservation Office

cc: Chris Amer, SCIAA
Barbara Neal, SCDHEC-OCRM
Dean Moss, Savannah River Maritime Commission
Elizabeth Shirk, GA SHPO

South Carolina State Historic Preservation Officer

559-MM-01-EV01

Comment: *Meeting Areas (GA and SC Waters-8tations +55+000 to +68+500): Two Confederate crib obstructions were identified in a 2005 underwater archaeological survey of this portion of the project. Our office concurs that these crib obstructions are eligible for listing in the National Register. It is not clear from the DEIS if these historic properties will be affected by the project. Additional consultation with our office is needed on this portion of the project.*

Response: The two Confederate crib obstructions are included among the cultural resources addressed by the Programmatic Agreement; any additional coordination will be carried out in accordance with the procedures outlined in the Agreement.

Review & Oversight Commission
On the South Carolina State Ports Authority

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VIA OVERNIGHT DELIVERY AND ELECTRONIC MAIL

January 24, 2011

Mr. William G. Bailey
ATTN: PD
Savannah District, U.S. Army Corps of Engineers
100 West Oglethorpe Ave
Savannah, GA 31401

RE: Comments on GRR and Draft Tier II EIS for the Savannah Harbor Expansion Project

Dear Mr. Bailey:

The Review and Oversight Commission on the South Carolina State Ports Authority is a joint legislative commission tasked with ensuring the promotion, development and operation of the state's current and future harbors and seaports in accordance with all applicable laws and regulations. In keeping its charge, the Commission has reviewed the SHEP DEIS. Our members have grave concerns with what we find to be an unbalanced and unsound study.

The Commission has numerous questions about the study's assumptions, methodology and conclusions, and will seek answers before the final EIS is released. However, we are doubtful our concerns can be adequately addressed in the current project and believe the applicant should withdraw the application, significantly amend it, and resubmit. For purposes of this letter, we include three areas we believe will have the greatest effect on South Carolina's residents:

1) **Environmental.** The Corps identifies impacts upon the habitats of Shortnose Sturgeon and Striped Bass and upon tidal freshwaters and brackish marsh. Recreational fishermen and boaters would be affected by increased vessel traffic and dredging. The harbor's dissolved oxygen would decrease, while proposed techniques to restore dissolved oxygen have not been thoroughly vetted. Relating to federal and state law, the Commission notes that of the twenty-three federal and state environmental laws that apply, the draft complies with just eight. **The environmental damage caused by the SHEP as planned means that no future project could be permitted on the Savannah River, including the deepening needed to accommodate two-way post-Panamax traffic at the Jasper Ocean Terminal.**

2) **Economic.** The Corps fails to reconcile the **severe and dangerous limitations imposed by its imprudent recommendations for draft, channel width, vessel speed and single-lane layout.** On the contrary, the Corps wrongly implies that the channel could accommodate significant numbers of the largest post-Panamax ships. The Corps' defective channel models are neither wide enough nor deep enough to allow for unencumbered use by these vessels. **The Commission is astonished to find the Corps believes that the Georgia Ports Authority would enjoy the same growth in container traffic regardless of whether or not the SHEP is completed.** If this is accurate, why would taxpayers spend a dime to make *any* "improvements" to the Savannah? Finally, it is

bewildering to see that the DEIS's 'Need for and Objective of Action' – essentially why the project is necessary – contains just 11 sentences.

3) **Navigability.** The Commission finds that of study's plentiful inconsistencies, a daunting number concern navigability. Tonnage estimates suggest the use of post-Panamax ships with drafts of 50 feet, but the DEIS itself shows ships with drafts as low as 46 feet would run aground, even in normal weather conditions. The ill-advised single-lane plan is inefficient and its passing lanes fell short of expectations during simulations. **If built to study specifications, the channel would not accommodate the number of ships upon which many of the benefits of the project are based.** The Commission is alarmed to find a recommendation for an "acceptable level of risk of accidents" is not in keeping with published U.S. Army Corps of Engineers standards for channel width and depth. These standards are designed to provide a minimum margin of safety, but it seems they were conveniently disregarded for this project.

Additionally, the Commission is baffled by the Corps' blatant and unjustified dismissal of a Jasper Ocean Terminal. While discussed within the DEIS, the Corps fails to consider the JOT as a viable alternative. **The Corps' repudiation of the JOT is abundantly clear from the Corps' published plans for dredge disposal: proposed dredge disposal sites are the very same sites upon which a JOT would be built. To add insult to injury, these sites would be used for disposal until 2060.** We also question the likelihood of the Corps ever approving taking these 1,500 acres of upland disposal out of use for maintenance dredging capacity because the replacement capacity would need to be cost neutral for the federal government.

There are ongoing negotiations between South Carolina and Georgia to build a Jasper Ocean Terminal, and this week officials in both states reaffirmed their commitment to that project. Given the improbability that leaders in the State of Georgia sat quietly by as the contradictory expectations of the DEIS were made public, our Commission questions their commitment to the project. Further, the Corps plans to use the JOT site for dredge disposal, while the 2007 Water Resources Development Act reads, in pertinent part:

> SEC. 4084. SAVANNAH RIVER, SOUTH CAROLINA AND GEORGIA. (a) In General- The Secretary shall determine the feasibility of carrying out projects-- (1) to improve the Savannah River for navigation and related purposes that may be necessary to support the location of container cargo and other port facilities to be located in Jasper County, South Carolina, in the vicinity of Mile 6 of the Savannah Harbor entrance channel; and (2) to remove from the proposed Jasper County port site the easements used by the Corps of Engineers for placement of dredged fill materials for the Savannah Harbor Federal navigation project.

The Commission maintains that improvements to the Savannah River must: 1) provide more acceptable levels of environmental impact and commensurate mitigation; 2) be based upon reconcilable economic methodology; and 3) demonstrate clearly that navigation would be cost-effective, efficient and safe. Further, the plan must make the JOT site available for its use pursuant to the intergovernmental agreement between South Carolina and Georgia; must, by a date certain, remove easements upon it (as the Corps is authorized to do in the 2007 WRDA); and must make the JOT accessible by post-Panamax traffic.

Sincerely,

Lawrence K. Grooms
Chairman

Review and Oversight Commission On the South Carolina State Ports Authority

Page 1

595-MR-05-EV01

Comment: *Environmental. The Corps identifies impacts upon the habitats of Shortnose Sturgeon and Striped Bass and upon tidal freshwaters and brackish marsh. Recreational fishermen and boaters would be affected by increased vessel traffic and dredging. The harbor's dissolved oxygen would decrease, while proposed techniques to restore dissolved oxygen have not been thoroughly vetted. Relating to federal and state law, the Commission notes that of the twenty-three federal and state environmental laws that apply, the draft complies with just eight. The environmental damage caused by the SHEP as planned means that no future project could be permitted on the Savannah River, including the deepening needed to accommodate two-way post-Panamax traffic at the Jasper Ocean Terminal.*

Response: The environmental impacts identified in this comment, e.g., impacts to fish, marsh, dissolved oxygen, and mitigation for these impacts, are fully addressed in the FEIS, especially Section 5.0, and various appendices including C, Mitigation Planning, D, Monitoring and Adaptive Management Plan, and others. See also other responses to comments on these issues.

The general comment about compliance with only eight of twenty-three environmental laws is unclear because the laws are not specified. Section 6.0 of the FEIS, which is a non-exhaustive listing, documents project compliance with more than twenty federal and state environmental laws and executive orders.

Environmental evaluations were conducted in accordance with NEPA and Council on Environmental Quality (CEQ) Regulations for Implementing NEPA (40 CFR 1500-1508), the platform for ensuring compliance with applicable environmental laws and regulations. Additional procedural steps were also taken as a result of the conditional authorization of this project (WRDA 1999). Those include the requirement that the Secretary of the Interior, Secretary of Commerce, Secretary of Army, and Administrator of the Environmental Protection Agency approve the selected plan and verify that the associated mitigation plan adequately addresses its potential environmental impacts. The environmental impact/mitigation planning process included comprehensive assessment, avoidance, minimization, and mitigation components. This process has also included years of close coordination with pertinent federal and state agencies, as well as a host of other stakeholders. Given this lengthy cooperation among so many interested parties, the District is satisfied that all evaluations were conducted in full compliance with required environmental laws.

The DEIS will be modified and revised as appropriate to resolve the comments received during public review [resulting in the FEIS]. The Record of Decision [ROD] is the final step in the NEPA process and is only issued after the FEIS has been approved, with recognition that the action is in full compliance with all applicable laws and regulations.

Construction of the proposed action does not preclude further development on the Savannah River or the permitting of future projects including a Jasper Terminal. The cumulative impact evaluation includes an assessment of past, present, and future actions and the associated acceptable levels of impacts. The cumulative impact evaluation for this project did not identify any resource for which the project impacts with mitigation would approach an unacceptable threshold. See also other responses to comments regarding a Jasper Terminal, many of which discuss the permitting that would be necessary for such a facility.

695-MR-05-END1, 695-MR-05-EC01

Comment: *Economic. The Corps fails to reconcile the severe and dangerous limitations imposed by its imprudent recommendations for draft, channel width, vessel speed and single-lane layout. On the contrary, the Corps wrongly implies that the channel could accommodate significant numbers of the largest post-Panamax ships. The Corps" defective channel models are neither wide enough nor deep enough to allow for unencumbered use by these vessels. The Commission is astonished to find the Corps believes that the Georgia Ports Authority would enjoy the same growth in container traffic regardless of whether or not the SHEP is completed. If this is accurate, why would taxpayers spend a dime to make any "improvements" to the Savannah? Finally, it is bewildering to see that the DEIS"s „Need for and Objective of Action" – essentially why the project is necessary – contains just 11 sentences.*

Response: With regard to the channel safety (width and depth) comment, please see other responses to comments on these issues, especially responses to comments by the Savannah River Maritime Commission. In addition, the channel was designed in accordance with Corps of Engineers' Design Standards and Procedures outlined in EM-1110-2-1613. Final channel dimensions and navigation requirements were developed using the Corps' state-of-the-art ship simulation, with input from the Savannah Harbor Pilots Association (SHPA). Since those pilots guide vessels through the harbor on a daily basis, they are thoroughly familiar with environmental conditions that affect the way vessels handle in this particular harbor. The use of ship simulators to establish final design parameters for deep-draft navigation channels is the standard practice worldwide and ensures that channels are safe and economical and minimize environmental impact and long-term maintenance requirements. The use of ship simulators also provides the harbor pilots who would actually use the channel with the opportunity to provide input into the design and ensure the navigability and safety of the channel. The existing channel dimensions can accommodate meeting of a deepening design vessel (Post-Panamax Generation 2 with a 140' beam) and a smaller vessel. Ship simulation verified that the inner harbor channel could be widened at 3 bends to maintain two-way traffic capability after deepening for a design vessel and smaller vessel. The entrance channel would be wide enough for two design vessels to meet. Two meeting areas are included to allow two design vessels to meet in the inner harbor.

With regard to the portion of the comment relating to growth in container traffic, the District evaluates its water resource projects from a National Economic Development (NED) perspective which, in essence, is the alternative [meeting project objectives] having the greatest net economic benefits [benefits minus costs]. In this instance, the NED benefits are comprised primarily of the reduced transportation costs resulting from removing the current constraints of draft. It is important to note that these economic benefits accrue from the use of larger, more cost-effective container ships, not an increase in the number of containers. The savings are presumably passed on to US consumers and businesses in the form of lower prices. In determining the NED, analysts are mindful not to claim benefits if a project would merely redistribute commerce from one port to another rather than actually increase the size of the market.

In recent years, additional analyses have been undertaken which focus on Regional Economic Development [RED]. In doing so, analysts calculate the economic impacts to the region that could result from the funds expended to construct a project. The primary effects measured in a RED analysis include jobs and worker income. Chapter 8 of the Economic Appendix describes regional economic impacts.

The District conducted a multi-port analysis of alternate ports and networks. That analysis indicated that most of the cargo imported and exported through Savannah served a distinct hinterland. After evaluating the total transportation costs to serve several key hubs in the hinterland, the analysis

concluded that deepening Savannah Harbor would likely not result in sufficient savings in transportation costs to cause cargo to divert from other ports. A deepening project would allow the same volume of cargo to be moved more efficiently via larger or more fully-loaded vessels. This basic position is supported by the present calling of PPX 1 vessels on Savannah in increasing numbers. Those and PPX 2 vessels are anticipated to call in greater numbers once the Panama Canal is enlarged.

The largest capacity vessels calling on the US East Coast [including Garden City Terminal] are expected to be about 8,000 TEUs. Vessels much larger than 8,000 TEUs are more apt to be deployed on Asia to Europe and/or Transpacific trade routes. The Economic Appendix [page 51] explains why these larger vessels are unlikely to call at Savannah, irrespective of SHEP.

Table 42 [Economic Appendix-Page 73] displays the forecasted vessel calls by size class for the "without project condition" and for each of the deepening alternatives. The transportation costs of keeping the channel at its present depth is compared to same for each of the depth options to derive its project savings (benefits).

With regard to the need and objective comment, FEIS Section 2.0 provides a concise explanation of the purpose and need for this action.

Page 2

695-MR-05-END2

Comment: *Navigability. The Commission finds that of study's plentiful inconsistencies, a daunting number concern navigability. Tonnage estimates suggest the use of post-Panamax ships with drafts of 50 feet, but the DEIS itself shows ships with drafts as low as 46 feet would run aground, even in normal weather conditions. The ill-advised single-lane plan is inefficient and its passing lanes fell short of expectations during simulations. If built to study specifications, the channel would not accommodate the number of ships upon which many of the benefits of the project are based. The Commission is alarmed to find a recommendation for an "acceptable level of risk of accidents" is not in keeping with published U.S. Army Corps of Engineers standards for channel width and depth. These standards are designed to provide a minimum margin of safety, but it seems they were conveniently disregarded for this project.*

Response: As stated previously, the deeper channels conform to US Army Corps of Engineers design guidelines. The channel was designed in accordance with Corps of Engineers' Design Standards and Procedures outlined in EM-1110-2-1613. Final channel dimensions and navigation requirements were developed using the Corps' state-of-the-art Ship Simulator with input from the Savannah Harbor Pilots Association (pilots that regularly guide vessels through Savannah Harbor). The use of ship simulators to establish final design parameters for deep-draft navigation channels is the standard practice worldwide and ensures that channels are safe and economical and result in minimal environmental impact and long term maintenance requirements. The use of ship simulators also provides the harbor pilots who will actually use the channel with the opportunity to provide input into the design and ensure the navigability and safety of the channel. The District also consulted the US Coast Guard, who stated that they had no concerns with the safety of vessels using the proposed channel design. The US Army Corps of Engineers, US Coast Guard, and Savannah Harbor Pilots Association are confident that the proposed deeper channel would allow safe passage of the design vessel and the entire fleet of deep-draft vessels projected to call at Savannah.

The existing channel dimensions can accommodate meeting the deepening design vessel (Post-Panamax Generation 2; 140' beam) and a smaller vessel. Two meeting areas are also included to provide for meeting of two design vessels.

Please see also other responses to comments on these issues, especially responses to comments by the Savannah River Maritime Commission.

595-MR-05-EV02

Comment: *Additionally, the Commission is baffled by the Corps" blatant and unjustified dismissal of a Jasper Ocean Terminal. While discussed within the DEIS, the Corps fails to consider the JOT as a viable alternative. The Corps' repudiation of the JOT is abundantly clear from the Corps' published plans for dredge disposal: proposed dredge disposal sites are the very same sites upon which a JOT would be built. To add insult to injury, these sites would be used for disposal until 2060. We also question the likelihood of the Corps ever approving taking these 1,500 acres of upland disposal out of use for maintenance dredging capacity because the replacement capacity would need to be cost neutral for the federal government.*

Response: The SHEP NEPA alternatives analysis and Clean Water Act practicable alternatives analysis fully considered a proposed Jasper Terminal. Among other things, the Regional Port Analysis specifically evaluated current and projected port capacity, demand, and growth, and environmental impacts and constraints for other South Atlantic ports (Norfolk, VA; Wilmington, NC; Charleston, SC; Savannah, GA; and Jacksonville, FL) and a proposed Jasper Terminal (GRR, Appendix A, Attachment 6, Final Report). In addition, the information regarding analysis of a Jasper Terminal was analyzed in a study of the potential costs and environmental impacts of locating the project at one of eight different sites along the Savannah River (four on the South Carolina side, four on the Georgia side). EIS Section 3.0 and Appendix O. Among the conclusions reached as a result of the Regional Port Analysis, the Multiport Analysis, and the analysis of eight alternative sites for the project along the Savannah River were the following: a Jasper Terminal would not be cost effective when compared to improving Savannah Harbor based on the high cost involved (now estimated at $4 billion including the cost of constructing the new transportation infrastructure that would have to be built), and the timing (a Jasper Terminal does not exist at present and cannot be constructed in time to meet the growth in demand occurring through Savannah Harbor).

Appendix O [2005] makes no reference to the "Jasper Terminal" because the document was completed before the term "Jasper" was used in its description. The following locations for a new terminal were evaluated in Appendix O:

Georgia - Garden City Terminal, East Coast Terminal, Ocean Terminal, Elba Island, Brunswick;

South Carolina- Disposal Area 12A, Disposal Areas 14A/B (this is the site of what is now currently proposed for a Jasper Terminal), Tybee Island National Wildlife Refuge (NWR), and other locations.

It should also be noted that the SHEP and a Jasper Terminal are not viewed by the Joint Project Office as opposing alternatives. Rather, the JPO believes both ports are needed. A March 11, 2011 "Update" from the Jasper Ocean Terminal Joint Project Office, contains numerous statements that SHEP is necessary and beneficial for a Jasper Terminal project ("The development of the Jasper site is predicated on the success of ports in Savannah and Charleston. A completed SHEP and the planned expansion of Charleston are the first steps . . . ."). The Update states that the Jasper Terminal will handle container

volumes in excess of what an improved (deepened) Savannah Harbor or Charleston Harbor could handle. The Update also confirms that the Jasper Ocean Terminal will cost $4 billion (a more recent estimate by the SCSPA is $5 billion).

The Georgia Department of Transportation has requested that the District relinquish its sediment disposal rights for Dredged Material Containment Areas 14A and 14B [presently proposed site for a Jasper Terminal]. The District is providing technical information to the Joint Project Office to identify an alternate disposal site to replace this sediment storage lost capacity for Savannah Harbor, as well as the mitigation features [from previous projects] that those sites presently provide. The District has advised GA DOT and the Joint Project Office that it would not consider releasing the disposal easements until development of the new container terminal is imminent, i.e. the developer obtains a Section 404 permit. The JPO's consultant observed that placing new work sediments on Areas 14A and 14B would save the terminal development project over $400 million by raising its elevation to a workable height. Therefore, if SHEP is constructed, it could benefit the development of a terminal in Jasper facility by significantly reducing initial construction costs. Further, the Joint Project Office has stated that a terminal at Jasper would require a navigation channel deeper that the present 42-foot depth. So the SHEP project would provide a deeper channel beyond the location of a future terminal in Jasper County, reducing the costs of developing a functioning terminal if construction occurs.

Development of a container terminal in Jasper County would be challenging. Site development work would be substantial, since most of the sites along the river were once marsh [which provides a weak foundation upon which to construct heavy structures]. Road and rail access to the site would need to be constructed. The Joint Project Office has begun the design studies, but much work remains. The controlling organization recently extended completion of those needed design studies. The JPO has not obtained or applied for a Section 404 construction permit. The legislatures in the two states have not ratified a bi-state compact (as outlined in the Governors' 2007 Term Sheet). When viewed holistically, there is still considerable uncertainty about development of a container terminal in Jasper County.

See also other responses regarding alternatives issues including 760-JK-400-EV02, 760-JK-400-EV50, 765-DC-149-EV28, and 765-DC-149-EV46.

Comments from the Savannah River Maritime Commission on the Savannah River Expansion Project DEIS and GRR

January 21, 2011

Report Prepared By:

Savannah River Maritime Commission

Columbia, South Carolina

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1. **Comments on Select DEIS Appendices**
   Appendix B - Biological Assessments for Threatened and Endangered Species
   Appendix C - Mitigation Planning
   Appendix D - Monitoring Plan and Adaptive Management Program
   Appendix F - Cultural Resources
   Appendix H - Section 404(b) (1) Evaluation
   Appendix K - Air Emission Inventory
   Appendix L - Cumulative Impact Analysis
   Appendix M - Sediment Quality Evaluation
   Appendix N - Record of Interagency Coordination
   Appendix Q - Risk and Uncertainty in Environmental Evaluation and Approach
   Appendix R - Section 103 Evaluation
   Appendix S - Essential Fish Habitat Evaluation

2. **Verbatim Agency Comments**
   - Department of Natural Resources
   - South Carolina Archives & History Center, State Historic Preservation Office
   - South Carolina State Ports Authority
   - Lowcountry Economic Alliance
   - Lowcountry Office of Government, Planning Department

1. Introduction

This document presents the combined and integrated comments of agencies, interested parties and representatives of the State of South Carolina relative to the Tier II Draft Environmental Impact Statement for the Savannah Harbor Expansion (DEIS), the accompanying Draft General Re-Evaluation Report for Savannah Harbor Expansion (DGRR) and associated attachments and appendices. Both the DEIS and the DGRR are dated November 2010. Comments on the economic analyses that were provided for this project in Appendix A of the GRR are contained under separate title, "Comments from the Savannah River Maritime Commission on the Savannah River Expansion Project DEIS and GRR - Costs and Economic Benefits, January 21, 2011".

This document provides comments grouped according to major issues identified by the Commission at its September 2010 meeting.

The agencies, entities and representatives of the State of South Carolina which have either participated in discussions pertinent to comments on the DEIS and DGRR and/or provided written comments on the DEIS and DGRR include the following:

- Department of Natural Resources
- Department of Health and Environmental Control, Division of Water Quality and Shellfish Management
- Department of Health and Environmental Control, Office of Ocean and Coastal Resources Management
- State Historic Preservation Officer
- Department of Archives and History
- Attorney General's Office
- South Carolina State Ports Authority
- Lowcountry Economic Alliance
- Lowcountry Office of Government, Planning Department

The preparation of this document has been coordinated by the Savannah River Maritime Commission (SRMC), an agency charged by the State of South Carolina with the responsibility of representing the interests of the State of South Carolina in all matters related to the "navigability, depth, dredging, wastewater and sludge disposal and related collateral issues in regard to the use of the Savannah River as a waterway for ocean-going container or commerce vessels.".

This document represents an overall State of South Carolina review of the DEIS and the DGRR. Comments on issues addressed by multiple contributors have been merged and synthesized to reflect a consensus of opinion, where appropriate. Comments on specific issues or resource categories have been compiled and integrated, as practical, into unified narratives where respective issues or resources have been presented in a number of DEIS or DGRR sections. For example, comments pertinent to water quality are incorporated into a single narrative instead of separate comments concerning water quality from the various sections on Alternatives, Affected Environment, Environmental Consequences of the Proposed Action and other portions of the DEIS. Where deemed appropriate, comments on select appendices are provided as an attachment to this document (Attachment 1). In addition, all of the verbatim written comments provided by agencies, entities and representatives of the State of South Carolina are included in this document in Attachment 2.

In the following sections comments are first presented regarding compliance with National Environmental Policy Act (NEPA) related regulations and then comments on the two DEIS sections on Need for and Objective of Action and Alternatives. Subsequently, as mentioned above comments are organized for specific resource categories in an issue based approach that integrates review of the DEIS sections on Affected Environment, Environmental Consequences of the Proposed Action, subsections addressing mitigation and other parts of the DEIS or DGRR as appropriate.

2. General Comments

General

1. CEQ NEPA Regulations (1502.13) require that the section on Purpose and Need "specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action." The DEIS section on Purpose and Need describes existing conditions and presumed benefits of the proposed action, and is vague on whether these individually or collectively comprise the underlying purpose and need. There is no clear statement of the proposed action's purpose and need.

2. CEQ NEPA Regulations (1502.14(a)) require that the proponent agency "rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated". The DEIS section on Alternatives evaluates no "build" alternatives other than deepening the channel to Garden City (i.e. no other locations for a marine terminal were given serious consideration). There is no discussion of alternatives that were eliminated from detailed study, and no reasons are given for their elimination.

3. Section 1502.14 of the CEQ NEPA Regulations states that the Alternatives section of the DEIS "should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision-maker and the public". This is not done.

4. In the Introduction to the 2010 General Re-Evaluation Report (GRR) it states that "the Panama Canal Expansion Project will be fully operational by 2014, which will allow passage for vessels with up to 50 feet of draft. The Georgia Ports Authority has planned and funded improvements at Garden City Terminal to coincide with the Panama Canal Expansion Project." Would the GPA be making this major investment in the Garden City Terminal if it were concerned about the risk of some other alternative (perhaps a different terminal site) being proposed in the DEIS?

Environmental

Wetlands

1. The DEIS states that the Harbor Expansion Project will likely result in impacts to over 1,200 acres of tidal freshwater wetlands, more than 1,000 acres of brackish water wetlands, and several acres of tidal saltwater wetlands. Mitigation (by re-routing freshwater flow from adjacent streams and offering to purchase and

preserve more than 2,000 acres of existing wetlands) is estimated to reduce the permanent wetlands impacts to 330 acres of freshwater wetlands and 730 acres of brackish water wetlands. The re-routing of freshwater flow would have its own impact (which may be significant) on the environment and this impact was not evaluated in the DEIS. Further, the use of preservation (for wetlands that are under no current threat of development) as mitigation for the permanent loss of hundreds of acres of wetlands is inconsistent with Federal "no net loss" policy.

Essential Fish Habitat

1. The DEIS contains a paucity of information about impacts to essential fish habitat or how the project will impact essential fish habitat from a fish accessibility perspective. Instead the DEIS focused on the mitigation of essential fish habitat in the majority of the discussion. The lack of detail on the impacts or consideration of realistic options that would avoid the impacts suggests that the "full disclosure" intent of NEPA may not have been met.

2. Extensive areas of essential fish habitat will be lost because of the project. The mitigation of essential fish habitat through the restoration of inaccessible marsh habitats or the purchase of woodland does not provide adequate replacement for the essential fish habitat.

3. Regarding Shortnose sturgeon, a federally-listed Endangered Species, the Corps conducted a preliminary review of the 2001 fishway design and confirmed that conditions had not changed that would reduce its effectiveness or implementability. Does the Corps have documentation that Shortnose sturgeons have used fishways in the Savannah River, or any other river of similar characteristics?

Marine and Estuarine Resources

1. There was a lack of discussion and a lack of recent evaluation of the project's impacts on commercial and non-commercial pelagic and benthic invertebrates. In that this trophic level serves as the base of the food chain, more analysis is needed to determine the impacts on these resources.

Terrestrial Resources and Shoreline

1. Impacts to terrestrial resources and existing shorelines were examined in three separate USACE documents titled *Ship Forces on the Shoreline of the Savannah Harbor Project (2006)*, *Impacts of the Savannah Harbor Expansion Project-Draft (2006)*, and *Savannah Harbor Expansion Bank Erosion Study-Update (2010)*. The studies were designed to determine the impacts that the project would have on the shorelines of the Confined Sediment Placement/Disposal

Facilities, City Front, Ft. Pulaski, and Tybee Island (Ship Forces on the Shoreline of the Savannah Harbor Project and Savannah Harbor Expansion Bank Erosion Study-Update) as well as to determine the change in shoreline and sediment volume and to predict changes in circulation, waves, and potential sediment transport between the existing and future conditions (Impacts of the Savannah Harbor Expansion Project-Draft).

Some of the conclusions made in the documents were sound; however, many were based on unsubstantiated claims. In some cases conclusions were based on existing conditions without determining the impacts of the proposed conditions. Comparisons were made between alternatives which were not the proposed alternative, while ignoring differences in impacts between the existing condition and the proposed alternative. Data which could be used to allow peer review of some of the models was missing or omitted. Some conclusions were based on incomplete models and impacts to some resources were not determined because they were not under the scope of the current study. It remains unclear whether impacts to these resources were determined. Finally, none of the studies examined the impacts resulting from the use of Generation 2 post-panamax vessels within the deepened channel.

The documentation does not clearly quantify the impacts to the Confined Sediment Placement/Disposal Facilities, City Front, Ft. Pulaski, and Tybee Island. The conclusions drawn from these studies have not been substantiated and continuation of the NEPA process without disclosing the potential impacts to these resources would be in error.

Threatened and Endangered Species

1. The DEIS lacked information that is critical to make an assessment on listed and candidate species, did not substantiate its determination of non-significant impacts when adverse impacts were acknowledged, and often relied upon unsubstantiated assumptions and conclusions to make its determinations. If the assumptions and conclusions were based on peer-reviewed or project related studies, the DEIS should cite that source as a basis upon which the assessment occurred.

2. The shortnose and Atlantic sturgeon are examples of the incompleteness of the assessment. Shortnose sturgeon and Atlantic sturgeon were grouped together for purposes of assessing impacts from the project. The DEIS justifies the grouping due to their "similarities in habitat use, distribution throughout the proposed action area, foraging behavior and prey base, and subsequent risk of take relative to dredging and trawling operations..." No citations or other reference information was provided to substantiate this decision to group the species. Other information provided in the DEIS provides information that contradicts the

claim that the species are similar enough to group together for impact assessment purposes. For example, the narrative states that Atlantic sturgeon primarily lead a marine existence and are therefore more likely to be impacted by hopper dredges than the more estuarine-based shortnose sturgeon. The document states that shortnose sturgeon spawn 100 miles upstream of the project area, but also states that an Atlantic sturgeon larva was found 6.7 km (4 miles) upstream of the project impact area. This information not only suggests that shortnose and Atlantic sturgeon spawn in different areas, it also highlights the possibility that some larva may drift into the project area and may be affected by the upstream increases in salinity that would occur as a part of this project. Additional information should be collected to verify the actual location of Atlantic sturgeon spawning to ensure the project dredging and upstream movement of salinity and decreases in DO will not deleteriously impact Atlantic Sturgeon.

3. The impact summary to the Essential Fish Habitat in Appendix S, acknowledges that the proposed action would have adverse impacts on shortnose sturgeon, an endangered species. Nonetheless, the text dismisses the adverse impacts as non-significant without providing sufficient detail as to how the non-significant status had been applied. Over 400 acres of habitat is expected to be lost to the shortnose sturgeon alone. Moreover, the lost habitat may have been underrepresented by the modeling. For example, a baseline level of 3.0 to 4.0 mg/l of dissolved oxygen was used to determine if habitat was available for shortnose sturgeon. This is a minimum level at which the agencies determined shortnose sturgeon can survive, but does not necessarily indicate the dissolved oxygen level that is necessary for foraging, resting, and moving. For example, the Collins et al. (2001) study of shortnose sturgeon habitat use cited in the DEIS, reported minimum mean dissolved oxygen levels of 6.36 and 6.45 in areas where adults and juveniles were found, respectively. In the Appendix N documentation, Prescott Brownell, from NMFS requested that a range of suitable habitat thresholds be used for modeling habitat availability. The agency panel then redacted his comments from the record without providing an adequate basis for the redaction. The panel decided the current methods were "acceptable for now." This comment would suggest that additional work would be necessary in the future in order to adequately asses the impacts. The narrative does not provide adequate discussion as to why the pass/fail approach was more adequate than the range approach suggested by Mr. Brownell.

4. A number of the state-listed sensitive species were dismissed from further discussion without sufficiently detailed information to determine if any impacts would occur and how impacts would be avoided. As an example, the DEIS often stated that sediment deposition would be conducted in a manner to not interfere with nesting of various sensitive species. There was no detail provided to

substantiate this claim. There was no monitoring plan cited nor detailed deposition plan cited to document that the sensitive species will be avoided. Modification of presently licensed or future licensed disposal areas will require endangered species review in with a sufficient level of detail to ensure impacts will be avoided. Moreover, other sensitive species were dismissed because they were not known to exist in the project area even when habitat existed that may support the species. If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

Water Quality (Chlorides in Groundwater)

1. Regulatory officials from both South Carolina and Georgia agree that future pumping from the Upper Floridan aquifer must decrease in order to limit the impacts of salt-water intrusion in the coastal area. A recently-released GAEPD document entitled Coastal Georgia Water and Waste Water Permitting Plan for Managing Salt-Water Intrusion (2006) indicates that Georgia will reduce withdrawals from the Upper Floridan aquifer by 5 MGD by the end of 2008; therefore keeping the pumping rate constant provided a conservative assessment of future ground-water production in the area."

   Has groundwater use in the Upper Floridan aquifer decreased in Georgia and South Carolina as assumed in the model and analysis?

   Did groundwater withdrawals from the Upper Floridan aquifer decrease by at least 5 MGD between 2006 and 2008 in Georgia?

2. Groundwater use trends and restrictions by GAEPD are discussed in various sections of the GRR and supporting appendices. There appears to be a lack of corresponding discussion on groundwater use and restrictions by SDHEC in South Carolina.

3. While the overall conclusion that the impacts to groundwater are not expected to be significant appear reasonably well substantiated, quantifying the increased flow through the confining unit to 3-4% does not appear to be well substantiated given the uncertainty in leakage though this unit.

4. In the Draft GRR (page 150) the following conceptual mitigation measures are presented:

   Deposit channel sediments in nearshore areas where the groundwater aquifer is near the ocean floor.

Acquire but not use a permit from the State to withdrawal fresh water from the Upper Floridan aquifer.

Reduce pumping of groundwater by acquiring – but not using – permitted rights from industries to remove freshwater from the Upper Floridan aquifer.

These potential mitigation measures, in particular the last two, have significant ramifications on water use in the region by reducing overall water availability. The ability to acquire permitted rights in Georgia and presumably South Carolina, including existing permitted rights without replacing them with an alternate source raise significant questions regarding the viability of these conceptual alternatives.

Water Quality (Chlorides in Surface Water)

1. Available input data relating to chloride/salinity changes over tidal cycles and over cross-sectional areas of critical river reaches appear to be sparse to absent. There is reference to proposed or on-going chloride / salinity monitoring, however these does not appear to be any detail on this monitoring effort. Given the highly stratified nature of the chloride distribution in conjunction with tidal effects, understanding the temporal and spatial distribution throughout the estuary may prove critical to evaluating peak chloride levels at the Abercorn Creek intake. Clarification on the existing data and any proposed monitoring would be useful in evaluating potential future impacts at the intake.

2. As a potential mitigation measure, cost for a supplemental water intake approximately 10-miles upstream from the current intake was presented in a document titled "Review and Costs for Supplemental Water Supply – City of Savannah Intake at Abercorn Creek" dated 17 Sep 2009. It is not clear if environmental impacts from this proposed new intake have been evaluated, including the potential in increase salinity in Abercorn Creek further upstream from the current intake location.

Water Quality (Dissolved Oxygen)

1. The water quality-related sections of the DEIS include detailed assessments of the project's impacts on dissolved oxygen and chloride concentrations. The analysis relied on models and field testing of mitigation techniques. Much of this information is useful for identifying the potential water quality impacts and mitigation strategies. However, the DEIS understates that uncertainty and risks associated with both the water quality impacts and the proposed mitigation. The DEIS also does not explicitly consider the manner in which the water quality of

the harbor is currently being managed and regulated. For example, the DEIS does not address impact of the project on the 2010 draft TMDL for oxygen-demanding substances, nor the related regulatory framework for achieving full compliance of water quality standards.

2. Much of the DEIS's analysis of potential water quality is based on models that are have some capability to predict "average" dissolved oxygen or chloride conditions, but limited ability to characterize the trends and variability in water quality. Therefore, it is unclear whether the models are accurately predicting the critical conditions for water quality protection. The DEIS provided little indication that model uncertainties were explicitly considered in either predicting impacts or designing mitigation strategies. This is an especially important concern for the mitigation of dissolved oxygen impacts, because the proposed technology is somewhat experimental and of highly uncertain benefit.

3. The pending dissolved oxygen TMDL is expected to have a major regulatory and economic impact on both industrial and municipal dischargers, many of which will have to make large capital investments to reduce wasteloads. It tends to be controlled by the location in which attainment of dissolved oxygen concentrations is most difficult. From this perspective, it would not matter if 97% of the system experienced oxygen improvements if the critical location(s) experienced degradation, or if the wasteload allocations to achieve full attainment would be lower. The DEIS currently does not allow this determination. Similarly, it is unclear if how the proposed mitigation approach would affect the ability of point source dischargers to use the same technology for TMDL compliance.

4. The analysis should be revised to (1) more accurately characterize the uncertainties associated with water quality impacts; (2) more explicitly consider those uncertainties in designing environmentally conservative mitigation strategies; and (3) specifically examine the impact on the project on water quality management of the estuary under the draft 2010 TMDL.

Abstract – Pg 1, 2nd para – "The Corps of Engineers issued a Chief of Engineers' Report later in 1999 which provided further direction on the additional studies that needed to be conducted". Please include the Chief's Report as an Appendix to the EIS.

Section 1.02 Areas of Concern and Issues – Pg 1-4, 1st para – "The proposed deepening of the Savannah River Federal Navigation Channel would impact the endangered Shortnose sturgeon and Striped bass habitat, tidal freshwater wetlands, brackish marsh, increase salinity at the City of Savannah's Water Intake at Abercorn Creek, and decrease dissolved oxygen in the harbor". Atlantic sturgeon, recently proposed for listing as an endangered species by NMFS, should also be identified as a resource that would be impacted by the SHEP.

Section 2.04 Study Authority – Pg 2-3, 4th para – "(ii) the Secretary of the Interior, the Secretary of Commerce, the Administrator of the Environmental Protection Agency and the Secretary approve the selected plan and determine that the associated mitigation plan adequately addresses the potential environmental impacts of the project". The mitigation plan needs to adequately compensate (not just address) for the potential environmental impacts.

Section 5.16 Cumulative Effects of the Proposed Action – Pg 5-142, 6th para – "The cumulative effects analysis is found in Appendix L of the EIS". A summary of the findings of the cumulative impacts analysis, that includes text on the magnitude and significance of the collective impacts, would be appropriate for inclusion in this section of the DEIS.

Section 5.19 Socio-Economic Resources – Pg 5-144, 1st para – "The harbor deepening project is expected to reduce the cost of shipping containerized goods through the port". This statement needs elaboration with specific details, or a reference to a document that contains those details.

Section 5.19 Socio-Economic Resources – Pg 5-144, 2nd para – "None of the alternatives conflicts with long term land use plans outlined in 1987 Special Area Management Plan for the Lower Savannah River which was prepared by the SC Coastal Council (SCCC)". The referenced document is more than 20 years old and has almost certainly been updated or replaced with a more current land use plan. To be accurate, the Corps' impact analysis should be based on the most recent land use planning information available.

Section 5.20 Protection of Children and Environmental Justice, Overview – Pg 5-144, 6th para – "The Corps collected and analyzed information concerning the potential impact on minority populations, low-income populations, and children from the proposed Savannah Harbor Expansion Project. The information shows that the proposed action would not cause disproportionately high and adverse impacts on minority populations". What specific information lead the Corps to this conclusion and where is the analysis located?

Section 5.21.E. Community and Regional Growth – Pg 5-155, 2nd para – "No additional cargo is expected to pass through the harbor as a result of the proposed project". This statement appears to be inconsistent with recent and future planned actions taken by the GPA to increase the container through-put capabilities of their Garden City Terminal. The Corps should elaborate on their statement above, and reconcile the disparity.

Section 7.01 Public Involvement and Review – Pg 71-, 1st para – "Comments on these scoping meetings were received from the following:" Were no scoping comments received from South Carolina interests?

The maximum authorized plan of -48 ft is supported by the non-Federal cost share sponsor. Although it is acknowledged in the DEIS that environmental impacts associated with shallower depths would be less than those associated with the NED plan, the DEIS concludes that *"the lesser impacts of the 44-foot depth, 45-foot depth, and 46-foot depth alternatives are not considered sufficient to justify recommendation of these*

alternatives instead of the NED Plan". The DEIS further concludes that all depth alternatives, with the inclusion of proposed mitigation features, are *"environmentally acceptable."*

DNR disagrees with this conclusion, and believes that the only two deepening alternatives that might be considered environmentally acceptable are the 44-ft and the 45-ft alternatives, provided the proposed mitigation is effective in minimizing any adverse impacts of these alternatives. Obviously, the "no action" alternative (i.e., maintaining the channel at the currently authorized depth of 42 ft) would have the fewest adverse environmental impacts.

As stated in the DEIS, the extent of direct wetland impacts resulting from the excavation of bend wideners would not differ substantially among the five deepening alternatives considered. In each case, a total of 14.08 acres of salt and brackish marsh would be affected. In the absence of an approved saltwater mitigation bank in the Savannah River Basin, the USACE proposes to mitigate for these direct losses by grading down approximately 42 acres of a former confined dredge spoil disposal site (CDF 1S) near the confluence of the Front and Middle rivers to an elevation that would support *Spartina alterniflora.* A "feeder" creek system would also be constructed toward the interior of the restored marsh. This area would then be allowed to revegetate naturally. Active planting of *Spartina* would only be conducted if the area did not revegetate naturally at a rate that would provide 15 percent vegetative cover after 1 year and 80 percent vegetative cover after 5 years (with interim goals of 25, 40, and 60 percent cover at the end of two, three and four years, respectively). Conceptually, DNR concurs with this approach to mitigating for the direct loss of brackish and saltwater wetlands resulting from any of the deepening alternatives; however, DNR's overriding concern about the indirect effects of harbor deepening should be given greater weight.

As stated in Chapter 5 of the DEIS, *"All of the deepening alternatives would adversely impact tidal freshwater marsh."* Model predictions indicate that, without mitigation, deepening the harbor would result in the conversion of tidal freshwater marsh to brackish marsh as a result of increased salinity intrusion. Under conditions of average flow and low sea level rise, the acreage of freshwater marsh that would be lost as a result of deepening is predicted to range from 551 acres for the 44-ft alternative to 1,212 acres for the 48-ft alternative, assuming no mitigation is implemented. With the flow-altering modifications proposed as mitigation by the USACE, however, the acreage of freshwater marsh is actually projected to *increase* by 332 acres with the 44-ft alternative; whereas, a net *loss* of freshwater marsh (ranging from 32 acres for the 45-ft alternative to 337 acres for the 48-ft alternative) would still result from the other deepening alternatives, even with mitigation. Considering the substantial loss of tidal freshwater wetlands that has already occurred as a result of past dredging operations and other modifications to the

system, the DNR considers anything more than a *de minimis* loss of freshwater wetlands to be a significant adverse impact of the proposed deepening project.

As discussed in the DEIS, there are significant concerns related to the predicted decrease in dissolved oxygen that would result from the proposed deepening project. The primary area of concern for dissolved oxygen is the portion of the Savannah River between Fort Pulaski (River Mile 0.0) and the Seaboard Coastline Railroad Bridge (Mile 27.4). This is the section of the Savannah River estuary that would be directly affected by the deepening project. As noted in the DEIS, this segment of the river is on Georgia's Section 303(d) list as impaired for dissolved oxygen. Modeling studies conducted in support of the development of a Total Maximum Daily Load (TMDL) for dissolved oxygen in Savannah Harbor estimate that the existing dissolved oxygen concentration in Savannah Harbor is 1 mg/l lower than it was during the baseline year (1854) and condition (12-foot controlling depth) because of dredging operations that have been conducted since then. Model predictions from the SHEP studies indicate that further deepening will have additional impacts on the dissolved oxygen regime in Savannah Harbor.

As reported in the DEIS, hydrodynamic and water quality modeling conducted in support of the deepening project suggest that the proposed mitigation features (i.e., the flow-altering plans discussed above and the DO injection systems) would substantially reduce project impacts to freshwater wetlands and some species of fish. While DNR does not necessarily dispute the hydrodynamic and water quality modeling results, we are concerned that there is still substantial uncertainty regarding the predicted magnitude of adverse impacts and the effectiveness of the proposed mitigation measures, particularly, the oxygen injection system. The results of a demonstration project conducted to determine the effectiveness of the system in Savannah Harbor were inconclusive. The slight increase in dissolved oxygen in the vicinity of the Speece Cones was shown to be within the normal range of natural variability due to tidal influences, and could not be definitively attributed to the oxygen injection system itself. Furthermore, the long-term effectiveness and viability of this system in a tidal brackish water environment is highly questionable. The minimal net improvement in DO predicted by the model may not be sufficient to warrant the initial cost of the system or the long-term maintenance costs. Instead, DNR recommends that adverse impacts to dissolved oxygen levels be minimized by deepening to no more than -45 ft.

DNR also is concerned that some or all of the flow-altering modifications could have unintended consequences that result in additional adverse impacts to natural resources. Significantly, the modifications proposed to reduce salinity intrusion into the Back River to protect tidal and managed freshwater wetlands could result in increased salinity intrusion into the Front and lower Middle rivers, where both juvenile and adult SNS have been found to concentrate, particularly during the winter when temperatures are below

22° C (Collins et al., 2001). In fact, Table 5-30 shows that the loss of adult SNS habitat in winter would be much greater *with* the flow alterations (maximum loss of 439 acres for the 48-ft alternative) than *without* them (maximum loss of 44 acres for the 48-ft alternative). Conversely, the loss of adult SNS habitat in summer and juvenile SNS habitat in winter is predicted to be *less* with the proposed flow-alterations than without them.

The deepening alternative that is predicted to have the least negative impact on SNS habitat *overall* (including adults and juveniles during winter and summer) is the 44-ft alternative, which would result in a net loss of approximately 60 acres of SNS habitat with flow-altering mitigation, and 151 acres without flow alterations. By comparison, the NED Plan (i.e., the 47-ft alternative) is predicted to result in a net loss of 473 acres of SNS habitat overall with flow alterations (or a loss of 545 acres without flow alterations). The locally preferred plan (i.e., the 48-ft alternative) would result in even greater net losses of SNS habitat overall. DNR considers magnitude of these impacts to the habitat of shortnose sturgeon to be unacceptable, with or without mitigation.

Other unintended consequences of flow alterations could also occur. Recent and ongoing tagging studies suggest that SNS may move freely between the Front, Middle and Back rivers via Steamboat Cut and Rifle Cut. If this proves to be the case, closing Rifle Cut could impede this movement, and limit SNS access to suitable foraging and nursery habitat. In addition, DNR field biologists have recently reported that the sediment basin in the lower Back River has already filled in to a large extent, and that any further deposition of sediments in this area could present another impediment to SNS migration throughout the system.

The USACE proposes to provide compensatory mitigation for unavoidable impacts to SNS foraging and nursery habitat by constructing a fish passage structure around the New Savannah Bluff Lock and Dam (NSBLD) near Augusta, at a projected cost of $6.3 million. The structure (a rock ramp) would be located on the South Carolina side of the river, and would theoretically provide SNS access to approximately 20 miles of upstream spawning habitat. DNR believes the likelihood that this approach would be successful in passing SNS is highly doubtful. While such a fish passage structure might benefit other migratory fish, its success in passing SNS has never been demonstrated. Because of its unproven success, DNR is opposed to implementing active fish passage as mitigation for unavoidable impacts to SNS habitat, and believes that the best approach to protecting shortnose sturgeon habitat would be to minimize those impacts by selecting either the "no action" alternative or the 44-ft deepening alternative (with flow-altering mitigation).
While impacts to SNS would be minimized by selecting either the no action alternative or the 44-ft alternative, modeling results presented in the DEIS suggest that the overall net loss of striped bass habitat (including suitable habitat for spawning, eggs and larvae) would be less with the 45-ft alternative. Because of this apparent benefit to striped bass,

an important recreational species whose population in the lower Savannah River has been drastically reduced by earlier dredging operations and flow-altering modifications to the system, DNR would consider the 45-ft deepening alternative (with flow-altering mitigation) to be acceptable, as well.

The USACE also proposes to provide compensatory mitigation for unavoidable impacts to tidal freshwater wetlands. Initially, an attempt was made to identify other sites in the Savannah River estuary that could be used for restoration or creation of tidal freshwater marsh; however, neither the USACE nor any of the stakeholders could find any suitable sites that were available within the Savannah River Basin. In the absence of any such sites, the USACE (in consultation with the USFWS and other natural resource agencies) used the Savannah District Standard Operating Procedures (SOP) to calculate the minimum number of acres that would need to be acquired and preserved to acceptably mitigate for unavoidable freshwater wetland impacts. Using this procedure, it was determined that the total acreage of wetlands that would need to be preserved ranged from 0 acres for the 44-ft deepening alternative (with flow-altering mitigation) to 2,683 acres for the 48-ft alternative (with flow-altering mitigation). The USACE proposes to acquire lands identified in the latest version of the Savannah National Wildlife Refuge Acquisition Plan (dated July 2007), and provide them to the USFWS to manage as additions to the Refuge as compensatory mitigation for unavoidable wetland impacts from the deepening project. Priority will be given to acquiring properties that are dominated by freshwater wetlands. DNR concurs with this approach to mitigating for any unavoidable impacts to tidal freshwater wetlands, particularly since most of the indirect impacts of deepening would occur within the Savannah National Wildlife Refuge. DNR recommends that any such acquired properties be made accessible to the public for educational and recreational activities that are consistent with the wildlife management goals of the Refuge.

Navigation

Channels: The channel is shallower and narrower than Army Corps design standards for fully loaded post-panamax ships. This indicates margins of safety for navigation will be lower than normal. The Engineering Investigations section promotes accepting greater than normal levels of risk without further justification (page 59).

Channel Depth and ship draft: The project will not accommodate post-panamax draft even on high tide. It will most likely handle drafts of 43 feet on any tide, and 47 feet on high tide, well under post-panamax. Tide range in the offshore channel is reported at 50 to 75 percent in excess of the actual tide range offshore, distorting estimates.

Channel Width and Ship Width: The proposed channel width will be narrower than present, and therefore will decrease the number of ships the project can handle. This is

contrary to the objectives. The channel is only wide enough for ships up to 117 feet wide, and then only in one-way traffic, according to Army Corps channel design standards. Post-panamax beam is 160 feet.

One-Way Traffic: The channel is not satisfactory for two-way traffic of any appreciably sized ships, per Army Corps standards. Navigational simulation studies only simulated ships up to 140 feet wide, less than post-panamax, and problems presented in these simulations. There were no simulations of a full sized post-panamax ship reported.

Passing Lanes: One passing lane was found to be inadequate, leaving one viable passing lane throughout the length of the project.

Offshore Channel Bend: This critical point was found to be navigationally sound only when ranges are visible, limiting use to days when the visibility is good.

Traffic Load: The project cannot accommodate the number of ships projected to be calling on the port with only one-way traffic. No traffic density study was reported verifying the number of ships the port might handle daily.

Maintenance Dredging: The GRR suggests maintenance dredging will not increase in cost or volume over present levels, though four other ACOE studies indicate the contrary. Maintenance at present levels is lacking, as the existing channel is less than project depth across seven ranges of the channel. Basing future maintenance on inadequate present maintenance of a shallower project is likely to prove inaccurate.

Dredge Spoil Disposal: Even with artificially low estimates of dredge spoil volume, the project relies on the availability of the site considered for a Jasper County terminal for 60 years. The actual amount of dredge spoil disposal volumes is likely to be much higher than estimated in the report, creating further reliance on the Jasper site for decades.

Economic Benefit: The economic analysis did not account for limitations on draft, width, speed, and two-way traffic, but rather assumed the project could actually handle post-panamax ships at unlimited density. Actual ship activity is unlikely to meet economic benefit estimates.

Draft General Reevaluation Report-General Comments:

Navigation

The DGRR states that the Garden City Container will handle up to 6.5 million twenty foot containers (TEU) being on or off loaded at this facility annually. Using several

methods to analyze potential capacity with their proposed capital improvements, a more realistic capacity for the facility would be about 3.5 million TEUs annually.

The Savannah Maritime Association recommends a 2 ft minimum water clearance under vessels transiting the Port of Savannah. The GRR uses clearances of over 4 ft for certain classes of vessels in the analysis. There should be general agreement between operational practices at the port and assumptions used in the report.

Given forecasts for the year 2030 in the report, it is assumed there will be 3,500 container ships calling at Savannah Harbor, along with about 3,000 general cargo ships and 167 LNG tankers. This equates to over 13,000 commercial vessel transits in or out of Savannah Harbor annually. Given:

- Multi-mile wide safety zone required for LNG transits,
- Recreational boating at the cross point of the channel and the ICWW,
- Large size of vessels expected to call Savannah, and
- Complexity of navigation within the Savannah River complex.

The report offers no details on how Savannah Harbor can accommodate so many vessel calls.

Economics

Most of the anticipated traffic increase forecasted for Savannah Harbor in the future is imports with a large increase forecasted for imports from the Far East. The report does not effectively address the impact of a significant increase in import cargo versus U.S. exports. By 2030, given the forecasts in the report, there will be over 1.5 million TEUs of empty containers going out of Savannah harbor, due to the imbalance between import volumes and export volumes. This forecasted imbalance in trade flows has an effect on outbound vessel loading and draft requirements that do not seem to change over time. For some trade routes, the depth of outbound vessels is the main source of benefits.

There is only minimal analysis of the effect deepening Savannah Harbor may have on other Southeast US and Gulf ports. It is acknowledged in the report that there are plans for potential port capacity expansion of 12 million TEUs at Southeastern US ports. Market service areas of ports can often overlap. Rather than looking at each port as a singular entity, they need to be evaluated in a regional as well as national scope, to optimize potential public investment in this industry.

One argument for the expansion project is the need of greater depth within the river or tonnage will move elsewhere, but the GDRR claims lower shipping costs all the way from China. Benefits would be much lower if the transportation benefits were measured from a likely alternative U.S. port.

The NED channel depth to Garden City seems to be about 44 ft. Reducing under-keel clearance alone reduces the optimal channel depth by one to two feet. As depth increases, fewer and fewer vessels draft deep enough to save money.

3. Comments on Compliance with NEPA Related Regulations

Format of the EIS

Section 1502.10 of the CEQ NEPA regulations (40 CFR Part 1500) and 32 CFR Part 651, Environmental Analysis of Army Actions; Final Rule prescribe the format of an EIS. The Savannah Harbor EIS does not follow this format and should be revised accordingly. Specifically, Section 2.00 should be entitled Purpose of and Need for the Action; Section 3.00 needs to be titled Alternatives Including Proposed Action; a List of Preparers section should be added (presently the list of preparers appears in Appendix V) and should include persons who were primarily responsible for "significant background papers" per 1502.17; the List of Preparers section should be followed by a section entitled Distribution List, which would be the list of agencies, organizations and persons to whom copies of the statement are sent (this list is currently in Section 7.00); and an Index (there is no index in the EIS).

CEQ NEPA Regulations (1502.13) require that the Purpose of and need for action section of an EIS "specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action." Section 2.00 includes statements that describe existing conditions and presumed benefits of the proposed action, but it is not clear if these individually or collectively comprise the underlying purpose and need. The purpose and need needs to be clearly and concisely presented.

CEQ NEPA regulations (1502.14(a)) require that agencies "Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." Paragraph 4 on page 3-2 in Section 3.00 states that "The Corps considered three locations in Jasper County, SC that were considered by others for a 'Jasper Terminal'." Paragraph 5 states that the ". . . analyses . . . resulted in several conceptual alternatives being eliminated from further consideration." It references "Formulation of Alternatives, May 2005, found in Appendix O" as the document describing that work. However, Appendix O contains no evaluation of the three locations in Jasper County that were considered for a "Jasper Terminal." A Plan Formulation Appendix that discussed the Jasper Terminal locations is included in the General Reevaluation Report, but there is no reference to this in Section 3.00. Additionally, Section 3.00 of the EIS does not identify the alternatives which were eliminated from detailed study, nor does it discuss the reasons for elimination of those alternatives. This deficiency in the document needs to be corrected for the EIS to comply with CEQ NEPA regulation Section 1502.14(a).

Section 1502.14 of the CEQ NEPA regulations states that the Alternatives section of an EIS "... should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public." Section 3.03, however, does not present a comparison of the impacts of alternatives as recommended in the NEPA regulations.

CEQ NEPA regulations 1502.14(f) requires the alternatives section of an EIS to "include appropriate mitigation measures not already included in the proposed action or alternatives." A review of Section 3.00 indicates that the alternatives section does not discuss mitigation of identified adverse impacts listed in the abstract and in other sections of the EIS, including adverse impacts on the endangered shortnose sturgeon and striped bass habitat, tidal freshwater wetlands, fringe brackish wetlands, and water quality (lowered dissolved oxygen in the inner harbor). For example, the acquisition of lands to mitigate for freshwater wetland impacts is discussed in Appendix C but is not included in the Alternatives section. A mitigation subsection should be added to the Alternatives section which clearly describes mitigation measures not already included in the proposed action or alternatives.

CEQ NEPA regulations (1502.15) require that the affected environment section of an EIS "concentrate effort and attention on important issues." It is unclear if Project Economics, for example, which is identified in Table 1-1, is an important issue. If so, it should be discussed in the Affected Environment section.

Methodology

CEQ NEPA regulations (1502.24) requires that agencies "shall identify any methodologies used . . ." in analyses in environmental impact statements. In many instances, the Environmental Consequences Section 5.00 of the EIS clearly states the methodologies that were used to complete the analysis of impacts (e.g., wetlands), but in other instances, such as Environmental Justice, the methodology used to conduct the analysis is not clear and needs to be described.

4. Comments on Purpose and Need

In reviewing the DEIS it becomes apparent that the actual purpose of the proposed action is to implement a channel deepening program to mainly support the expansion objectives of the Georgia Ports Authority's (GPA) Garden City Terminal (GCT). In the Introduction to the 2010 General Reevaluation Report (GRR) it states that "...the Panama Canal Expansion Project will be fully operational by 2014, which will allow passage for vessels with up to 50 feet of draft. The Georgia Ports Authority has planned and funded improvements at Garden City Terminal to coincide with the Panama Canal Expansion Project." This would indicate that the GPA has already made and will continue to plan/make modifications to the GCT facilities in clear anticipation that the deepening of the Savannah Harbor to enable larger vessels to reach the GCT will be approved and implemented. Would the GPA be making this major investment in GCT modifications (about $130 million according to the 2005 version of the GRR) if it were concerned about the risk of some other option being chosen? Would the improvements to the GCT be carried out if another alternative, perhaps involving a different terminal site, was selected in the FEIS as a preferred action?

5. Comments on the Alternatives Considered

CEQ NEPA regulations (1502.14(a)) require that agencies "Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." Paragraph 4 on page 3-2 in Section 3.00 states that "The Corps considered three locations in Jasper County, SC that were considered by others for a 'Jasper Terminal'." Paragraph 5 states that the ". . . analyses . . . resulted in several conceptual alternatives being eliminated from further consideration." It references "Formulation of Alternatives, May 2005, found in Appendix O" as the document describing that work. However, Appendix O contains no evaluation of the three locations in Jasper County that were considered for a "Jasper Terminal." A Plan Formulation Appendix that discussed the Jasper Terminal locations is included in the General Reevaluation Report, but there is no reference to this in Section 3.00. Additionally, Section 3.00 of the DEIS does not identify the alternatives which were eliminated from detailed study, nor does it discuss the reasons for elimination of those alternatives. This deficiency in the document needs to be corrected for the DEIS to comply with CEQ NEPA regulation Section 1502.14(a).

Paragraph 5, line 5 on page 3-2 of Section 3.00 discusses "Four alternate terminal locations . . ." The section continues by stating that "Those four sites were then compared on their economics . . .", implying that economics was a reason for eliminating alternatives from detailed study. However, if economics was a reason for eliminating alternatives from detailed study, it is not clearly stated. Moreover, if there were other reasons for eliminating alternatives from detailed study, the DEIS does not state so. Additionally, the DEIS should identify the criteria that were used to compare the feasibility of alternatives for further consideration in the DEIS.

Section 3.03, Comparative Impacts of Alternatives. Section 1502.14 of the CEQ NEPA regulations states that the Alternatives section of an EIS " . . . should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public." Section 3.03, however, does not present a comparison of the impacts of alternatives as recommended in the NEPA regulations.

Section 3.04, Rationale for Plan Selection. Paragraph 1, line 2 of this section references two pages of the DEIS following the Section 3.04 text that ". . . summarize the results of the impact analyses." However, the two pages (Table 3-6 and Table 3-7) only summarize the hydrodynamic-related impacts of the five depth alternatives and do not summarize the impacts of the No Action Alternative, nor deepening only the Garden City Terminal site,

which Section 3.00 states in Paragraph 5 on page 3-2 ". . . was considered in the detailed evaluations." Section 3.04 of the DEIS, therefore, should be revised to present the environmental impacts of the No Action and Garden City Terminal site alternatives with the five depth alternatives in comparative form to provide a clear basis for choice among options. Moreover, the comparison of alternatives should include all environmental impacts that are discussed in Section 5, Environmental Consequences. In addition to those impacts currently included in Tables 3-6 and 3-7, the summary of impacts should include the following: sediment quality, air quality, marine and estuarine resources, terrestrial resources, floodplains, threatened and endangered species, cultural resources, essential fish habitat, cumulative effects, aesthetics and recreational, recreational and commercial fishing, socioeconomic resources, environmental justice, and other items and factors.

Section 3.07, Alternative Methods or Beneficial Use of Dredged Sediments. Paragraph 1 on page 3-23 of this Section identifies that ". . . Savannah Harbor ODMDS is the least cost disposal alternative for long term maintenance of the proposed harbor deepening project." It is not clear whether or not maintenance dredging is part of the proposed action. If it is part of the proposed action and alternatives, the DEIS must present the environmental consequences of the disposal alternatives and should present these in a comparative form so that the decisionmaker and the public are presented with a comprehensive evaluation of the short-term and long-term impacts of each alternative.

Paragraph 1 on page 3-24 of Section 3.07 discusses a "sediment placement plan" that was developed by the Savannah District for the new dredging work associated with the proposed action and alternatives. The text in paragraph 1, line 2 on page 3-24 indicates that "The plan was reviewed from an environmental perspective . . ." However, the text does not present the results of that review nor indicate if a complete analysis of impacts of the plan was completed. Since placement of sediment is part of the proposed action, an evaluation of the environmental impact of that component of the proposed action needs to be included in the DEIS. Additionally, Paragraph 3 of Section 3.07 indicates that the " . . . currently proposed plan is based . . .", in part, on ". . . general environmental acceptability issues." These issues need to be explained and presented for the proposed plan and any reasonable alternatives to allow a comparison of the impacts of alternatives.

Selection of the Garden City Terminal Alternative

As stated in the 2005 GRR, the preferred terminal was the GCT and it was selected on the basis of construction costs only (page 34). The comparison of these construction costs is skewed to the GCT. Table 6 compares the construction costs of the various potential terminal alternatives. For the GCT there 0$ cost shown in the column for facilities costs. Yet in the succeeding discussion there are $130 million in costs to modify the GCT to achieve a 1.5 m TEUs. This $130 m is considered in the GRR as part of the without

Project Condition and not part of the cost of the SHEP. How can that be when the modifications are to accommodate the larger ships from the Panama Canal Expansion? Facility costs for all the other terminals which range from $250m to $370 m and as they are included in the cost comparison, all of the other alternatives are more costly than the GCT. For example the total facility, dredging and mitigation costs are $326 m for the GCT compared to the Jasper County 14A/14B terminal site of $484 m. However, if the $130 m in facility costs are included for the GCT, its total would be $426 m making the actual cost comparisons among the terminal alternatives more equitable. This analysis was repeated in the 2010 GRR with slightly altered numbers in Table 6-3 but again without including any facility costs for the GCT and thus again the conclusion is that the GCT is the best terminal alternative.

On pages 105-106 of the 2010 GRR the stated goal for the GCT build-out will be 6.5 m TEUs. The costs to achieve this to the GCT would be expected to be substantial yet they are never included in the cost comparison of the terminal alternatives.

In addition, the cost comparisons of the terminal alternatives do not include operations and maintenance costs. From the dredging maintenance required these costs would be expected to be much higher for the GCT than the other alternatives since the GCT is much further upstream.

All of this would indicate that a more thorough and comprehensive cost analysis is warranted. Furthermore, a construction cost comparison alone is not the complete picture. There has been no benefit/cost financial analysis performed for any of the terminal alternatives and it is recommended that one be carried out to provide a more equitable comparison.

The comparison of potential adverse environmental impacts among the terminal alternatives is further evidence of the bias favoring the GCT. Table 5 in the 2005 GRR and discussions in the 2010 GRR clearly demonstrate that the adverse impacts associated with deepening all the way to the GCT are much more significant than those for any other terminal alternative. Yet the economic "efficiency" of the GCT is considered the controlling variable in selecting it as the preferred alternative. The large discrepancy in the degree of adverse impacts attributable to the deepening to service the GCT as compared to the other terminal alternatives and the subsequent elimination of all the other terminal options from further consideration in the DEIS implies an inadequacy of the DEIS to provide a truly rigorous assessment of reasonable terminal alternatives.

Range of Reasonable Alternatives

What is left in the DEIS is not a range of reasonable alternatives but a range of alternatives to deepen the approach to the GCT. The comparative effects of possible terminal alternatives have been effectively removed from consideration in the DEIS.

They have been segmented out of the alternatives analysis and segmentation of this nature can be a basis for inadequacy of the DEIS. The analysis presented only addresses comparative impacts of the deepening alternatives, not of the combined total potential impacts of both terminals (new or modified) and deepening options. Some alternatives to consider:

Clearly a thorough analysis of comparative impacts of at least some of the terminal options in concert with the deepening options should be included other than only the GCT. It would appear that the alternatives for a Jasper County terminal would merit inclusion since it appears that many of the most serious environmental adverse impacts would be eliminated or minimized with those options. The possibility of a Jasper County terminal is discussed in the GRR, but it requires a more rigorous comparison of impacts with the GCT and other alternatives. This position is supported in Appendix L: Cumulative Impacts where there a number brief mentions of the minimal adverse impacts (to salinity intrusion, oxygen depletion, shortnose sturgeon) associated with a Jasper County terminal location in comparison with the deepening to the GCT.

In fact, the degree of adverse impacts associated with deepening to the GCT and the respective major investments required for mitigation calls into question whether the GCT is located optimally. Some of these impacts, specifically related to the endangered shortnose sturgeon, cannot be well mitigated. Perhaps an alternative that removes the GCT from the SHEP or maintains it as a companion facility to a more optimally located terminal with substantially less adverse environmental effects could be evaluated.

With regard to the deepening alternatives that are presented within the DEIS a question arises as to the need for evaluations at one foot intervals since the overdraft is estimated at two feet. Why not evaluate alternatives that are two or more feet between them? Further, why is there no deepening alternative of 50 feet? Or even 52 or 55 feet? It would seem reasonable to include alternatives of 50 feet or more since that is the deepest depth of draft for the ships that will traversing the Panama Canal in 2014? As stated in the GRR, economic benefits increase with deeper alternatives. This may also possibly necessitate other terminal options than only the GCT.

Other

3.0 Alternatives – Pg 3-3, 2nd para – "The studies found that (1) the expected growth of container cargo over the next 20 years would exceed the capability of any single existing or future (Greenfield) deepwater container terminal along the East Coast, (2) expansion of any existing container terminal or creation of a new terminal would cause environmental impacts, and (3) improving Savannah Harbor would not cause cargoes to shift from other ports to Savannah. Dismissing as an alternative the creation of a new terminal because it would cause environmental impacts is shortsighted and premature. Only after investigating the potential impacts of a new terminal to a level that would

allow them to be directly compared against potential impacts of other alternatives such as incremental deepening, would it be possible to determine if the new terminal alternative were the least environmentally damaging practicable alternative.

3.0 Alternatives – Pg 3-4, 3rd para – "For all dredging alternatives, the proposed dredging depths would include an additional 2 feet of allowable overdepth to ensure the contractor obtains the required dredging template. The dredging depths also include advanced maintenance that help the project remain at the authorized project depth between maintenance events. The existing amounts of advanced maintenance are shown in Table 3-2". The project alternatives that are being considered in detail within this DEIS are channel deepening activities ranging from authorized depths of -44 feet to -48 feet. Based on the above reference to allowable overdepth and advanced maintenance (shown in Table 3-2), the final channel depths for each deepening alternative could actually range from -52 feet (i.e., -44 feet of authorized depth plus 2 additional feet of depth for allowable overdepth, plus up to 6 additional feet of depth for advanced maintenance) to -56 feet (-48 feet of authorized depth plus 2 additional feet of depth for allowable overdepth, plus up to 6 additional feet of depth for advanced maintenance). This needs to be more clearly identified in the text describing each alternative and in a table that compares the final depths of each alternative.

3.01.1 No Action Alternative – Pg 3-4, 5th para – "Previous investigations indicate that demand for goods moving through Savannah Harbor, particularly as containerized cargoes, will increase in the future". What is/are the references for this statement?

d. Annual Maintenance Dredging – Pg 3-8, 2nd para – "Approximately 7 million cubic yards of sediments are removed each year from Savannah Harbor Navigation Project by the Corps". What is the calculated increase/decrease in maintenance dredging due to the SHEP? Does the calculation include the effects of a navigation channel that could be as deep as -56 feet?

h. Unconfined Placement Sites – Pg 3-14, 2nd para – "Moreover, the results of this survey indicated that no cultural resources would be adversely impacted by the proposed placement of dredged sediment within these areas". Was there SHPO concurrence with this finding?

3.04 Rationale for Plan Selection – Pg 3-19, 4th para – "Environmental impacts associated with a shallower depth would be less than those associated with the NED plan, but the lesser impacts of the 44-foot depth, 45-foot depth and 46-foot depth alternatives are not considered sufficient to justify recommendation of these alternatives instead of the NED plan". There is no explanation as to why the Corps considers the lesser impacts of the 44, 45 and 46 foot channels to be sufficient to justify their recommendation instead of the NED plan. This rationale needs to be discussed in detail.

3.04 Rationale for Plan Selection – Pg 3-20, Table 3-6 – Regarding Fisheries, and the impacts of each Depth Alternative, what does "Loss of Acceptable Habitat" mean?

3.05 Tentatively Recommended Plan – Pg 3-22, 5th para – "Two feet of allowable overdepth and up to 6 feet of advanced maintenance in selected areas (see Table 3-2, above) would also be included for the proposed action". This apparently means that the actual depth of the navigation channel in much of the Savannah River would be either 55 feet deep (for a 47-foot project) or 56 feet deep (for a 48-foot project). This being the case, the water quality and hydrodynamic model results for the 47-foot and 48-foot alternatives don't correctly predict the impacts on dissolved oxygen and salinity. In turn, the discussion of impacts on the river's resources is inaccurate for the 47-foot and 48-foot alternatives. Since the mitigation plan was developed to address the impacts predicted by the models, it too would need to be revised to address impacts of the actual channel depths.

3.12 Relationship of Proposed Action to Other Federal Projects – Pg 3-29, 5th para – "As indicated in Section 3.01 of this Draft EIS, the proposed action assumes that the project feathures associated with the LTMS (USACE 1996), Bank Protection for CDFs 13A and 13B, and the realignment of the Federal Navigation Channel (USACE 2006) have been completed". Given the historic uncertainty in the federal funding stream, what would be the environmental and economic impacts if the above mentioned project features have not been completed when the proposed SHEP project is ready to be constructed? Would the Corps proceed with constructing SHEP?

6. Comments on Critical Resource Categories

6.1. Natural Resources

6.1.1. Wetland Impacts

The sections of the report discussing impacts to wetlands and floodplains are generally without consistent references to the numerous support documents, making the discussion difficult to follow. The document has numerous figures without legends, scales and north arrows; this combined with the actual size of the figures makes them difficult to interpret.

The USACE proposes to allow the wetland restoration site (Disposal Area 1S) to revegetate naturally. Slow vegetative establishment within the restoration site allows for the establishment of invasive species and would allow more temporal loss in wetland functions and values than is necessary. Planting the site with appropriate wetland vegetation would minimize the potential for invasives to colonize the area.

The USACE is depending on the models to estimate proposed impacts and potential mitigation alternatives. Despite these models being independently verified, the USACE is putting too much reliance on their results.

A comprehensive investigation is needed to quantify the impacts of the project and the amount of mitigation proposed to ensure no net loss of wetland functions and values.

DEIS Comments

Section 4.08, page 4-62. The first sentence under the wetlands sub heading references a 1992 Planning Aid Report for the Savannah Comprehensive Study but does not provide an author. Later in the section, references are made to "that USFWS report" or "the UFWS report." Are these the same report? If so what is the correct date? The reference section contains a 1982 and a 1983 report of the same title by USFWS.

The imagery used in the report discussed above was taken in 1979 (31 years ago) and is too old to accurately reflect existing conditions.

Section 4.08, page 4-63, item 14 "Scrub-shrub." The community description only lists one shrub and 4 tree species. Should this more appropriately be classified as a forested community?

Section 4.08, page 4-63. Are there no pine dominated wetlands along the transition between marsh and forested communities?

Section 4.08, page 4-65 cites "Tidal Wetland Studies, USFWS, 2003". This reference cannot be found in Section 9.0 References.

Section 4.08, page 4-64 states: "It is likely that the percentages of those various wetland community types have changed over time. However, the Corps is not aware of similar information that is more recent."

No project specific wetlands data is provided in this Section. Has a wetland delineation using the Corps 1987 Manual and regional supplement been done for the Project Area? The exact location of wetlands should be shown and each wetland should be characterized based size and dominant flora. If not, an "on-the-ground" delineation is needed. Alternatively, appropriate remote sensing techniques may be used.

Based on Table 5-1 page 5-2, wetland impacts appear to be based solely on elevation. An explanation is appropriate. Have these impacts been field verified? If so, this needs to be stated.

Table 5-1, page 5-2. The use of a single elevation in evaluating wetland impacts throughout the project area is in appropriate. The lower and upper limits within a single wetland community (i.e. *Spartina alterniflora*) will change moving further upstream or downstream. These changes may be small but given the length of this project, the acreage could be significant.

Section 5.1.1.2 Mitigation, identifies *Spartina alterniflora* as occurring at +7.6 to +7.8 MLLW but Table 5-1 is based on MLW. A single vertical datum and tidal stage should be used to reference all elevations or the relationship between each one used needs to be defined within the document.

Figure 5-1, page 5-3. No scale or north arrow provided. Text on background image is illegible. No aerial image. Scale of drawing prevents an evaluation of the two excavation areas planned at the Kings Island Turning Basin.

Figure 5-2, page 5-4. Level of detail and scale of the Figure prevents evaluation of planned wetland impacts.

Figure 5-3, page 5-5 No scale bar, north arrow or legend. The lack of a legend prevents reviewers from determining what exactly is happening at this location.

The fourth sentence on page 5-6 states; "CDF 1S is located adjacent to the confluence of Front River and Middle River, and it is located within the boundaries of the Savannah National Wildlife Refuge (see Figure 5-52)." However; Figure 5-52 on page 5-134 is a photograph of Old Fort Jackson (Upstream Bank Protection).

This project will result in a net loss of wetlands within South Carolina and the Charleston District, based on the fourth sentence on page 5-5 describing the location of the proposed mitigation site

The last sentence of the first paragraph on page 5-6 states "excess mitigation would be credited to the Savannah Harbor Navigation Project." How will this "excess" mitigation be credited and debited to ensure no additional loss of wetland acreage? Establishment of a wetland mitigation bank with the Corps as the sponsor and overseen by the remaining agencies that make up the Wetlands Interagency Coordination Team may be a plausible approach.

In Section 5.1.1.2, page 5-6, the USACE proposes to allow the wetland restoration site (Disposal Area 1S) to revegetate naturally, provided that the minimum percent vegetative cover shown in Table 5-2 is met in each of the first 5 years shown.

Based on the text below Table 5-2, it is uncertain when the USACE would plant, at the end of any year or at the end of the 5 year period? By allowing natural revegetation the Corps is ensuring that the plants that establish within the site are genetically appropriate for the region. However the slow vegetative establishment within the restoration allows for the colonization of invasive species and would allow more temporal loss in wetland functions and values than is necessary. Planting would be more appropriate.

Figure 5-4, page 5-7 No scale bar or legend presented. Level of detail and scale of the Figure prevents evaluation of restoration site.

Section 5.1.2.2, page 5-11, Applied Technology and Management (March 2003) was cited; however this reference does not appear in Section 9 References.

Section 5.1.2.2, page 5-11, USFWS (Welch and Kitchens 2006) was cited; however this reference does not appear in Section 9 References.

Table 5-2, page 5-7. Table title does not match with what is provided in Table of Contents.

Section 5.1.2.1, page 5-8. The accuracy of the models will not be known until years after all of the work is complete. This fact is supported by the internal Corps documents found in Appendix N on page 44.

Table 5-3, page 5-11 Table title does not match with what is provided in the Table of Contents.

Table 5-4, page 5-13 Table title does not match with what is provided in the Table of Contents.

In Section 5.1.2.3 page 5-13, The Corps introduces a component of the mitigation package, "Flow Routing". What are the direct and secondary impacts from Flow Routing?

Table 5-7, page 5-16. Table title does not match with what is provided in the Table of Contents.

Figure 5-5, page 5-15. Table title does not match with what is provided in the Table of Contents.

The following figures have no scale bars or north arrows (not inclusive):

- Figure 5-6, page 5-18
- Figure 5-7, page 5-19
- Figure 5-8, page 5-20
- Figure 5-9, page 5-21
- Figure 5-10, page 5-22
- Figure 5-11, page 5-23
- Figure 5-12, page 5-24
- Figure 5-13, page 5-25
- Figure 5-14, page 5-26

Table 5-16, Page 535. Channel Depth Alternatives 46, 47 and 48-Foot have freshwater wetland impacts too large to go without at least a 1:1 restoration component within the same river basin or at a larger ratio in another river basin.

There is no discussion on potential impacts associated with elements of this project including a new boat ramp and new water intakes. Are there wetland (or other resource) impacts associated with these components of the project?

6.1.2. Essential Fish Habitat Impacts

The Essential Fish Habitat portion of the DEIS was difficult to follow. Tables and figures were mislabeled, lacked legends, or were of poor quality. In addition, the DEIS contained a paucity of information about impacts to essential fish habitat or how the project will impact essential fish habitat from a fish accessibility perspective. Instead the DEIS focused on the mitigation of essential fish habitat in the majority of the discussion. The lack of information about the impacts or consideration of realistic options that would avoid the impacts suggests the requirements of NEPA may not have been satisfied. Extensive areas of essential fish habitat will be lost because of the project. The mitigation of essential fish habitat through the restoration of inaccessible marsh habitats or the purchase of woodland does not provide adequate replacement for the essential fish

habitats that will be lost due to this project. The inaccessibility of mitigation areas renders the essential fish habitats, non-fish habitats and, therefore, non-essential and non-existent from a fisheries perspective.

Following are specific comments on the DEIS regarding essential fish habitat issues.

Table 4-8 highlights potential impacts to essential fish habitats due to the project. The table does not include potential impacts due to the increased wave activity caused by the larger ships for which the project is being constructed. The absence of this information is likely to underestimate the loss of essential fish habitats.

Table 4-8 also highlights a potential loss of live/hard bottoms. Actual loss could be determined by a study of the proposed channel extension or sediment deposit areas. It is difficult to assess the impacts of a project if the proper studies have not been completed to determine the likely impacts of the project.

Table 4-10 does not, but should include the Atlantic Sturgeon as a candidate species.

Section 5.3.2.A.Shortnose sturgeon – Pg 5-91, 3rd para – The Corps conducted a preliminary review of the 2001 fishway design and confirmed that conditions had not changed that would reduce its effectiveness or implementability". Does the Corps have documentation that Shortnose sturgeons have used fishways in the Savannah River, or any other river of similar characteristics?

6.1.3. Recreational and Commercial Fish Resources

GRR Section 4.8.4 Marine and Estuarine Resources – Pg 61, 4th para - "The recreational fishery for striped bass was recently reopened in the harbor, as a response to restored population levels."..."the Savannah River was the location of Georgia's most important striped bass fishery." This is a critical statement. Where is the citation for this?

DEIS Section 4-12, P. 4-79, 5th para. -Shrimp fishing common at the mouth of the River. May be more in the spring when females are moving toward the ocean to release their eggs. As queried above, shrimp fishing is a significant commercial venture but there appears to be no recent survey data to characterize population or health of this resource.

6.1.4. Marine and Estuarine Resource Impacts

The report contained extensive amounts of information on a wide variety of issues. The DEIS would be more understandable if proper citations were made. As currently organized, significant issues are difficult to follow.

Overall, there was a lack of discussion and a lack of recent evaluation of the project's impacts on commercial and non-commercial pelagic and benthic invertebrates. In that this trophic level serves as the base of the food chain more information should be provided on the impacts to these assemblages.

The following comments are on the DEIS:

Section 3.07 - Page 3-23, Para. 4-"Savannah District followed an iterative process to develop a plan for the new work entrance channel sediments. The work started with an engineering determination of sediment quantities to be removed at various channel depths and the composition (i.e., percent fines and percent sands) of those sediments. A review of previous information was conducted, including: the Draft 2003 ERDC Report on Nearshore Placement at Tybee Island;...". What is the citation for this document? It is not listed in the References.

Section 4.04 Marine and Estuarine Resources – Pg 4-20, 1st para – "Shad spawn in the main river, further upriver than do striped bass". Where do American shad spawn in the main river with respect to the limits of the SHEP?

Section 4.04 Marine and Estuarine Resources – Pg 4-20, 3rd para – "However population levels have been much lower in the last 20 years and a higher proportion of the spawning now appears to be occurring in the Savannah River a few miles upstream of the harbor (over 21 miles upstream from the mouth of the Savannah River)." Over what type of bottom does striped bass spawning in the Savannah River occur?

Section 4.04, Page 4-21, Para. 3- Invertebrates s of commercial import- cited from 1974 report (Johnson et al.) ((e.g., crabs, oysters, and shrimp). Cites data back to 1955. Provided an unreferenced, undated Shellfish Harvest Area Map from Mr. Dominic Guadagnoli, Shellfish Program Leader with the Georgia Department of Natural Resources – Coastal Resources Division. Is there more recent data available on the state of invertebrates of commercial importance?

Page.4-38. Para. 1. Information was taken from Collins et al. (2001). Also, discusses plankton in two studies from 2001 and 1988. Not sure of the geographic extent of these studies and they are very qualitative. Simply references species caught in tows. This may indicated that a better understanding of the resource is needed.

5.7 Marine and Estuarine Resources, Page 5-111, Section 5.7.1.1, C - Example of unreferenced critical statement, "More recent data indicate that present-day dredging operations are conducted in ways that do not increase suspended sediment concentrations to such a degree." No reference. Is this real data specific to Savannah River or an industry-wide generalization?

5.7 Marine and Estuarine Resources, Page 5-113, Section 5.7.1.1, C – Example of unreferenced critical statement, "Moreover, the Savannah River already has a very high sediment load and turbidity caused during the new work dredging would not adversely impact shellfish areas." There is no reference or a discussion in the DEIS that supports this. Has it been quantified?

Section 5.7 Marine and Estuarine Resources, Page 5-114, Section 5.7.2, A – "The sediments to be deposited in the nearshore area consist primarily of sands. The sand content of the sediments generally exceed 70 percent and in most reaches exceed 80 percent." Where is the support for these data? It should be cited.

Also, the DEIS states "Eggs and larval fish are not as mobile as adults, so there is a higher potential for those early life stages to be impacted being physically damaged by sediment or materials in the dredge plume. However, the near shore areas off Tybee Island have a very high sediment load since the Savannah River discharges at the north end of the island. Also the wind and wave climate in the near shore area tends to have a naturally high sediment content and high turbidity. The placement activities would be much localized and therefore not impact a large area."-These are very broad, uncited, unquantified statements that, if inaccurate, could have very significant impacts on these life forms in the vicinity of these proposed.

5.7.2 Sediment Placement Impacts, B. Turbidity, p.5-115. Para 5 – "The turbidity in effluent from diked sediment placement is controlled by adjustable spillways. The SC standard for turbidity is that discharges not to exceed 25 NTUs provided the existing uses of the water body are maintained. Savannah District imposes a 500 mg/l limit on suspended solids in the CDF discharges. This limit is believed to be sufficient to reduce turbidity impacts in the receiving waters to acceptable levels."- What is this based on?

6.1.5. Floodplain Impacts

The following comments are on the DEIS.

The three paragraphs within this section fail to sufficiently discuss the floodplains within or immediately adjacent to the project area. Information was lacking on floodplains within or immediately adjacent to the project area and the quantity, functions and values of the floodplains.

The final sentence in this sections states that "large-scale filling of wetlands within the floodplain are not expected in the future". Large is a relative term. If floodplains are going to be impacted, this impact needs to be accurately quantified. Also, why does the SHEP mitigation plan propose to preserve existing wetlands that are "protected" and under no threat of filling as compensation for the loss of 337 acres of tidal freshwater wetlands?

Section 5.10 Floodplains on page 5-122 states "hurricane modeling indicates that change in the water surface elevations due to the proposed harbor deepening is not significant." What statistical analysis was used to determine if a significant difference exist?

Section 5.10 Floodplains on page 5-122 did not quantify any specific impact to floodplains including shift in community composition or land use.

Section 5.10 Floodplains on page 5-122 did not provide any information on the secondary impacts to floodplains caused by this project?

In Section 5.10 Floodplains on page 5-122, modeling discussed involved storm surge from hurricanes. Was any modeling done to identify the effects of the project to floodplains in normal conditions?

Section 5.10 Floodplains on page 5-122. Was the potential impact to floodplains/riparian wetlands caused by increased ship traffic or ships traveling at increased speeds evaluated?

6.1.6. Terrestrial Resource and Shoreline Impacts

Impacts to terrestrial resources and existing shorelines were examined in three separate USACE documents titled *Ship Forces on the Shoreline of the Savannah Harbor Project (2006)*, *Impacts of the Savannah Harbor Expansion Project-Draft (2006)*, and *Savannah Harbor Expansion Bank Erosion Study-Update (2010)*. The studies were designed to determine the impacts that the project would have on the shorelines of the Confined Sediment Placement/Disposal Facilities, City Front, Ft. Pulaski, and Tybee Island (Ship Forces on the Shoreline of the Savannah Harbor Project and Savannah Harbor Expansion Bank Erosion Study-Update) as well as to determine the change in shoreline and sediment volume and to predict changes in circulation, waves, and potential sediment transport between the existing and future conditions (Impacts of the Savannah Harbor Expansion Project-Draft).

Some of the conclusions made in the documents were sound; however, many were based on unsubstantiated claims. In some cases conclusions were based on existing conditions without determining the impacts of the proposed conditions. Comparisons were made between alternatives which were not the proposed alternative, while ignoring differences in impacts between the existing condition and the proposed alternative. Data which could be used to allow peer review of some of the models was missing or omitted. Some conclusions were based on incomplete models and impacts to some resources were not determined because they were not under the scope of the current study. It remains unclear whether impacts to these resources were determined. Finally, none of the studies examined the impacts resulting from the use of Generation 2 post-panamax vessels within the deepened channel.

The documentation does not clearly quantify the impacts to the Confined Sediment Placement/Disposal Facilities, City Front, Ft. Pulaski, and Tybee Island. The conclusions drawn from these studies have not been substantiated and continuation of the NEPA process without knowledge of the potential impacts to these resources would be in error.

Specific comments on Terrestrial Resources are provided below.

4.07. Terrestrial Resources, p. 4-61, Last paragraph: The section titled Existing Shorelines Adjacent to the Federal Navigation Channel is Section 5.9 in the Tier 2 EIS.

5.9. Existing Shorelines Adjacent to the Federal Navigation Channel, p. 5-120: This section fails to discuss the analysis, or lack thereof, of the effects of the project on the shoreline along the Confined Sediment Placement/Disposal Facilities as reported in Ship Forces on the Shoreline of the Savannah Harbor Project. Table 20 of the report lists the observed drawdown of seven inbound vessels and eight outbound vessels not the predicted values resulting from the proposed project.

5.9. Existing Shorelines Adjacent to the Federal Navigation Channel, p. 5-120, 6th paragraph: The Savannah Harbor Expansion Savannah Harbor Expansion Bank Erosion Study was updated in June 2010; the paragraph should indicate this fact.

5.9. Existing Shorelines Adjacent to the Federal Navigation Channel, p. 5-120, Last paragraph: The Savannah Harbor Expansion Savannah Harbor Expansion Bank Erosion Study-Update indicates that Areas 13A, 13B, and 14 B of the Bight Area were to be protected prior to completion of the proposed project and therefore not studied in the Savannah Harbor Expansion Savannah Harbor Expansion Bank Erosion Study-Update. Has the shoreline protection projects within these three areas been completed? Has the shoreline along the remaining portions of the Confined Sediment Placement/Disposal Facilities (Such as the Jones Island Disposal Area) been completely protected and stabilized? If unprotected areas remain, the Savannah Harbor Expansion Bank Erosion Study should be updated again to include an analysis of potential impacts to the unprotected areas of the shoreline along the Confined Sediment Placement/Disposal Facilities.

Did the analysis consider potential sea level rise and its impacts on existing shorelines? Will the areas which are currently protected by hardened shorelines (i.e. jetties and bulkheads), and excluded from this analysis, continue to be protected if sea level rise becomes a reality? The analysis should be updated to include the effects of sea level rise on existing shorelines and quantify the impacts that longer and deeper draft vessels will have at higher, base water levels.

5.9. Existing Shorelines Adjacent to the Federal Navigation Channel, p. 5-121, 3rd paragraph: Paragraph states that from 2003 to 2050 there is 3.1 feet of shoreline erosion along Ft. Pulaski per year due to ship traffic and in the same sentence it states that only 0.1 foot (1.2 inches) of the erosion is due to ship traffic. Both values cannot be correct.

5.9. Existing Shorelines Adjacent to the Federal Navigation Channel, p. 5-121, 3rd paragraph: Paragraph states that from 2003 to 2050 there is only 0.1 foot (1.2 inches) of erosion along the Ft. Pulaski shoreline due to ship traffic. However, in the last sentence

the document reads that up to 2.23 inches of annual erosion could occur by year 2050. Both values cannot be correct.

5.9. Existing Shorelines Adjacent to the Federal Navigation Channel, p. 5-121, 4th paragraph: The paragraph states that the circulation and wave modeling results indicate that very small changes are anticipated with the proposed deepening on the beaches of Tybee Island. However, the paragraph fails to mention the sedimentation modeling results, or lack thereof, detailed in the report titled Impacts of Savannah Harbor Expansion Project contained in the Engineering Appendix of the GRR. This report indicates that "A complete sediment budget was not produced due to lack of broad coverage for bathymetry, lack of multiple surveys pre-project to establish the baseline, and uncertainty in rates of some key pathways (p. 2-15)." This report was completed in 2006, four years earlier then the submittal of the Tier 2 EIS. A complete sediment budget should be formulated to determine the impacts that the project would have on Tybee Island.

5.9. Existing Shorelines Adjacent to the Federal Navigation Channel, p. 5-121, 4th paragraph: The paragraph fails to mention that the shoreline and volume change analysis reported in Impacts of Savannah Harbor Expansion Project did not include the barrier islands along the coastline. The report states that the islands were not studied because they were not part of the "scope of work." If the potential for negative impacts to barrier islands exist then the scope should have been expanded or a separate study should have been conducted to determine potential impacts. If there is potential for negative impacts to barrier islands, the shoreline and volume change analysis should be updated.

5.9.Existing Shorelines Adjacent to the Federal Navigation Channel, p. 5-121, 4th paragraph: The paragraph fails to mention that the shoreline and volume change analysis reported in Impacts of Savannah Harbor Expansion Project could not adequately determine the impacts to Tybee Island as stated as follows: "Data are lacking to fully quantify the impact of the project on Tybee Island (primarily multiple full coverage surveys prior to the project to establish historic rate and recent surveys to establish present rates) (p. 2-17). " The report indicates that the Tybee Island Shelf is currently deflating at a rate of 220,000 m^3/yr and although the full impacts of the project cannot be "full quantified" with the data available, the Report indicates that the major impacts to the Shelf and Barrett Shoals are from "dredging and deepening." The Shoreline and Volume Change Analysis should be completed with the missing data to determine the potential impacts of yet another dredging and deepening project on the Tybee Island Shelf and Barrett Shoals.

5.9. Existing Shorelines Adjacent to the Federal Navigation Channel, p. 5-121, 2nd and 3rd paragraphs: The conclusions drawn from the results detailed in Ship Forces on the

Shoreline of the Savannah Harbor Project, (which is contained as an attachment in the Engineering Appendix) should be reconsidered.

Ship Forces on the Shoreline of the Savannah Harbor Project, p. 2, 1st paragraph: Page 2 is very optimistic about the "blockage ratio". In areas where the channel takes up much of the river, such as the U.S. Route 17 crossing, the blocking ratio is much greater than predicted. A vessel with a 160 ft beam (Such as a Generation 2 post-panamax vessel which is predicted to use the channel by 2015, Savannah Harbor Expansion Bank Erosion Study-Update, Appendix B) and a 42.3 ft draft (Allowing for a10 percent under keel clearance, or 6,768 sq ft), in a channel that's 470 ft wide, 47 ft deep, and has sloped sides at 3:1 (22,560 sq ft) the blockage ratio is 30 percent not the 9.5 percent stated as the maximum in the report. The blockage ratios should be revised to include areas where the river is narrow in width and should be updated based on the predicted use of Generation 2 post-panamax vessels (See below).

Also, the assumption that ship forces are essentially dependent on a two dimensional slice of the ship in the channel is also flawed. It is a problem of added mass, which is the mass of water a ship needs to displace to move into a new location within the fluid. Two ships of the same beam but different hull forms have different added mass factors. A very full ship such as a tanker moves more water than a finer hull like a container ship, which moves more water than a naval ship.

Ship Forces on the Shoreline of the Savannah Harbor Project, p. 13, 2nd paragraph: The writer bases the drawdown, wave height, and wave power calculations on the facts that panamax vessels will have an increased speed in the deepened channel and that post-panamax vessels will have a decreased speed. The assumption that post-panamax vessels will maintain the same power level and travel at a lower speed seems poor (The lower speed resulting from a deeper draft). The post-panamax vessels would travel at a speed which provides safe maneuverability when traveling the channel. To assume that this speed will always be lower than the current speed and that that the captain or pilot will maintain the same power setting, which may result in a speed which provides low maneuverability, is a poor assumption. The analysis should be based on the actual predicted speeds not the predicted power level.

Ship Forces on the Shoreline of the Savannah Harbor Project, p. 20, 2nd paragraph: Wave power, is expected to increase by up to19 percent along Ft. Pulaski. This is not insignificant. Wave power has to increase substantially as the percentages of larger vessels running with deeper drafts are projected to increase in a channel whose cross sectional area is only increasing by 4 percent. It is assumed that the 19 percent increase was forecasted for a post-panamax vessel, as a full summary of the results of the wave power analysis are not provided in this document. The details of the wave power study need to be made public to allow for peer review of these conclusions.

The document states that the project's effects along the Confined Sediment Placement/Disposal Facilities (p. 24, 1st paragraph) will be the same as along Ft. Pulaski, therefore the ship forces along this long section of the river were not modeled. Barring any differences in river width which may exists between the two sections of the river (Wave impacts will be greater in a narrower river as the waves will have less time to decay before reaching the shoreline) the conclusion that wave power will also increase by up to 19 percent along the Confined Sediment Placement/Disposal Facilities is fair. This is a significant increase.

The document states that the only effect which needs to be modeled for the shoreline along the City Front is the long period drawdown. However, the document only provides observed drawdown results (Table 21) and not predicted impacts of the project. The predicted drawdown results, as wells as wave power results, should be published for review.

The study also fails to analyze the predicted drawdown, wave height and wave power increases along the City Front, the Confined Sediment Placement/Disposal Facilities, and Tybee Island resulting from the passage of a Generation II post-panamax vessel along the River. As mentioned previously, according to the updated fleet forecasts detailed in Appendix B of the Savannah Harbor Expansion Bank Erosion Study-Update Generation II post-panamax vessels (Which can have beams up to 160 ft) are expected to call by the year 2015. These vessels will displace an even greater amount of water and it doesn't appear that the effects that they will have has been calculated, or at least reported in Ship Forces on the Shoreline of the Savannah Harbor Project or in the Tier 2 EIS. For example, a Generation 2 post-panamax vessel (160ft beam) with 10 percent underkeel clearance will take up 30 percent of the cross section of the new 47 ft channel. Current panamax vessels in the current channel only take up 18 percent of the cross section of the channel. Thus, Generation 2 vessels will displace 67 percent more water relative to channel cross section. This cannot amount to a negligible erosion rate, and the conclusion that wave power will be substantially greater is accurate. The effects that the use of Generation 2 post-panamax vessels will have on drawdown, wave height and wave power along the City Front, the Confined Sediment Placement/Disposal Facilities, and Tybee Island should be determined.

Ship Forces on the Shoreline of the Savannah Harbor Project, p. 22, 3rd paragraph: The document indicates that the impact analysis conducted for the Tybee Island shoreline compared the typical (80 percent of design draft) and design draft conditions. The document then states that "in all cases, the design draft ship in the deepened channel had slightly less drawdown then the existing channel." The difference between those two conditions is much less important than the difference in drawdown between the current condition (Vessels traveling at 80 percent draft in the existing channel) and the future condition (Vessels traveling at design draft in the deepened channel). Table 15 indicates

that post-panamax vessels traveling at typical and high speed will have drawdown increases of 12.9 percent and 5.73 percent, respectively. These are much less then the differences calculated for panamax and sub-panamax vessels. The increase in drawdown for panamax vessels traveling at typical speed is 31.5 percent and the increase for those traveling at high speed is 22.3 percent between existing and future conditions. The increase for sub-panamax vessels traveling at typical speed is 27.2 percent and the increase for those traveling at high speed is 34.4 percent. These increases are not insignificant.

Ship Forces on the Shoreline of the Savannah Harbor Project, Tables 16-19: The tables should provide the differences between the existing conditions (Vessels traveling at 80 percent draft in the existing channel) and the future conditions (Vessels traveling at design draft in the deepened channel) for the years of 2030 and 2050. The differences in drawdown between the other scenarios matter much less. The updated table should be updated to make these comparisons.

Ship Forces on the Shoreline of the Savannah Harbor Project, p. 36, Table 9: The ship effects should be recalculated using the actual predicted speeds for post-panamax vessels (not an estimate of the power level), and should show the predicted drawdown, return velocity, and wave height for Generation 2 post-panamax vessels. The same type of table should be developed to show the results of these forces on the shorelines of the Confined Sediment Placement/Disposal Facilities and the City Front. Appropriate cross sectional areas should be used for each of these sections of the River.

Ship Forces on the Shoreline of the Savannah Harbor Project, p. 36, Table 9: As the table appears in the report, the predicted return velocity increase for typical speed panamax vessels with the change from 80 percent draft to design draft is 24 percent. The drawdown increase for typical speed panamax vessels is 26 percent. The return velocity increase and drawdown increase for high speed panamax vessels are 30 percent and 35 percent, respectively. The short period bow and stern wave heights for typical and high speed panamax vessels going from 80 percent draft to design draft are 28 percent and 30 percent, respectively. These area substantial increases and should not be hidden within the composite tables which average in the results from the smaller vessels shown in Tables 5 and 9. As mentioned previously, the analysis should be conducted again using predicted speeds and should include an analysis of the impacts of Generation 2 post-panamax vessels using the channel. The results should be updated to clearly indicate that return velocities, drawdowns, and wave heights could increase with the project as shown in the example above.

Ship Forces on the Shoreline of the Savannah Harbor Project, p. 43, Table 15: The table heading indicates that it contains return velocity information, however, this data is absent

from the table. Table 15 should be updated to include this missing information for public review purposes.

5.9. Existing Shorelines Adjacent to the Federal Navigation Channel, p. 5-121, 2nd and 3rd paragraphs: The conclusions drawn from the results detailed in Savannah Harbor Expansion Bank Erosion Study-Update, (which is contained as an attachment in the Engineering Appendix) should be reconsidered to address the following concerns with this document.

Savannah Harbor Expansion Bank Erosion Study – Update, p. 1, 7th paragraph: For 2008, 3,055 calls would have been reduced to only 3,049 calls if the channel is deepened to 48 ft. This is a statistical draw, not a "notable reduction".

Savannah Harbor Expansion Bank Erosion Study – Update, p. 2, 2nd paragraph and p. 7, 3rd paragraph: "The updated forecast changes in ship length, beam, and speed were evaluated." And "Changes with regard to ship length, width, speed were negligible." It appears that changes in draft were not considered and Generation 2 post-panamax vessels were not included as part of this Study. The Study should be amended to address these significant deficiencies.

Savannah Harbor Expansion Bank Erosion Study – Update, p. 5, 4th paragraph: The paragraph mentions the increase in wave power at Ft. Pulaski but doesn't mention which vessels and which speeds were used to develop these numbers and how these results are "Included" or utilized within the bank erosion analysis.

Savannah Harbor Expansion Bank Erosion Study – Update, p. 6, 1st paragraph: The report lists the average length of 98.9 percent of all ships calling from the ERDC report to be 574 ft. It is assumed that these callings are the same as those listed in Table 4 of this report. The average length of the 1,245 callings listed in Table 4 is 869.5 ft, a 51.4 percent increase. This is easily noticeable when 70 percent of the calls were panamax vessels with an average length of 951 ft (Table 4). Using the average length of 869.5 ft divided by the average ship speed (19.6 fps) returns a passing time of 44.4 seconds. This number is 126 percent greater than the estimated time of generated wave activity upon the shoreline. The observed wave incident data from the study needs to be made public to allow for peer review of these conclusions.

Savannah Harbor Expansion Bank Erosion Study – Update, p. 7, 3rd paragraph: The percentage of passing time was revised upwards with the measured forces from the ERDC study and other factors and used to estimate the percentage of annual erosion that could be attributed to vessel traffic. This method appears to be using poor science. There is no evidence presented that indicates that the actual percentage of annual erosion couldn't be higher, or lower, for that matter. A different method should be used to estimate the amount of bank erosion attributable to vessel traffic.

Savannah Harbor Expansion Bank Erosion Study – Update, p. 7, 3nl paragraph: The method used to estimate the impact from vessel traffic in 2030 and 2050 uses equally poor science. Multiplying the year 2003 erosion amount by the change in vessel numbers between 2003 and 2030 and again for 2050 completely ignores changes in vessel length and vessel draft. The Revised Fleet Forecast in Appendix B of the Savannah Harbor Expansion Bank Erosion Study – Update details the increasing use of Generation 1 post-panamax vessels and the use of Generation 2 post-panamax vessels beginning in 2015. At this point, the effect that vessels have on the Savannah River shoreline is unknown. Also unknown are the impacts that longer and deeper draft vessels will have on the shoreline. As mentioned previously, a different method should be used to estimate the amount of bank erosion attributable to vessel traffic.

Savannah Harbor Expansion Bank Erosion Study – Update, Appendix B: Consistent use of year 2050 forecast numbers occurs within the document, yet the table in Appendix B only contains forecasts out to year 2032. The Appendix should be updated to included forecasts out to year 2050.

Savannah Harbor Expansion Bank Erosion Study – Update, p. 8, 2nd paragraph: The document states that "There appears to be a net reduction of bank erosion due to the proposed deepening effort." As mentioned previously, the science in the study does not support this claim.

Savannah Harbor Expansion Bank Erosion Study – Update, p. 8, 4th paragraph: This document states results detailed in the report titled Ship Forces on the Shoreline of the Savannah Harbor Project, and as indicated in a previous comment, the drawdown comparisons should be made between the current condition (Vessels traveling at 80 percent draft in the existing channel) and the future condition (Vessels traveling at design draft in the deepened channel). Comparison s between other scenarios is almost meaningless. The claim that "the Savannah Harbor Deeping will have no significant effect on North Tybee" has yet to be substantiated.

Savannah Harbor Expansion Bank Erosion Study – Update, p. 9, 2nd paragraph: Table 21 of the report titled Ship Forces on the Shoreline of the Savannah Harbor Project lists the observed drawdown of 15 inbound and 22 outbound vessels as they passed the City Front area. The report says nothing of predicted drawdown expect that it was assumed to "remain unchanged" due to low vessel speeds in the area. Even if speeds remain the same, the percentages of longer vessels with deeper drafts are to increase according to the table in Appendix B of the document titled Savannah Harbor Expansion Bank Erosion Study – Update. Therefore, it cannot be assumed that conditions in the area are to remain the same (as obviously they are not with larger vessels passing the area) and the potential effects of the project cannot remain unknown. The effects of the project in the City Front area need to be determined.

General Reevaluation Report Comments – Appendices, Engineering Appendix, Engineering Attachments

Savannah Harbor Expansion Bank Erosion Study – Update

2. General, p. 1, 7th paragraph: For 2008, 3,055 calls would have been reduced to only 3,049 calls if the channel is deepened to 48 ft. This is a statistical draw, not a "notable reduction".

2. General, p. 2, 2nd paragraph and p. 7, 3rd paragraph: "The updated forecast changes in ship length, beam, and speed were evaluated." And "Changes with regard to ship length, width, speed were negligible." It appears that changes in draft were not considered and Generation 2 post-panamax vessels were not included as part of this Study. The Study should be amended to address these significant deficiencies.

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Ship Forces on the Shoreline of the Savannah Harbor Project

1. Savannah Harbor Characteristics, p. 2, 1st paragraph: Page 2 is very optimistic about the "blockage ratio". In areas where the channel takes up much of the river, such as the U.S. Route 17 crossing, the blocking ratio is much greater than predicted. A vessel with a 160 ft beam (Such as a Generation 2 post-panamax vessel which is predicted to use the channel by 2015, Savannah Harbor Expansion Bank Erosion Study-Update, Appendix B) and a 42.3 ft draft (Allowing for a10 percent under keel clearance, or 6,768 sq ft), in a

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The document states that the project's effects along the Confined Sediment Placement/Disposal Facilities (p. 24, 1st paragraph) will be the same as along Ft. Pulaski, therefore the ship forces along this long section of the river were not modeled. Barring any differences in river width which may exists between the two sections of the river (Wave impacts will be greater in a narrower river as the waves will have less time to decay before reaching the shoreline) the conclusion that wave power will also increase by up to 19 percent along the Confined Sediment Placement/Disposal Facilities is fair. This is a significant increase.

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8. Tybee Island Ship Forces Analysis, p. 22, 3rd paragraph: The document indicates that the impact analysis conducted for the Tybee Island shoreline compared the typical (80 percent of design draft) and design draft conditions. The document then states that "in all cases, the design draft ship in the deepened channel had slightly less drawdown then the existing channel." The difference between those two conditions is much less important than the difference in drawdown between the current condition (Vessels traveling at 80 percent draft in the existing channel) and the future condition (Vessels traveling at design draft in the deepened channel). Table 15 indicates that post-panamax vessels traveling at typical and high speed will have drawdown increases of 12.9 percent and 5.73 percent, respectively. These are much less then the differences calculated for panamax and sub-panamax vessels. The increase in drawdown for panamax vessels traveling at typical speed is 31.5 percent and the increase for those traveling at high speed is 22.3 percent between existing and future conditions. The increase for sub-panamax vessels traveling at typical speed is 27.2 percent and the increase for those traveling at high speed is 34.4 percent. These increases are not insignificant.

Ship Forces on the Shoreline of the Savannah Harbor Project, Tables 16-19: The tables should provide the differences between the existing conditions (Vessels traveling at 80 percent draft in the existing channel) and the future conditions (Vessels traveling at design draft in the deepened channel) for the years of 2030 and 2050. The differences in drawdown between the other scenarios matter much less. The updated table should be updated to make these comparisons.

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Ship Forces on the Shoreline of the Savannah Harbor Project, p. 43, Table 15: The table heading indicates that it contains return velocity information, however, this data is absent from the table. Table 15 should be updated to include this missing information for public review purposes.

6.1.7. Threatened and Endangered Species

General Comments on T & E Information

The June 2010 forecast of vessel calls appearing in Appendix B of the *Savannah Harbor Expansion Bank Erosion Study – Update* indicates that fewer vessels will call under the proposed conditions (completed project) than the current conditions (maintaining the 42 ft depth). If this proves to be true, then the chances for invasive species to enter the

harbor in ballast water are decreased along with the decrease in vessel calls. The analysis of this subject seems appropriate as well as the conclusion that the vessels entering the Port of Savannah will have to adhere to State and Federal laws regarding ballast water regardless of the depth.

The 2007 report from the Atlantic Sturgeon Status Review Team lists a seasonal restriction on dredging in the Savannah River between March 16th and May 31st. The DEIS does not appear to address this seasonal restriction in the document.

The DEIS lacked information that is critical to make an assessment on listed and candidate species, did not substantiate its determination of non-significant impacts when adverse impacts were acknowledged, did not appear to pursue studies to collect the necessary information, and relied upon a significant amount of unsubstantiated assumptions and conclusions to make its determinations. If the assumptions and conclusory statements were based on peer-reviewed or project related studies, the DEIS should cite that source as a basis upon which the assessment occurred. Furthermore, the assessment should include all potential impacts from the project, including omitted impacts, e.g., increased boat strikes and wave erosion due to larger ships accessing the port; disruption of habitat continuity; disruption of habitat accessibility; and mitigation impacts.

The shortnose and Atlantic sturgeon are examples of the shortcomings of the assessment of impacts to threatened and endangered species. Shortnose sturgeon and Atlantic sturgeon were grouped together for purposes of assessing impacts from the project. The DEIS justifies the grouping due to their "similarities in habitat use, distribution throughout the proposed action area, foraging behavior and prey base, and subsequent risk of take relative to dredging and trawling operations..." No citations or other reference information was provided to substantiate this decision to group the species. However, other information provided in the DEIS provides information that contradicts the claim that the species are similar enough to group together for impact assessment purposes. For example, the DEIS states that Atlantic sturgeon primarily lead a marine existence and are therefore more likely to be impacted by hopper dredges than the more estuarine-based shortnose sturgeon. The DEIS states that shortnose sturgeon spawn 100 miles upstream of the project area, but also states that an Atlantic sturgeon larva was found 6.7 km (4 miles) upstream of the project impact area. This information not only suggests that shortnose and Atlantic sturgeon spawn in different areas, it also highlights the possibility that some larva may drift into the project area and may be affected by the upstream increases in salinity that would occur as a part of this project. Additional information should be collected to verify the actual location of Atlantic sturgeon spawning to ensure the project dredging and upstream movement of salinity and decreases in DO will not deleteriously impact Atlantic Sturgeon as its spawning habitat has not been adequately accounted.

The impact summary to the Essential Fish Habitat in Appendix S, acknowledges that the proposed action would have adverse impacts on shortnose sturgeon, an endangered species. Nonetheless, the DEIS dismisses the adverse impacts as non-significant without providing sufficient detail as to how the non-significant status had been applied. The DEIS does not provide an accurate representation of impact. The DEIS states that "the maximum expected reductions in habitat acreage range [sic] of about 11.0 percent or 439.0 acres [with mitigation], depending on channel depth, life stage, and season." First, there is apparently an error in the DEIS narrative as indicated by the out-of-place 'range.' Second, this estimate fails to accurately sum the decreases in habitat that will still be realized even with mitigation. Table 8-13 of Appendix B states that 439 acres of January habitat will be lost for adult shortnose sturgeon alone. An additional 113 acres of August habitat will be lost for adult shortnose sturgeon and another 28 acres of January habitat will be lost for juvenile shortnose sturgeon. The estimated loss in habitat is a minimum projection because it does not include lost habitat that is used during other seasons. Also, shortnose sturgeon use different habitats based upon life stage and season. Thus, estimates of habitat loss by month and life stage may be representative, but are not conclusory as to the total amount of habitat lost.

The DEIS also fails to represent impacts to shortnose sturgeon based upon sediment impacts from the project even though substrate preference information is available and substrates will be affected by the project. For example, the 1998 NMFS Final Shortnose Sturgeon Recovery Plan states that "juveniles in the Savannah River use sand/mud substrate in 10-14 m depths (Hall et al. 1991). Furthermore, the Atlantic sturgeon, for which the DEIS has claimed the shortnose sturgeon is an adequate surrogate for purposes of impact assessment, occupies habitats dominated by gravel and sand substrates (NOAA Fisheries Office of Protected Resources webpage). Presumably, dredging will alter the depth and substrate composition of the river. This impact should be accounted for and quantified in the DEIS.

Moreover, the habitat losses may have been further underrepresented by the habitat suitability modeling in the DEIS due to inaccurate assumptions regarding dissolved oxygen levels necessary for habitat use. For example, a baseline level of 3.0 to 4.0 mg/l of dissolved oxygen was used to determine if habitat was available for juvenile and adult shortnose sturgeon. This is a minimum level at which the agencies determined shortnose sturgeon can survive based on laboratory studies of survival. However, these levels do not necessarily indicate the dissolved oxygen level that is necessary for foraging, resting, and moving. For example, the Collins et al. (2001) study of shortnose sturgeon habitat use, cited in the DEIS, reported minimum mean dissolved oxygen levels of 6.36 and 6.45 in areas where adults and juveniles were found, respectively. In the Appendix N documentation, Prescott Brownell, from NMFS requested that a range of suitable habitat thresholds be used for modeling habitat availability. The agency panel then redacted his comments from the record without providing an adequate basis for the redaction. The

panel decided the current methods were "acceptable for now." This comment would suggest that additional work would be necessary in the future in order to adequately asses the impacts. The narrative does not provide adequate discussion as to why the pass/fail approach was more adequate than the range approach suggested by Mr. Brownell. Moreover, there is no indication of future actions that would be necessary or that any future action was taken in order to compensation for the inadequacies of the pass/fail analysis.

The DEIS also mentions mitigation, but does not accurately quantify the acres of impact or the quantity of mitigation area with the exception of newly provided access to 20 miles of river upstream of the New Savannah Bluff Lock and Dam at Augusta, Georgia. The DEIS fails to describe the habitat upstream of the dam, its adequacy for sturgeon habitat, its past use by sturgeon, or the successful use of fishways by shortnose or Atlantic sturgeon. Spawning habitat for shortnose sturgeon in the Savannah River has been documented by Hall et al. (1991) as areas with gravel/sand/log substrate in curves in the Savannah River. Furthermore, the New Savannah Bluff Lock and Dam are located on or about the fall line. The NOAA Atlantic Sturgeon Fact Sheet states that Atlantic sturgeon spawn between the fall line and salt front, suggesting Atlantic sturgeon would not benefit from the proposed mitigation measures. Thus, the use of the fish passage structure as adequate mitigation has not been shown to be sufficient to mitigate the intensity and extent of impacts to shortnose and Atlantic sturgeon.

Specific Comments from the DEIS on threatened and endangered species follow. Additional T and E comments are contained in Attachment 1 in the form of comments to the DEIS' Appendix B, Biological Assessments for Threatened and Endangered Species.

4.06.1. Invasive Species, p. 4-43, 2nd paragraph: The document should cite the source of the text used for this paragraph. The text appears to be taken from the EPA's Ballast Water Factsheet found on the Agency's website.

4.06.1. Invasive Species, p. 4-44, 2nd paragraph: The document states that the Marine Extension Service was "expected to release an Invasive Species Plan for the State of Georgia later in 2008." This document was finalized in October 2009 and is available from the Marine Extension Service's website. The text should be updated to include this fact and to include information contained in the Plan pertinent to invasive species control in ballast water for this project.

4.06.1. Invasive Species, p. 4-44, 4th paragraph: The document should cite the source of the text used for this paragraph. The text appears to be taken from the USCG's Aquatic Nuisance Species Website.

4.06.1. Invasive Species, p. 4-44, 5th paragraph: The document states the mandatory practices which must be applied by "all vessels with ballast tanks on all waters of the

US." It should be noted that crude oil tankers engaged in coast wide trade, DOD and Homeland Security vessels, and vessels operating exclusively within one COTP zone are excluded from these regulations.

4.06.1. Invasive Species, p. 4-45, 5th paragraph: The words "per cent" should be changed to the word percent.

6.08 Threatened and Endangered Species Act – Pg 6-2, 8th para – "A Biological Assessment evaluating the potential impacts of the proposed action on endangered and threatened species has been prepared (Appendix B)". Impacts to adult Shortnose sturgeon habitat is estimated by the Corps to range from 20 to 220 acres, and for juvenile sturgeon from 86 to 373 acres, depending on the channel depth alternative selected. Under the Endangered Species Act, why would the loss of this habitat not be considered a "take", and thus a violation of the Act? Since Atlantic sturgeon also inhabit the Savannah Harbor, and have recently been proposed for listing by NMFS as endangered, the same question applies to that species.

6.2. Water Quality

This section presents groundwater and surface water quality comments generated from review of the water quality section of the DEIS and other related sections in the GRR and attachments. It focuses on proposed effects on chlorides in groundwater, chlorides in surface water, with respect to drinking water intakes, and dissolved oxygen in surface water.

6.2.1. Chlorides in Groundwater

GRR Engineering Appendix 1.1.36, Page 4-25 – Ground-water pumping; Section 4.4.5.1 Input Parameters: "Future ground-water pumping was kept constant at year 2000 levels. Regulatory officials from both South Carolina and Georgia agree that future pumping from the Upper Floridan aquifer must decrease in order to limit the impacts of salt-water intrusion in the coastal area. A recently-released GAEPD document entitled Coastal Georgia Water and Waste Water Permitting Plan for Managing Salt-Water Intrusion (2006) indicates that Georgia will reduce withdrawals from the Upper Floridan aquifer by 5 MGD by the end of 2008; therefore keeping the pumping rate constant provided a conservative assessment of future ground-water production in the area."

1. Has groundwater use in the Upper Floridan aquifer decreased in Georgia and South Carolina as assumed in the model and analysis?

2. Did groundwater withdrawals from the Upper Floridan aquifer decrease by at least 5 MGD between 2006 and 2008 in Georgia?

Groundwater use trends and restrictions by GAEPD are discussed in various sections of the GRR and supporting appendices. There appears to be a lack of corresponding discussion on groundwater use and restrictions by SDHEC in South Carolina.

There has been a great deal of effort in characterizing the pore water for the Miocene confining unit and underlying Floridan aquifer. One key question evaluated in the DEIS is the rate of vertical movement through the clay, in particular the area near the mouth of the harbor where 1) the confining unit is thinnest; 2) surface water salinity is greatest; 3) paleochannels are abundant. Were any efforts made to age date the pore water and underlying groundwater from the Upper Floridan aquifer as a more direct measure of transport time?

One of six tasks related to the groundwater investigation was an Aquitard Test Feasibility that consisted of a "trial step-drawdown pumping test on two recently installed Upper Floridan wells located adjacent to river channel to determine feasibility of hydraulic testing of confining unit. If results indicate hydraulic testing of confining unit are feasible, estimate design parameters and assumptions for full aquitard testing."

1. The groundwater model was used in place of the step drawdown test. Given that the model is developed from available field data and assumptions on characteristics of the aquifers and confining units, it is not at all clear how the model replaces the field test.

2. It would seem more reasonable to use the model to design an adequate aquitard test that may or may not include pumping directly from the Floridan aquifer, rather than use the model to try and disprove the need to conduct a "trial step-drawing" test altogether.

DEIS Appendix C – Mitigation Planning; page 9. While the overall conclusion that the impacts to groundwater are not expected to be significant appear reasonably well substantiated, quantifying the increased flow through the confining unit to 3-4 percent does not appear to be well substantiated given the uncertainty in leakance though this unit.

Draft GRR, page 150, the following conceptual mitigation measures are presented:

1. Deposit channel sediments in nearshore areas where the groundwater aquifer is near the ocean floor.

2. Acquire but not use a permit from the State to withdrawal fresh water from the Upper Floridan aquifer.

3. Reduce pumping of groundwater by acquiring – but not using – permitted rights from industries to remove freshwater from the Upper Floridan aquifer.

These potential mitigation measures, in particular the last two, have significant ramifications on water use in the region by reducing overall water availability. The ability to acquire permitted rights in Georgia and presumably South Carolina, including existing permitted rights without replacing them with an alternate source raise significant questions regarding the viability of these conceptual alternatives.

6.2.2. Surface Water

6.2.2.1. Chlorides in Surface Water

There are abundant references to past supporting work but there is a lack of specific references to the relevant documents in the DEIS and GRR. This lack of references makes evaluating the supporting information difficult.

GRR (10Nov10), Page 93, Section 5.7.2: A general discussion of global sea level rise and its expected effect on salinity is provided. However, it is not clear if or how the effect of global sea level rise was evaluated in conjunction with the channel deepening, in particular as it relates to chloride levels at the Abercorn Creek intake as well as other intakes on the river. Specifically, it is not clear how the channel deepening will affect the timing and magnitude of salinity intrusion associated with sea level rise.

Chloride Model Analysis:

1. It is not clear what the chloride results presented from the EFDC model used to evaluate potential chloride impacts represent:
   - Average chloride concentrations over a river reach and/or over time?
   - Cross-section maximum chloride levels?
   - Tidal maximum?
   - Another metric?
2. It is not clear what pumping rate was used in the assessment:
   - Current rate is described as 30 MGD.
   - Plant capacity is variously described as 62.5 MGD and 75 MGD.
3. GRR (10Nov10), Page 166, Section 9.8 states that the rate of surface water withdrawal at the Abercorn Creek intake "has been increasing substantially over recent years as the western part of the County has grown rapidly. In addition, the City has been directed by the Georgia EPD to reduce groundwater withdrawals by 11 MGD requiring more surface water use." It is not clear how the expected increase in use at the intake was considered as part of the chloride impact evaluation.

Available input data relating to chloride/salinity changes over tidal cycles and over cross-sectional areas of critical river reaches appear to be sparse to absent. There is reference to proposed or on-going chloride / salinity monitoring, however these does not appear to be any detail on this monitoring effort. Given the highly stratified nature of the chloride distribution in conjunction with tidal effects, understanding the temporal and spatial distribution throughout the estuary may prove critical to evaluating peak chloride levels at the Abercorn Creek intake. Clarification on the existing data and any proposed monitoring would be useful in evaluating potential future impacts at the intake.

The DEIS evaluates potential effects of chloride/salinity changes at the Abercorn Creek intake. Have potential impacts at other intake structures been evaluated?

As a potential mitigation measure, cost for a supplemental water intake approximately 10-miles upstream from the current intake was presented in a document titled "Review and Costs for Supplemental Water Supply – City of Savannah Intake at Abercorn Creek" dated 17 Sep 2009. It is not clear if environmental impacts from this proposed new intake have been evaluated, including the potential in increase salinity in Abercorn Creek further upstream from the current intake location.

DEIS, Page 5-55, Section 5.2.4 - Side-bank storage reservoir options were considered in the GRR. The preliminary design size of the reservoir was to hold a 1-week supply of raw water. It appears for the purpose of evaluating potential locations for the side-bank reservoir a 210 MG capacity was assumed, corresponding to a 30 MGD demand. However, as stated in this section, the plant's capacity is 62.5 MGD. In the GRR Attachment 1.1.7, the plant capacity is stated as 75 MGD, 20-percent more than the 62.5 MGD capacity provided in the DEIS. Also, as stated in Section 5.2.3, page 5-51 of the DEIS as well as in appendices to the GRR, demand has increased significantly due to increased growth in the western part of the County. It is also noted in the GRR appendix 1.1.36 that groundwater use from the Upper Floridan aquifer is being cut back by GAEPD, it is not clear if this reduction in groundwater use corresponds to an increase in surface water demand.

1. A side bank reservoir with a 210 MG capacity provides only 3 1/3 days of capacity at a plant capacity demand of 62.5 MGD. This is less than half of the stated goal of 1-week supply of raw water.
2. It is not clear what analysis was completed to determine that 1-week duration was adequate to address an increase in chlorides. Section 5.2.4, page 5-55 references a "new moon" receding, was this the extent of the evaluation? Were any historical durations considered?
3. It is not clear the level of evaluation completed for the mitigation sites:
   - Can they accommodate a 440 MG capacity (1-week at 62.5 MGD)?

- Has an equivalent of a Phase I ESA been completed to establish past Recognized Environmental Conditions?
- Has a screening level evaluation for wetlands, threatened and endangered species, historic resources, and similar issues that significantly impacts availability of properties been completed?
- What is the proposed process that would implement construction of a side-bank reservoir? How will availability of potential sites be maintained?

DEIS Appendix C – Mitigation Planning; page 9. The accuracy of the chloride model is not sufficient to support the stated increase in chloride levels at the City's intake (e.g.; 0.34 percent during very low flows). It is worth noting that the relatively low accuracy of the model is the stated reason the USACE evaluated various mitigation alternatives that included re-locating the pump intake and use of side-bank storage.

6.2.2.2. Dissolved Oxygen

The water quality-related sections of the DEIS include detailed assessments of the project's impacts on dissolved oxygen and chloride concentrations. The analysis relied on models and field testing of mitigation techniques. Much of this information is useful for identifying the potential water quality impacts and mitigation strategies. However, the DEIS understates that uncertainty and risks associated with both the water quality impacts and the proposed mitigation. The DEIS also does not explicitly consider the manner in which the water quality of the harbor is currently being managed and regulated. For example, the DEIS does not address impact of the project on the 2010 draft TMDL for oxygen-demanding substances, nor the related regulatory framework for achieving full compliance of water quality standards.

Much of the DEIS's analysis of potential water quality is based on models that are have some capability to predict "average" dissolved oxygen or chloride conditions, but limited ability to characterize the trends and variability in water quality. Therefore, it is unclear whether the models are accurately predicting the critical conditions for water quality protection. The DEIS provided little indication that model uncertainties were explicitly considered in either predicting impacts or designing mitigation strategies. This is an especially important concern for the mitigation of dissolved oxygen impacts, because the proposed technology is somewhat experimental and of highly uncertain benefit.

The pending dissolved oxygen TMDL is expected to have a major regulatory and economic impact on both industrial and municipal dischargers, many of which will have to make large capital investments to reduce wasteloads. It tends to be controlled by the location in which attainment of dissolved oxygen concentrations is most difficult. From this perspective, it would not matter if 97 percent of the system experienced oxygen improvements if the critical location(s) experienced degradation, or if the wasteload allocations to achieve full attainment would be lower. The DEIS currently does not allow

this determination. Similarly, it is unclear if how the proposed mitigation approach would affect the ability of point source dischargers to use the same technology for TMDL compliance.

The analysis should be revised to (1) more accurately characterize the uncertainties associated with water quality impacts; (2) more explicitly consider those uncertainties in designing environmentally conservative mitigation strategies; and (3) specifically examine the impact on the project on water quality management of the estuary under the draft 2010 TMDL.

Specific DO Comments

Affected Environment, p. 4-13, 2nd paragraphs: The description of South Carolina's dissolved oxygen criteria should include elements related to naturally-low oxygen conditions. These elements include a 0.1 mg/L allowable deficit from the natural dissolved oxygen concentration and a 10 percent allowable deficit in the event that it was demonstrated that resident aquatic species would not be adversely affected.

Affected Environment, p. 4-13, section 4.02.04, 4th and 5th paragraphs: These paragraphs do not indicate any difference between class SA and SB waters, and should be revised to indicate the more stringent water quality criteria for class SA waters.

Affected Environment, p. 4-14, section 4.02.04, 2nd paragraph: This paragraph incorrectly cites the Georgia D.O. criteria. The criteria listed have been revised, as noted in the third paragraph on this page, so should not be cited using the present tense.

Affected Environment, p. 4-13, 2nd and 3rd paragraphs: The description of Georgia's dissolved oxygen criteria should include elements related to naturally-low oxygen conditions. These elements include a 0.1 mg/L allowable deficit from the natural dissolved oxygen concentration and a 10 percent allowable deficit in the event that it was demonstrated that resident aquatic species would not be adversely affected.

Affected Environment, p. 4-14, section 4.02.04, 2nd paragraph: This paragraph mentions the 2006 TMDL for Savannah Harbor, but makes no mention that this TMDL is being revised by USEPA Region 4, and that a draft revised TMDL was issued in 2010. Statements such as "...the Savannah River cannot accept anthropogenic oxygen-demanding substances..." are no longer true given the revised standards and updated TMDL. Such statements should be modified to reflect the updated regulatory approach.

Env. Consequences, section 5.2.1 (Dissolved Oxygen), Tables 5-19 through 5-23 and related discussion: The dissolved oxygen modeling results presented here—and the associated discussion—focus on the average dissolved oxygen concentrations in the bottom three layers of the 6-layer model. The more appropriate and environmentally

conservative approach would be to examine the "critical" DO concentration; i.e., the lowest concentration of the 6 layers, which will usually occur in the bottom layer. This is because the state water quality criteria apply to entire water column without vertical averaging. The present approach underrepresents the project's impacts to oxygen.

Env. Consequences, p. 5-42, section 5.2.1 (Dissolved Oxygen): It is stated that "from a general perspective, the [project] would result in insignificant (1-2 percent) increases in the percentage of the harbor's waters with violations of existing water quality standards." It is unclear if this determination was correctly made by considering not only the 4-5 mg/L criteria, but also the maximum 0.1 mg/L allowable deficit from natural dissolved oxygen concentrations. Regardless, this is a misleading metric because of the widespread existing D.O. impairments. It is not recommended to use this metric to summarize general project impacts.

Env. Consequences, p. 5-42, section 5.2.1 (Dissolved Oxygen): The analysis defines a "substantial" impact to dissolved oxygen as a reduction of 0.25 mg/L or more. Given the existing water quality impairment, any measureable reduction of dissolved oxygen is a water quality concern. It is not recommended to arbitrarily define a "substantial" impact or imply that only reductions of 0.25 mg/L or greater are a concern.

Env. Consequences, section 5.2.1 and 5.2.2 (Dissolved Oxygen and related mitigation analysis)—general comment: There appears to be a disconnect between the manner in which the dissolved oxygen-related analysis was performed and the manner in which water quality is managed under existing regulations. USEPA has performed extensive water quality modeling and analysis to support the draft TMDL that was issued in 2010 and will be finalized in 2011. The TMDL is expected to have a major regulatory and economic impacts on both industrial and municipal dischargers, many of which will have to make large capital investments to reduce wasteloads. The analysis in the DEIS does not allow the reader to determine whether the project would make full attainment of water quality standards easier or more difficult.

For example, the TMDL tends to be controlled by the location and time at which attainment of dissolved oxygen concentrations is most difficult. From this perspective, it would not matter if 97 percent of the system experienced oxygen improvements if the critical location experienced degradation, or if the wasteload allocations to achieve full attainment would be lower. The analysis should be revised to specifically examine the impact on the project on the critical cells that control wasteload allocations under the draft 2010 TMDL, under critical hydrologic/tidal conditions. This will allow determination of whether the project (with D.O. mitigation) would have a net positive or negative impact on water quality attainment.

Env. Consequences, section 5.2.2 (Mitigation for Impacts to Dissolved Oxygen)—general comment: This section lacks detail with respect to the quantitative benefits of the

mitigation on dissolved oxygen; i.e. it lacks the information corresponding to the tables in section 5.2.1. This is information is in the GRR Engineering Appendix, but it would be recommended to make section 5.2.1 and 5.2.2 consistent with regard to the type and level of detail of model results presented.

Env. Consequences, section 5.2.1 and 5.2.2 (Dissolved Oxygen and related mitigation analysis) and Section 5 of Appendix Q (Risk and Uncertainty Analysis)—general comment: The Corps has inappropriately based its assessment of the dissolved oxygen model's capabilities on its ability to predict "average" conditions, rather the critical conditions. Appendix Q of the DEIS (Risk and Uncertainty Analysis) describes how the dissolved oxygen model is relatively accurate for predicting the 50th percentile dissolved oxygen concentration and general spatial trends. However, it was also indicated that the model was much less accurate for predicting the variability of the dissolved oxygen concentration and the daily minima. DHEC concluded that the model has "limited ability to simulate the variability and trends in the data".

Based on the 2010 draft TMDL, the dissolved oxygen metric of concern is not the 50th percentile but the 10th percentile, a value closer to the minimum value. Therefore, it is not clear from the DEIS that the model can accurately predict the dissolved oxygen metrics of greatest concern. Moreover, the DEIS gives no indication that uncertainty in the model was explicitly considered in characterized impacts. It is recommended that the DEIS explicitly address the ability of the model to predict the lower percentile dissolved oxygen concentrations, and make adjustments as to needed to ensure that it is an environmentally conservative analysis. In the meantime, the Corps has undercharacterized the uncertainty of the dissolved oxygen models, and the statement in Appendix Q that "the model's errors in predicting dissolved oxygen levels present little risk for decision-makers" is unwarranted.

Env. Consequences, section 5.2.1 and 5.2.2 (Dissolved Oxygen and related mitigation analysis) and Section 5 of Appendix Q (Risk and Uncertainty Analysis)—general comment: There have been serious questions raised regarding the whether the proposed, experimental mitigation strategy will be effective. For example, the USGS review of the Speece cone pilot study concluded that the project might not have had any significant effect on DO concentration except near the injection point. The DEIS appears to have largely dismissed this concern based on the uncertain modeling analysis and very limited monitoring evidence. As a result, the DEIS significantly undercharacterizes the risk and uncertainty associated with the dissolved oxygen mitigation.

For example, the DEIS gives no indication that uncertainties associated with the mitigation technology or associated modeling analysis were taken into account during the mitigation planning, such as by providing additional DO injection points in case the system is less effective than modeled. The elements that are proposed in Appendix Q to

reduce risk primarily consist of references back to the original studies and post-construction monitoring. None of these elements would actually reduce dissolved oxygen impacts in the event that the mitigation strategy was ineffective. It is recommended that the mitigation strategy address the uncertainties of the selected technology in a more direct fashion, and include elements that reduce risk by providing environmentally conservative mitigation designs.

Env. Consequences, section 5.2.2 (Mitigation for Impacts to Dissolved Oxygen)—general comment: Dissolved oxygen injection is a key TMDL compliance strategy for dischargers to the Savannah Harbor. Most of these dischargers are already permitted at or below best practical technology (BPT) wastewater treatment levels, and oxygen injection might be the most cost-effective manner for TMDL compliance. It is unclear whether the use of oxygen injection to mitigate the channel deepening impacts would reduce or substitute for the ability of wastewater dischargers to use this same technology for TMDL compliance. In conjunction with consideration of the project's impact on TMDL compliance (see comment above), it is recommended to explicitly consider how the dissolved oxygen mitigation plan would affect compliance options for existing dischargers, and if so, if this would be accompanied by a significant economic impact to those dischargers.

Env. Consequences, p. 5-49, section 5.2.2 (Mitigation for Impacts to Dissolved Oxygen). Figure 5-18: The accompanying text mentions three locations for dissolved oxygen injection, but the map only shows two locations.

Env. Consequences, Section 5 of Appendix Q (Risk and Uncertainty Analysis)—general comment: Even if the dissolved oxygen mitigation works as intended, there would be a risk associated with lack of the funding for the Speece cone operations and maintenance, especially if the mitigation was dependent upon annual funding appropriations. This risk should be stated in Appendix Q. Similarly, this section should explain how this reisk could be reduced, such as by the provision of contingency funding.

6.3. Air Quality, Noise and Dust

The air quality analysis completed for the proposed project is very comprehensive in that it accounts for air emissions from all cargo-carrying vessels (containerships and other marine vessels) and landside cargo handling equipment at both the GPA and private terminals at the port. Further, emission estimates are provided for criteria pollutants, air toxics and greenhouse gases. Although the project is not subject to conformity determination requirements, the emission inventory completed for this project is similar to the comprehensive emission inventories prepared to satisfy conformity requirements.

While the emission inventory completed for the project is very comprehensive, the emission summary tables presented in Appendix K have certain shortcomings. The

reviewer was not able to calculate and confirm the accuracy of the emissions reported in many of the emission summary tables using the information provided in the descriptions preceding the emission summary tables. To facilitate a review of the emission estimates, an example calculation should be provided for each primary emission summary table. Additionally, the emission estimates are presented using various terminology to represent vessel trips (e.g., tons per transit, tons per vessel, and ton/call). The use of consistent terminology is recommended.

The following comments are based on review the Air Quality Section in the DEIS.

Page 5-105, Section 5.6 – the word "volume" is used in the third sentence and in the second to last sentence of the first paragraph. Because mass emission rates are being referred to in these instances, "amount" or "quantity" should be used in lieu of "volume".

Page 5-107, second sentence of the first paragraph - replace the word "volume" with "amount".

Page 5-108, second paragraph – Table 6-4 in Appendix K is referenced comparing port emissions to total emission in Chatham County. The percentages indicated in the second sentence of this paragraph do not match those presented in Table 6-4. The percentage values presented in Table 6-4 and the percentages indicated in this paragraph should be re-calculated or checked to confirm their accuracy.

Page 5-109, end of Air Quality section – a discussion is presented to explain why a conformity determination is not required for the project. Simply, a conformity determination is not required because the project location is in an attainment area (and the area is also not a designated maintenance area). This is well covered in the discussion under item a. It is suggested that item b. be deleted since it is not needed to support the conclusion that a conformity determination is not required. Further, a summary of project emissions is not provided in item b. for comparison with prescribed de minimus levels to confirm that the project emissions are below the de minimus levels. The following comment is made on the Draft GRR:

Page 142, Section 8.2.3 - in recognition that federal projects of this magnitude are typically subject to conformity determinations under the General Conformity or Transportation Conformity regulations, include an introductory statement to indicate that the project is exempt from conformity determination requirements because the project site is located in an area that is designated as an Attainment Area with respect to the National Ambient Air Quality Standards and the project area is not a maintenance area.

6.4. Tidal Intrusion

Issues regarding water quality impacts from tidal intrusion are addressed in section 5.3, Water Quality. Ecological impacts from tidal intrusion are addressed primarily in the Wetland Impacts Section.

6.5. Dredging and Deepening

5.7.1.1.C. Dredge Plume – Pg 5-112, 2nd para – "Another source of turbidity and sedimentation from hopper dredges is through the deposition of their sediment loads at the placement site". Please discuss the potential impact of this type of turbidity.

5.7.1.1.C. Dredge Plume – Pg 5-112, 5th para – "Dredge-induced water quality conditions will only be short-term and impact a small cross-sectional area of the Savannah River". Please quantify "short-term" and estimate the cross-sectional area to be impacted.

5.7.1.1.C. Dredge Plume – Pg 5-113, 3rd para – "All three shellfish harvesting areas are located a sufficient distance from the dredging in the Savannah River channel that sedimentation and high turbidity would not adversely impact these resources". Please state the distance from the dredging activity to the shellfish areas. Section 5.8.4.3 Confined Disposal Facilities (CDFs),

Page 5-118 – This section discusses the minimal impacts predicted on various resources that utilize the CDFs; however, there is no reference to the work that was done regarding identifying cadmium as a contaminant of potential concern (COPC), primarily presented in the DEIS Appendix M-Final Sediment Quality Evaluation.

Section 5.13 - Beneficial use of Dredged Sediment, Page 5- 142- "Impacts to fish (including larvae and eggs), shellfish and benthic communities within the near shore sediment placement areas are discussed in 5.7- Marine and Estuarine Resources. No long term adverse impacts are anticipated to any fishery resources or benthic communities from the near shore beneficial sediment placement." Section 5.7 does not provide adequate information to support this statement.

6.6. Sediment Quality

4.01.2.1 Sediment Quality (potential contaminant impacts) – Pg 4-9, 2nd paragraph – "The evaluation found that most of the sediments did not provide an concern for potential contaminant-related impacts associated with the proposed dredging and dredged sediment placement". What screening criteria were used to reach that conclusion?

4.01.2.1 Sediment Quality (potential contaminant impacts) – Pg 4-9, 3rd paragraph – "Polycyclic aromatic hydrocarbons (PAHs) and cadmium were detected in a sample

taken at about Station – 75+000B near the old RACON tower where a spill of fuel, batteries and paint lacquer occurred in November 1996. Subsequent sampling conducted in 2005 revealed that sediments at that location do not pose a potential for contaminant-related environmental impacts". What screening criteria were used to reach that conclusion?

5.4.2.3 Expected Results of Monitoring Cadmium-Laden Sediments – Pg 5-102, 2nd paragraph – "In light of the information summarized above, the dredging and the placement of cadmium-laden sediment in CDF 14A, CDF 14B and covering these sediments with 2 feet of clean sediment is not anticipated to result in adverse impacts to the aquatic environment or biota found in the CDFs". A discussion of the potential impacts on the river's biota from the dispersion of cadmium-laden sediments during dredging is needed.

6.7. Navigation

The Savannah Harbor Expansion Project, if completed as currently described at either 47 or 48 ft of depth, does not likely provide sufficient harbor depth and width necessary to make the Jasper Ocean Terminal a viable project. We now know that over 80 percent of container ship capacity on order is post-panamax in size and will require harbors with 50 feet mean low water and unrestricted two-way ship traffic capability, such as offered by New York, Baltimore, and Norfolk today, to reliably make Panama Canal appointments. Thus, it is likely that investment in the Jasper Ocean Terminal would require a further harbor deepening project to be cost-justified.

If the Savannah Harbor Expansion Project is approved, the cost of dredging the 48 ft channel to the Garden City Terminal and the resultant environmental damage would make it extremely difficult if not impossible to get the additional dredging to 50 ft needed to make Jasper Ocean Terminal viable.

DEIS Section 5.17 Aesthetics and Recreational, on page 5-143 fails to evaluate how increase ship traffic or speeds may affect recreational boaters and kayakers along the entire length of the project.

The following comments pertain to the documents contained in the GRR Attachment 3, Engineering Investigations Supplemental Materials. The documents are:

- 1.1.11 Savannah Harbor Entrance Channel Simulations 2010 Report; dated 9 March 2010
- 1.1.12 Savannah Harbor Simulations Study 2009; 31 March 2009
- 1.1.13 Navigation Study for Savannah Harbor Channel Improvements; September, 2004

- 1.1.14 Impacts of the Savannah Harbor Expansion Projects; October 2006
- 1.1.16 Vertical Ship Motion Study for Savannah, GA, entrance channel; May 2010
- 1.1.17 Ship Forces on the Shoreline of the Savannah Harbor Project; August 2006
- 1.1.24 Savannah Harbor Expansion Bank Erosion Study; November 2006
- 1.1.25 Savannah Harbor Expansion Bank Erosion Study Update; June 2010
- 1.1.34 Sensitivity Analysis of Proposed Navigation Meeting Areas; September 2009
- 1.1.39 Dredged Material Management Plan; June 2010
- 1.1.43 Correspondence Regarding Pipeline Crossings; May 2008

These reports and studies verify previous shortcomings regarding navigation and operational capability of the proposed project.

SHIP DRAFT CAPABILITY: The inshore project depth will not support post-panamax traffic except on high tide. The ship draft this project will accommodate will roughly equate to what Charleston can do now. Based on Army Corps channel design standards, which recommend channel depths of 110 percent of ship draft in protected waters, this project will support a 24 hour maximum draft of approximately 42 ½ feet, and 47 feet on high tide, in the inshore channels.

SHIP SPEED LIMITATIONS: The narrow offshore channels are proven to be untenable for ships at 46 ft draft and greater. The maximum draft these channels can accommodate may be much less, but simulations were only done for 46 ft and 47.5 ft drafts. Additional simulations should be done to determine a viable draft. The findings were that ships at the drafts simulated must maintain speeds not greater than 6 knots. These speeds also require a range of tide that is exaggerated. The study assumed tide range offshore is the same as tide range in the mouth of the river. This is false. Offshore tide lift in this area is roughly 2/3 of the tide lift at Fort Pulaski.

No simulations were done to verify that ships could maintain sufficient directional control at such slow speeds to safely negotiate the unusually narrow offshore channel design incorporated this project. Narrow offshore channels often require 14 to 18 knots to maintain safe directional control depending on weather and currents. The draft capability of the offshore channels must incorporate a coordinated study to determine vertical ship motions at sufficient navigational speed. Until this study is done, the viability of the offshore channel is indeterminate, except that this report proves it will not support drafts of 46 feet or deeper.

SHIP TRAFFIC: This project will not support two – way traffic of post-panamax traffic. No simulations were done with two full beam post-panamax ships, so passing has not

been verified anywhere in the project. Simulations with smaller ships only identified one passing lane as viable, at Long Island Range. This lane is roughly in the middle of the project, meaning that one inbound may pass one outbound, provided timing two ships 32 miles apart at the start of their planned passing rendezvous can be precisely executed for an exact meeting in a location not longer than 6 1/2 ship lengths. This one marginally adequate passing lane is only viable if lengthened to 8000 feet, according to pilot feedback, requiring additional study.

ECONOMIC BENEFIT LIMITATIONS: Economic benefit must account for accurate capabilities. Ships must be lightly loaded to 42 to 47 feet draft, and traffic density is limited to one-way traffic. Full economic benefit as estimated of Post-Panamax shipping is unattainable in this project. The economic limitations of predominantly one-way traffic and light loading would be significant.

JASPER TERMINAL BENEFIT: This project preempts availability of a South Carolina terminal on the Savannah River, because this project occupies the dredge disposal areas in way of the notionally proposed Jasper Terminal through 2060. No extra dredge material capacity is apparent in the operations and maintenance plan to free up these sites.

This project also will not support navigability parameters to support a viable Jasper Terminal. The Jasper Terminal would only be viable if it can support fully loaded post-panamax ships largely unrestricted. The draft limitations of this project would only allow post-panamax ships that are substantially less than fully loaded. One –way traffic competing with the other terminals in the river would limit ship arrivals such that berth utility at jasper would be severely curtailed. If this project goes forward, and ship traffic density reaches maximum capacity on a one-way channel, there would be no extra capacity to handle increased traffic to a Jasper Terminal, and permitting of a Jasper Terminal would be difficult justify.

Within this plan is a projection of some 19 ship arrivals per day. With many of them dependent on the tide given the limited depth, this may be an unsustainable traffic load. Adding the Jasper Terminal would likely overwhelm the traffic density a one-way channel can support. Proceeding with this project may approach the environmental limits this waterway can sustain, leaving little or no capacity to add width or depth necessary to support a truly post-panamax capable Jasper Terminal.

In order to make a Jasper Terminal viable, a dredging project would have to be designed for full two-way traffic from the terminal to the end of the cannel at sea, with an inshore depth of 50 to 51 feet, and an offshore depth of 55 to 57 feet. This proposed project falls far short of those parameters and provides no utility to South Carolina's terminal expansion plans for the Savannah River.

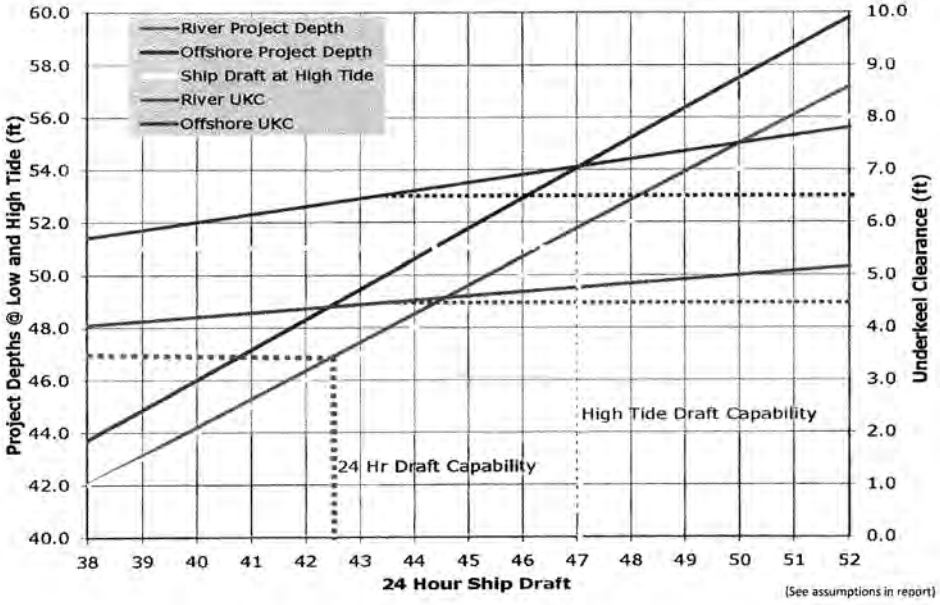
Figure 6-1 estimates draft and under keel clearance capability of various project depths at high and low tide for the Savannah River.

This chart depicts a difference of four feet between ship draft capability on any tide and on high tide based on the following assumptions:

1. Tide range at the seaward end of the project is four feet, at Fort Pulaski is six feet, and at Garden City is eight feet.
2. Tide lag from the sea buoy to Garden City is one hour.
3. Transit time from the sea buoy to Garden City would be three hours, on average.
4. The Army Corps of Engineers channel design standards per their engineering manual on channel design, which requires project depths to be 110 percent of the target ship draft in internal waters and 120 percent in exposed waters, is not being adhered to, as is apparent in the draft GRR and DEIS. Therefore, a lesser standard has been assumed to be 108 percent in internal waters and 115 percent in exposed waters for the purpose of these calculations. It should be noted that International Maritime Organization safe navigation standards for navigation mimic the USACE's standards of 110 percent and 120 percent respectively.
5. The result of the above assumptions is that an inbound ship will only be afforded 2/3 maximum tidal assistance at some point on their inbound voyage due to the duration of the voyage and the tide lag from the sea buoy to the terminal, and 1/3 of maximum tidal assistance on outbound voyages. The location of the ship at high tide, the speed of the ship, the length of a particular voyage within the project channel, and the actual tide range on a given day, determine actual tide assistance. The gross average of all these factors based on the above assumptions is 3 1/3 feet average benefit of high tide. For the purposes of this analysis, this has been rounded up to four feet, and therefore, this should be considered a liberal analysis, vice a conservative analysis. The USACE should report their findings and determinations on all of these factors and based economic projections on actual ship drafts this project can accommodate within Army Corps channel design standards.

FIGURE 6-1:

Savannah Draft vs Project



1.1.11 Savannah Harbor Entrance Channel Simulations 2010 Report; dated 9 March 2010

Pg.3, para 5: The ships modeled to investigate passing are a Panamax ship with a beam of 106 ft that no longer exists (this particular ship has been scrapped), and a less than post-panamax ship of only 140 ft beam (post-panamax beam is 160 ft). There is no testing done of two full post-panamax ships passing, so the channel has not been evaluated for post-panamax capacity. In some cases, they have considered a successful run where there was only 25 feet of clearance, indicating a true post-panamax ship would not have been successful.

Pg 3, para 7 & 8, Pg 4 Para 14.b & 15, Encl pg. 1 & 4: The inbound runs were reliable only when ranges were used, meaning the channel is only viable in clear visibility. Fog is prevalent in Savannah, as noted in the NOAA Coast Pilot, so dependence on ranges curtails the economic viability of the channel only to the extent of fair weather.

Pg 4, Para 13 & 14.c, Plates 12 & 14: The conclusion in paragraph 14c that two-way runs were successful is contradicted by paragraph 13 and Plates 12 & 14 that shows a ship left the channel in a passing run. It is also contradicted by the runs for one-way traffic that found that ranges were necessary for reliability.

Plate 5: While the ships outbound remained in the channel, the margin of safety was very thin. The report does not state a tolerance for satisfactory.

Encl, pg. 2, para 4 and 7: There are no simulations of steady steaming in the lengthy ranges offshore with limited width, especially considering the slow speeds necessary to limit squat per item 1.1.16, Vertical Motions. These notes indicate crabbing is common in "most transits". The width offshore is only 560ft. A post-panamax ship of 1050 ft length and 160 ft beam with 10 degrees crab takes up 330 ft of width, effectively doubling the beam. That leaves only 115 ft on each side. No runs evaluated the reliability of this channel in the long straight reaches, despite notes verifying crabbing is common. The narrow width of this lengthy offshore channel needs to be validated.

Summary: The offshore channel has not been validated as a safe channel for even one-way traffic of a full size post-panamax ship. Two way traffic has not been proven reliable in any segment of the channel, even with ships smaller than full post-panamax. The turn cannot be navigated safely inbound in limited visibility. The economic analysis needs to account for one-way traffic, high probability of ships leaving the channel, and closing the offshore channel in low visibility.

The channel needs to be simulated throughout the entire length with full size post-panamax ships both one way and passing.

1.1.12 Savannah Harbor Simulations Study 2009; 31 March 2009

Pg 2, para 5, Recommendations: The recommendation for an 8000 ft passing lane in Long Island Channel has not been studied. It is recommended by hypothesis based on the failure of the 7000 ft passing lane.

The Susan Maersk is only 140 ft beam. The project has not yet been studied for full post-panamax traffic. The population of ships greater than 140 ft beam is significant. Already, there are 347 container ships with a beam of greater than 140 ft in the world fleet. This represents 23 percent of the current post-panamax fleet. This population is certain to grow, and this project is not post-panamax capable without verifying the capability to handle full post Panama beam.

Enclosures: Almost every pilot recommended the entire Long Island Range be widened, vice just a segment of the Range, to allow for passing, citing that a minimal passing lane requires precise timing for each vessel to arrive in the lane, which is not realistic.

Plates 18 - 21 and Enclosures: Many pilots refuted the finding that passing in Oglethorpe Range is safe. The simulation runs do not show any appreciable margin of safety, even if the ships technically did not leave the channel. This reduces the passing opportunities to just the Long Island Range.

1.1.13 Navigation Study for Savannah Harbor Channel Improvements; September, 2004

This report is largely superseded by items 1.1.11 and 1.1.12. Shortcomings identified with the project in this report are reiterated and intensified in the two more recent reports noted above.

Pg 34, Plate 21: This study shows the Susan Maersk grounds in 6 ft seas in even a 52 ft deep offshore channel, verifying that the channel is not suitable for post-panamax drafts. At most, this simulation shows the channel is suitable for 44.5 foot drafts in 6 ft seas. At 44.5' (which would create only 2 feet of under keel clearance), the Susan Maersk is limited to some 600 fewer TEU's than fully loaded.

Pg 18 & Plates 3, 5, 7 & 11, 15, 17, 19, 23, 25, 27: Jones Island Range failed simulation runs.

Pg 25: Flats area failed simulation runs.

Pg 31: Jones Island Range failed even with a lightly loaded Susan Maersk.

Pg 32: Flats area failed even with a lightly loaded Susan Maersk.

Pg 36: Recommendations ignored that the Susan Maersk grounded in a 52 ft channel in 6 ft seas. The recommendation that the channel as proposed is satisfactory is unfounded.

Army Corps standards are that the offshore channel will provide for 120 percent depth compared to the target ship draft. On this measure, a 49 ft deep offshore channel will accommodate drafts up to 41 feet on low tide. Economic analyses must consider this limitation. The capacity of a typical 7000 TEU ship is some 200 TEU per foot of draft, so the capacity of a 7000 TEU ship limited to 6.5 less than full load draft foregoes 1300 TEU, or 19 percent of its cargo capacity.

1.1.16 Vertical Ship Motion Study for Savannah, GA, entrance channel; May 2010

This is a draft report. The project should be based on completed reports.

Pg 65: The simulated ship squats and grounds at speeds as low as 10 knots in channels deeper than the proposed. 10 knots has been found to be too slow to maintain control of a ship in a narrow channel subjected to ocean currents and waves. Maintaining control of the ship at 10 knots in a 550 ft wide channel needs to be studied carefully. 14 knots is widely considered the lowest safe speed to maintain control in confined offshore channels.

Pg 73: This shows that the channel only has viability for a fully loaded ship in a 49 ft channel 70 days a year at ten knots, an unsafe speed. A safer speed of 14 knots has zero days of viability.

This report verifies that the offshore channel cannot support 46 ft draft or 47.5 ft draft.

This report does not address channel depths as shallow as 49 feet, which is proposed. It does not evaluate the ability to maintain control of the vessels at slow speeds. It does not derive a maximum safe draft that is reliable most of the year (350 days plus).

This report does verify that this project is not suitable for post-panamax traffic.

A full-length simulation run needs to be conducted of a 160 ft wide ship at 47.5 feet draft at 6 knots as suggested here, or higher sped without inducing excessive squat, throughout the narrow 550 ft wide offshore channels. Controllability and under keel clearance must both be verified. A maximum safe draft for this channel should be derived and used as a basis for economic evaluations.

1.1.39 Dredged Material Management Plan; June 2010

Paragraph 1.1: The projection for how much maintenance material needs to be handled each year is not substantiated. Past actual volumes dredged are reported to be less than

the optimal volumes to keep pace with shoaling, but the amount reported for optimal maintenance, 6.225 million cubic yards (CY) is not substantiated.

The November 2010 ACOE Savannah District channel surveys show that all three offshore ranges have shallow quarters, as much as 1 ½ feet shy of project depth. Seven of thirteen river ranges have shallow quarters, as much as 4 feet shy of project. Over half of the Kings Island turning basin is 8 to 18 feet shy of project depth. This indicates that a significant amount of maintenance dredging is being deferred. It is entirely possible that some of this shoaling has reached equilibrium depth, having been deferred for so long, and, therefore, the current state does not indicate a linear progression of annual shoaling rates. It is safe to assume that with an improved channel, deferring maintenance as has been done in the past will no longer be tolerable, and therefore, annual maintenance dredged material will certainly increase. Due to the pattern of deferred maintenance and current shoaling, historical maintenance dredging data bears no credible indication of future annual demand, other than to indicate that proper maintenance dredging will greatly exceed historical dredging projects which have failed to keep pace with shoaling.

Table 3: Predicted O&M Volumes: This table projects maintenance dredging through 2060. It shows dependence on sites 13B, 14A, and 14B, which extend throughout the area notionally considered for an eventual Jasper County, SC marine terminal. The existing channel, unimproved, would likewise depend on the entire Jasper terminal site for annual maintenance perpetually. The Jasper terminal site is occupied by maintenance disposal demand indefinitely. With the increased maintenance load of a deeper channel, projected over an indefinite period, South Carolina's opportunities to develop a terminal on the Savannah River are even more obstructed.

Extended Notes Regarding Navigability:

The comparison to Charleston fails to take into account the salinity difference between the ports. Post –Panamax ships would sink approximately one foot as they enter the brackish water of the Savannah River. This phenomenon does not exist in Charleston where draft changes due to salinity are negligible. The other factor that differs is that the transit time is so long in Savannah that high tide only offers assistance for a portion of the transit. Even with the time lag between high tide at the sea buoy and high tide well into the port, and the higher amplitude of the tide inside the port, the ship will not be able to keep up with high tide throughout, and will be at half tide or worse at some point in the transit. Therefore, the tide only allows for an additional 4 1/2 feet of draft in optimal conditions. These factors contribute to the estimated potential of this channel project allowing only for the existing draft capability of the channel in Charleston, even though this project is two feet deeper.

The traffic density this project can support is severely constrained by the predominantly one-way capability. This limitation was documented in the Army Corps' letter to the

Savannah Pilots on March 28, 2002: "The channel was not designed for full two-way traffic for the design ship at all times." Given that the width is static, and is not afforded any benefit of tidal assistance, if the channel is only wide enough for one-way traffic some of the time, it is only wide enough for one-way traffic all the time for the design ship. It has also been noted, the design ship is not a full size post Panamx ship. The nearby Port of Charleston is currently wide enough for full post-panamax traffic all the time.

Therefore, the combined utility of this project would bring the ship handling capability of the Port of Savannah to roughly a one-way equivalent of the existing Port of Charleston. Economic and alternative studies should reflect this.

6.8. Environmental Justice

As noted in Section 5.20, Protection of Children and Environmental Justice, Federal agencies are required by Executive Order 12898 to identify and address "disproportionately high and adverse human health and environmental effects . . . on minority populations and low-income populations in the United States." Section 5.20, on Page 5-145, Paragraph 4 references figures that ". . . show the location of various poverty levels" in an area of Jasper County ". . . where the Garden City Terminal is located and most of the effects of the existing container terminal are experienced." The text further states ". . . that the closest area with the highest poverty level (40-100 percent) is located roughly a mile from the terminal", and this ". . . same area as being the closest one with the highest category of minorities (40-100 percent)." It is not clear in the text why this area is the focus of the analysis, rather than the area that may be potentially affected by the proposed action and alternatives. If the area identified on Figures 5-54 and 5-55 encompasses the region of influence, or area potentially affected by the proposed action and alternatives, it should be clearly stated as such in the text. If it does not, then the analysis needs to encompass that affected area, which needs to be defined based on the geographic extent of air quality and other impacts associated with the proposed action and alternatives that could potentially have adverse human health and environmental effects on minority populations and low-income populations.

Additionally, Section 5.20 does not define what low-income population was assessed as part of the environmental justice analysis. It would appear from the text to be the segment of the population with the highest category of people at or below the poverty level (40 – 100 percent), but that is not clear from the text. It is also not clear if the low-income population included in the environmental justice analysis comprised all people at or below the poverty level. The analysis should identify and assess disproportionately high and adverse effects on minority and low-income populations. Based on the mapping on Figures 5-54 and 5-55, it appears that minority and low-income populations may be closer to the project than one mile. What is not clear from the evaluation and needs to be included is an assessment (more than merely a statement) of whether or not minority and

low-income populations (not the highest category of minority and low-income populations) are disproportionately affected by any adverse human health and environmental effects of the proposed action and alternatives.

Section 5.20 also states that Executive Order 13045 requires that Federal agencies "identify and assess environmental health risks and safety risks that may disproportionately affect children;" and are required to "ensure that its . . . activities . . . address disproportionate risks to children that result from environmental health risks or safety risks." Figure 5-56 of the EIS shows the locations of schools, hospitals and child care facilities in the project area. It is presumed that the identification of these facilities is intended to represent locations where children would be exposed to environmental health risks or safety risks from the proposed action and alternatives. This is not clearly stated, however, but needs to be if that is the intent. There may be other locations in the affected area where children could be present and at risk, and they would include outdoor recreational areas (e.g., ball fields, playgrounds) and residential areas (for pre-school children not in child care facilities or all children present in residential areas if project activities would occur after school hours, for example, or during the weekend). If these areas exist in the area potentially affected by project activities, then they need to be included in the analysis.

Moreover, with regard to the evaluation under E.O. 13045, Section 5.20, Paragraph 1 on Page 148 states that ". . . schools, hospitals and child care facilities . . . are dispersed throughout the community and are not located disproportionately near the navigation channel." The disproportionate or non-disproportionate location of facilities, however, is not what needs to be evaluated. The analysis needs to identify and assess the effects of the proposed action on children and whether or not children may suffer disproportionately from environmental health risks and safety risks when compared to the adult portion of the population.

Section 5.20 concludes on Page 5-149, Paragraph 1 that "[t]he dredging activities, including deposition of the dredged sediment, will not have significant impacts on any populations, including minority populations and low-income populations." The basis for this conclusion is unclear from the text in Section 5.20 prior to this statement. The document needs to indicate the basis for this conclusion, i.e., whether it is from the results of air quality and other impact analyses of the proposed action and alternatives. If from air quality analyses, the document needs to explain how this conclusion was derived, as Section 5.6, Air Quality, indicates that the assessment of impacts on air quality ". . . did not include a detailed dispersion modeling assessment of air emissions of the alternatives", nor did it include " . . . a risk-based assessment of the health effects associated with the proposed project".

6.9. Cultural and Historic Resources

A South Carolina Department of Archives and History comment letter is provided in Appendix F of this comment document.

7. Comments on Proposed Mitigation

7.1. Wetlands

5.1.2.2 Impacts Without Mitigation – Pg 5-12, 2nd para – "Tidal freshwater marshes located outside the SNWR are subject to development threats and could be filled if the owner obtained a Department of the Army Permit". Please explain in detail the belief that those wetlands are threatened by development.

6.11 Executive Order 11990 (Protection of Wetlands) – Pg 6-3, 6th para – "A small amount of saltmarsh and brackish marsh (14.08 acres) would be lost through excavation of the turning basin and two wideners". The Corps estimates that approximately 1200 acres of tidal freshwater wetlands could be converted to another wetland type without mitigation, and over 300 acres of tidal freshwater wetlands will be impacted after mitigation. The Corps proposes as mitigation the preservation of existing tidal freshwater wetlands that are not under imminent threat of loss. How is that in compliance with Executive Order 11990, and how is that consistent with "no net loss"?

7.2. Water Quality

5.2.2 Mitigation for Impacts to Dissolved Oxygen – Pg 5-48, 2nd para – "Identified the use of Speece cones as the specific technique to inject oxygen into the water, although another land-based technique might be found later that could be more cost-effective." Where has this technology been employed to the degree needed for the SHEP and what was the result?

7.3. Fisheries

5.3.2 Mitigation for Impacts to Fisheries – Pg 5-91 – Adding a table to this section that identifies the quantity of fish habitat lost (by species) versus the quantity of habitat expected to be gained (by species) through mitigation would be helpful to understanding the magnitude of the potential impact.

6.04 Magnuson-Stevens Fishery Conservation and Management Act – Pg 6-2, 2nd para – "Conversion of freshwater marshes to brackish would require mitigation for all channel depths except the 44-foot project. Mitigation would be accomplished through the flow rerouting and preservation of wetlands in the Savannah River estuary". There appears to be no analysis of impacts to the plant and animal communities that reside in and adjacent to the streams that will have freshwater diverted from them, and no analysis of mitigation if impacts are likely to occur. Mitigation in the form of existing wetlands preservation

does not comply with "no net loss of function and value", a basic principal of the Corps' Section 404 regulatory program.

7.4. Other

5.22 Mitigation – Pg 5-157, 3rd para – "The project includes design features to avoid environmental impacts as well as features that reduce the amount of impacts that otherwise occur". The design features and features that reduce impacts should be identified in the text, or provide a reference to another section of the DEIS where those features are discussed in detail.

ATTACHMENT 1
COMMENTS ON DEIS APPENDICES

**Comments on DEIS Appendix B –
Biological Assessments for Threatened and Endangered
Species**

Appendix B Comments

Biological Assessment of Threatened and Endangered Species for the
Proposed Savannah Harbor Expansion Project
Under the Endangered Species Act of 1973, As Amended
Draft Tier II Environmental Impact Statement for Savannah Harbor Expansion

1. Section 5.04.2.A. Line 5. How and to what degree will lighting affect sea turtles? Will it increase the likelihood of a take?

2. Section 5.04.2.D. Has the use of a bed leveler been cleared by NOAA? Endangered species surveys should be conducted prior to use. How will the project determine if use of a hopper dredge would result in equal or greater take of endangered species?

3. Section 5.04.2.E. The narrative states that noise above 150 dB is the level of a take. However, noise levels above 150 dB and below 180 dB are proposed to be allowed under monitoring even though they are above the level of a take. This is counterintuitive and against a tenant of the ESA, which is to prevent a take of an endangered species.

4. Section 6.00.f. Authorization of the sites through LTMS in 1996 does not preclude the need for study and assessment in this EIS. Since 1996, additional species have been listed as threatened or endangered. In addition, these areas may currently be used by protected species. If, in fact, the allowable timeframe in the LTMS was indeterminate, the LTMS process is flawed.

5. Page 46, 4th paragraph states "The proposed action *does not plan* to place any excavated sediment…on any upland beaches…" (*emphasis* added) The project should specify whether it will or will not. The words 'does not plan' suggest that it may occur at a later date if the plans change. This impact is not assessed in the EIS and should therefore be changed to either state that it will not occur or that it may occur and address the environmental impacts of the action.

6. Page 46, 2nd to last paragraph, line 2. ERDC Mearshore should be corrected to read ERDC Nearshore.

7. Section 7.01, 4th Paragraph. The text discusses how the increase in salinity and decreased DO will remain downstream of the I-95 bridge. How does this compare to existing levels? It is difficult to assess impact when the document does not state how this is a change from existing conditions.

8. Section 7.02.2 (c). The assessment does not account for the loss of salt marsh due to increased wave action from the larger ships that will be using the channel.

9. Section 7.02.5 (c & d). The last paragraph of section c and the first paragraph of section d are contradictory. Section c states that "[i]ncreases in ship traffic are expected to occur in the future..." Section d then states "the number of vessels...is expected to decrease..." Which is it? The data to back up this information should also be cited in order to substantiate the claim.

10. Section 7.02.7 (c). The document states that sediment deposition would be conducted in a manner to not interfere with nesting terns. There is no detail provided to substantiate this claim. Has a monitoring plan been developed in order to determine the location of nests prior to deposition of sediments? Will deposition occur near nesting terns? If so, how close? If CDF's are being used for breeding, feeding, and loafing for any listed species, the relevant laws related to protection of sensitive species would apply and mitigation should be required if the disturbance of the sensitive species habitats are not authorized by the specific law that protects the sensitive species.

11. Section 7.02.9 (d). Has a monitoring plan been developed? What monitoring protocol will be used and how will it be used in order to ensure adequate habitat is available during the project for nesting? If the entire area is disturbed in a short period of time, it is highly unlikely that any habitat will be available for nesting during the project.

12. Section 7.02.10 (c). Lines 6 and 7. There is nothing in the document to substantiate this claim. A reference should be cited.

13. Section 7.02.11 (c). Have any nest surveys been completed near the impact areas? Surveys should be completed prior to determination of no impact.

14. Section 7.02.14 (c). The document does not consider or mention the impacts from saltwater intrusion into freshwater, thereby reducing available habitat. The reduction in available freshwater habitats is an impact that must be considered.

15. Section 7.02.15 (c). The document states that sediment deposition would be conducted in a manner to not interfere with nesting yellow crowned night herons. There is no detail provided to substantiate this claim. Has a monitoring plan been developed in order to determine the location of nests prior to deposition of sediments? Will deposition occur near nesting areas? If so, how close?

16. Section 7.02.17 (b). The document states that no gopher frogs have been observed at the CDFs, but does not provide any reference to a study that has looked for the frogs. Information should be provided as to which studies would have been expected to document gopher frogs had they been present. Non-presence cannot be determined by a lack of study.

17. Section 7.02.20 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

18. Section 7.02.21 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

19. Section 7.02.22 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

20. Section 7.03.Savannah River. The document states that the overall effect on the river and its fisheries are not expected to be significant. The impact on fisheries was not adequately addressed considering the fact that over 400 acres of habitat is expected to be lost to the shortnose sturgeon alone. In addition, the lost habitat may have been underrepresented by the modeling. For example, a baseline level of 4.5 mg/l of dissolved oxygen was used to determine if habitat was available for shortnose sturgeon. This is a minimum level at which the agencies determined shortnose sturgeon can survive, but does not necessarily indicate the dissolved oxygen level that is necessary for foraging, resting, and moving. For example, the Collins et al. (2001) study of shortnose sturgeon habitat use cited in Section 8.02.7 of this appendix, reported minimum mean dissolved oxygen levels of 6.36 and 6.45 in areas where adults and juveniles were found, respectively.

    The habitat use information, in conjunction with agency comments reported on page 128 #4, 2nd paragraph in Appendix N, again suggests the habitat modeling overrepresented the available habitat for sturgeon by denoting it all as equally beneficial at the 4.5 mg/l dissolved oxygen threshold and thus failed to quantify the intensity of the impact to the fisheries. In the Appendix N documentation, Prescott Brownell, from NMFS requested that a range of suitable habitat thresholds be used for modeling habitat availability. The agency panel then redacted his comments from the record without providing an adequate basis for the redaction. The panel decided the current methods were "acceptable for now." This comment would suggest that additional work would be necessary in the future in order to adequately asses the impacts. The narrative does not provide adequate discussion as to why the pass/fail approach was more adequate than the range approach suggested by Mr. Brownell.

    Additional questions as to the validity of the fisheries assessment are based on the habitat models and their interpretation for impact determination. On page 132 of Appendix N, the memorandum for the record states that other fish were not

modeled for habitat suitability because the Corps did not wish to spend the time modifying existing models and they would instead use other species as surrogates. Avoidance of spending time developing models is a suspect reason for not pursuing the assessment of some species. This is especially true when no documentation, reference, or justification was given as to the acceptability of using modeled species as surrogates for those species that were not modeled. Furthermore, the completed models were not used to extrapolate the potential impacts to species that were not modeled when determining potential impacts.

21. Section 7.04. The note on Rafinesque's big-eared bat states that some bottomland hardwood tress could be affected by salinity. Other sections of the document state that upland areas will not be affected by the project; however, this area highlights that effects may occur in upland areas. The potential effects should be investigated in greater detail in order to provide quantifiable impacts for the assessment of loss of habitat for this species.

22. Section 7.04.2 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

23. Section 7.04.5 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

24. Section 7.04.7 (c). 2nd paragraph. The narrative states that ship encounters with pygmy sperm whale are extremely rare, but do not provide a reference or other information to substantiate this claim. The data to back up this information should also be cited in order to substantiate the claim. The last paragraph of section c and the first paragraph of section d are contradictory. Section c states that "[i]ncreases in ship traffic are expected to occur in the future..." Section d then states "the number of vessels...is expected to decrease..." Which is it? The data to back up this information should also be cited in order to substantiate the claim.

25. Section 7.04.8 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

    The narrative also provides 2 c sections and 2 d sections that have different impact and effect determinations. Which apply here?

26. Section 7.04.9 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

27. Section 7.04.11 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

28. Section 7.04.15 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

29. Section 7.04.16 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

30. Section 7.04.21 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

31. Section 7.04.22 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

32. Section 7.04.23 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

33. Section 7.04.24 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

34. Section 7.04.25 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

35. Section 7.05.Savannah River. The document states that the overall effect on the river and its fisheries are not expected to be significant. The impact on fisheries was not adequately addressed considering the fact that over 400 acres of habitat is expected to be lost to the shortnose sturgeon alone. In addition, the lost habitat may have been underrepresented by the modeling. For example, baseline levels of 3.5 to 4.0 mg/l of dissolved oxygen was used to determine if habitat was available for adult shortnose sturgeon. This is a minimum level at which the agencies determined shortnose sturgeon can survive, but does not necessarily indicate the dissolved oxygen level that is necessary for foraging, resting, and moving. For example, the Collins et al. (2001) study of shortnose sturgeon habitat use cited in Section 8.02.7 of this appendix, reported minimum mean dissolved oxygen levels of 6.36 and 6.45 in areas where adults and juveniles were found, respectively.

    The habitat use information, in conjunction with agency comments reported on page 128 #4, 2nd paragraph in Appendix N, again suggests the habitat modeling overrepresented the available habitat for sturgeon by denoting it all as equally beneficial at the 4.0 mg/l dissolved oxygen threshold and thus failed to quantify the intensity of the impact to the fisheries. In the Appendix N documentation, Prescott Brownell, from NMFS requested that a range of suitable habitat thresholds be used for modeling habitat availability. The agency panel then redacted his comments from the record without providing an adequate basis for the redaction. The panel decided the current methods were "acceptable for now." This comment would suggest that additional work would be necessary in the future in order to adequately asses the impacts. The narrative does not provide adequate discussion as to why the pass/fail approach was more adequate than the range approach suggested by Mr. Brownell.

    Additional questions as to the validity of the fisheries assessment are based on the habitat models and their interpretation for impact determination. On page 132 of Appendix N, the memorandum for the record states that other fish were not modeled for habitat suitability because the Corps did not wish to spend the time modifying existing models and they would instead use other species as surrogates. Avoidance of spending time developing models is a suspect reason for not pursuing the assessment of some species. This is especially true when no documentation, reference, or justification was given as to the acceptability of using modeled species as surrogates for those species that were not modeled. Furthermore, the completed models were not used to extrapolate the potential impacts to species that were not modeled when determining potential impacts.

36. Section 8.02.1, The section header misspelled Bachman's warbler. Backman's should read Bachman's.

37. Section 8.02.1 (c). This sections states that no upland habitats will be adversely affected by the proposed action. This is contradictory to information provided in a note in section

38. Section 7.04. The note on Rafinesque's big-eared bat states that some bottomland hardwood tress could be affected by salinity. Will upland habitats be affected or not?

39. Section 8.02.2 (b). What does the term 'the areas' refer to in lines 7,8, and 9. It is unclear from the text and therefore impossible to determine what the impacts would be.

40. Section 8.02.2 (c). The document does not adequately address the impacts of the project on the wood stork. Impacts to the CDFs, which are currently being used as feeding areas for an endangered species should be quantified and mitigated. More detail should be provided about these impacts, the recovery period, and the habitats that will result from the project.

41. Section 8.02.3 (c) 1. The narrative is lacking in providing references that substantiate the factual claims in the document. The data to back up this information should be cited in order to substantiate the claims that impacts will be minimal.

    Additional detail should be provided to indicate the degree to which habitat would be affected during the project and the amount of habitat that will remain unimpacted at any one point in time. Phrases such as "[o]nly a small portion of the forging habitat is directly affected at any point in time during sediment placement and adjacent habitat is still available..." does not provide adequate specificity to assess impacts. Additional detail should be provided on benthic recolonization rates to substantiate the as yet unsubstantiated recolonization claims in the document.

42. Section 8.02.3 (d) 1. The word 'we' should be deleted.

43. Section 8.02.4 (d). The document does not consider the effects that the larger ship traffic, that will result because of this project, may have on manatees. In its current form, the impacts section is inadequate to address potential impacts.

44. Page 136. The narrative does not discuss how the increase in boat traffic or deposition of material in the nearshore area of Tybee Island will affect loggerhead sea turtles. Failing to discuss all potential impacts suggests this analysis is inadequate.

45. Page 148. Conservation Measures (a). 2nd Paragraph line 2. The document credits turtle deflecting dragheads with significantly minimizing the risk of sea turtle

take. No references or sources have been cited to substantiate this claim. Since the avoidance of take claims stated later depend upon this assertion, the avoidance claims are not valid unless this claim is substantiated.

46. Page 154. A. 4. Are the dates correct? Will the observer only be onboard in December and March? The first paragraph of Section A states the dredging will occur from December through March. If an observer is only present for 2 of the 4 months, how will compliance with protocol be ensured?

47. Page 155. C. first paragraph, last sentence. An assessment in 1996 is not valid today due to changes in the endangered species list and in the environment. The areas should again be assessed for potential endangered species impacts.

48. Section 8.02.7. Shortnose sturgeon and Atlantic sturgeon are grouped together for purposes of assessing impacts from the project. The narrative justifies the grouping due to their "similarities in habitat use, distribution throughout the proposed action area, foraging behavior and prey base, and subsequent risk of take relative to dredging and trawling operations..." No citations or other reference information was provided to substantiate this decision to group the species. Other information provided in the appendix provides information that contradicts the claim that the species are similar enough to group together for impact assessment purposes. For example, on Page 170, last paragraph, the narrative states that Atlantic sturgeon primarily lead a marine existence and are therefore more likely to be impacted by hopper dredges than the more estuarine based shortnose sturgeon. The first sentence of the second paragraph on Page 174 also states that the habitat ranges for shortnose and Atlantic sturgeon are slightly different. In addition, the SRT 2007 report states that not all rivers that support Atlantic sturgeon, support shortnose sturgeon. This information again reiterates the differences between the two species, the need to assess them independently, and the shortcomings of an assessment that assesses them together.

49. Page 157, 1st paragraph, Unsubstantiated claims are made throughout this paragraph without any reference materials, peer-reviewed or otherwise, cited.

50. Page 157, 2nd paragraph, specifically lines 1-7. Unsubstantiated claims are made throughout this paragraph without any reference materials, peer-reviewed or otherwise, cited.

51. Page 160, present conditions, 1st paragraph. The use of 4.0 mg/l continues to be used in spite of the information provided by Collins et al. 2001 that mean DO levels in sturgeon habitat use areas were 6.45 and greater. The claim that prolonged exposure to low oxygen levels may not produce acute impacts to fish is unsubstantiated by any outside reference materials. This use of 4.0 mg/l is a minimum level at which the agencies determined shortnose sturgeon can survive, but does not necessarily indicate the dissolved oxygen level that is necessary for

foraging, resting, and moving. The agency comments reported on page 128 #4, 2nd paragraph in Appendix N, again suggests the habitat modeling overrepresented the available habitat for sturgeon by denoting it all as equally beneficial at the minimum dissolved oxygen threshold and thus failed to quantify the intensity of the impact to the fisheries. In the Appendix N documentation, Prescott Brownell, from NMFS requested that a range of suitable habitat thresholds be used for modeling habitat availability. The agency panel then redacted his comments from the record without providing an adequate basis for the redaction. The panel decided the current methods were "acceptable for now." This comment would suggest that additional work would be necessary in the future in order to adequately asses the impacts. The narrative does not provide adequate discussion as to why the pass/fail approach was more adequate than the range approach suggested by Mr. Brownell.

52. Page 160, present conditions, paragraphs 2 and 3. Information provided is unsubstantiated by any outside reference materials and are therefore considered baseless for assessing impacts.

53. Page 164, threats, paragraph 1, line 2. Information provided is unsubstantiated by any outside reference materials and are therefore considered baseless for assessing impacts.

54. Page 170, Dredging methods and associated impacts, line 7. The SRT 2007 report states that habitat loss due to dredging is not just a short-term impact to foraging and refuge habitat. Atlantic sturgeon rely upon deep holes for refugia and are substrate dependent fish. If the bottom of the river is dredged to create an anoxic, uniform bottom without substrate diversity the effects on Atlantic sturgeon would be detrimental over a long-term period.

55. Page 171, Section B, Line 4. What does fairly low mean? The impacts should be quantified and substantiated. Even a single take is not allowed under the ESA unless a permit has been issued.

56. Page 171, Section B, Lines 4-6 state that eggs and larval sturgeons 100 miles upstream where hydraulic dredges are proposed? Are hydraulic dredges proposed upstream from the project area? If not and the sentence is inaccurate it should be corrected. If it is intended to state that eggs and larval sturgeon are located 100 miles upstream from the project area and therefore are outside of the area where hydraulic dredges are being used it is inaccurate.

57. Page 160 of this document, first paragraph, last line, states that an Atlantic sturgeon larva was found 6.7 km (4 miles) upstream of the project impact area. This information suggests that some larva may drift into the project area. Additional information should be collected to verify the actual location of Atlantic sturgeon spawning to ensure the project dredging and upstream

movement of salinity and decreases in DO will not deleteriously impact Atlantic Sturgeon.

58. Page 175. Indirect impacts. The impacts to refuge habitat are actually likely to be long-term impacts according to the SRT 2007 report. In addition, the loss of deep holes with sufficient levels of DO are likely to result in unavailable habitat in which sturgeon may be able to survive, but will not utilize due to inadequate levels of DO.

59. Page 175. Benthic foraging, First paragraph, Line 7. Unsubstantiated claim about benthic recolonization.

60. Page 175. Benthic foraging, First paragraph, Line 8. Unsubstantiated claim without a reference cited.

61. Page 175, Second paragraph, Lines 6 and 13. Unsubstantiated claim without a reference cited.

62. Page 176, Line 2. Unsubstantiated claim without a reference cited.

63. Page 176, Second paragraph, First sentence. Unsubstantiated claim without a reference cited.

64. Page 176, Second paragraph, Second and third sentences. A correlation between river flow and season does not equate to a correlation between natural community shifts and river flow rates. The logic is flawed in this assertion and it may not be accurate.

65. Page 176. Impacts from cadmium-laden sediment. 2nd paragraph. The text suggests that exposed clay would prohibit benthic recolonization. This statement contradicts earlier assertions that benthos would recolonize quickly.

66. Page 177. First paragraph, lines 5-7 suggest that 28% of the substrate surface is a minor fraction of the system. 28% of the channel bottom is not minor.

67. Page 177. Section B. First line. The line claims extensive studies have been conducted, but cites none. Only two studies are included below and neither appears to deal directly with fishes that may be found in the Savannah River.

68. Page 177. Section B, Second paragraph, second sentence. Unsubstantiated claim without a reference cited.

69. Page 179, second paragraph. Line 11 claims fish could use different habitat upstream in order to avoid increased salinity. The studies cited throughout the text and in literature cited by the text highlight the necessary use of estuarine

habitats by shortnose and Atlantic sturgeon. Excluding these fish from the necessary habitats is a substantial impact that cannot be mitigated by the assumption that the fish can simply avoid saline habitats.

70. Page 180. The document explains that since no additional habitat can be modified to make it suitable for sturgeon, the project can mitigate impacts by adding upstream habitats. The addition of upstream habitats may be beneficial for some of the life stages of sturgeon, but it is not a substitute for the necessary nursery areas that will be lost due to the project. There is no evidence to suggest the sturgeon will utilize or benefit from the upstream areas or that any benefits would mitigate deleterious impacts from the loss of estuarine habitats.

Appendix C Final Comments

Mitigation Planning Evaluation
Draft Tier II Environmental Impact Statement for Savannah Harbor Expansion

1. Section 2, Pages 1-5. Fails to discuss what steps were taken to avoid wetland and many other impacts described within Section 5 of the DEIS.

2. Section 3, Page 9, Summary Table. States that salt marsh impacts would be -15.68 acres. A negative impact suggests that there would be a net gain in salt marsh, which is not the case. In addition to the negative impact issue, the quantity of the impact does not match what is provided in Section 5 of the DEIS.

3. Section 4, Page 11. This project should not result in a net loss of wetlands of any type. Preserving existing wetlands should not count as part of the mitigation unless a direct threat can be shown for each and every site.

4. Section 4, Page 15, 2nd Paragraph. Flow rerouting was proposed as a method to reduce the impacts to freshwater marshes, but what are the direct and indirect impacts associated with the planned alternatives? Deepening existing cuts should be considered an impact to subaqueous bottoms. Filling cuts should be considered a fill of subaqueous bottoms and potentially a fill of intertidal wetlands adjacent to the open water. These impacts should be determined and enumerated. These impacts should be mitigated as part of this project.

5. Section 4, Page 30, 7th Paragraph. States "the Contractor shall provide an Environmental Monitoring Plan for the job site, including land, water, air, and noise monitoring. Special emphasis shall be provided for the monitoring of wildlife resources (manatees and marine mammals)." What about other wildlife resources (i.e. shortnose sturgeon)?

6. Section 4, Page 31, 1st Paragraph. Monitoring periods for manatee before after the blast should be lengthened.

7. Section 4, Page 32, 3rd Paragraph. The paragraph states that if a manatee or marine mammal is injured or killed during blasting, all blasting operations shall be suspended and shall not resume until the contractor obtains written permission from the Contracting Officer. The District will coordinate the take with the NMFS to determine the appropriate course of action." What preparations will be in place to save any manatee or marine mammal wounded during the blast?

8. Section 4, Page 33, 2nd Paragraph. The paragraph states that the Marsh Succession Models were not ultimately used to evaluate the mitigation proposals. If this model was used to predict the impacts, the same model should be used to predict the benefits of the mitigation proposals. How was the wetland mitigation

alternatives evaluated to confirm that the freshwater wetland impacts would be reduced from 1,212 acres to 337 acres without the use of the model?

9. Section 5, Page 49, 1st Paragraph. The paragraph states that the proposed restoration site is currently "high ground." Has a wetland delineation been confirmed for the proposed site to determine how much of the site is currently a wetland and how much is non-wetland? Portions of the site which are currently a wetland under normal conditions (the site was last filled at least 20 years ago) should not be included within the proposed restoration acreage. If wetlands exist within the proposed restoration area and were counted as part of the restoration acreage, then the proposed wetland restoration acreage should be reduced accordingly.

10. Section 5, Page 49, 2nd Paragraph. How will the proposed restoration site be protected from invasive species such as *Phragmites australis* if left to revegetate naturally?

11. Section 5, Page 53, 2nd Table. The table indicates that 730 acres of saltmarsh will be impacted by the project. However, the 3rd paragraph on page 110 indicates that the impacts are to brackish marshes. Both cannot be correct.

12. Section 5, Page 53, 2nd Table. What method was used to determine the location and quantity of impacts to brackish or saltmarsh (see previous comment)? This method should be discussed in the document and the location and quantity of impacts at each location should be made available for public review.

13. Section 5, Page 53, 2nd Table. The document clearly states that the natural resource agencies in Georgia require that "acceptable mitigation should consist of at least 50 percent restoration." If the impacts are actually to saltmarsh, then the proposed restoration is out-of-kind restoration. Is this acceptable to the State?

14. Section 5, Page 53, 1st Paragraph. How are the flow altering methods restoring 1,068 acres of brackish marsh? The mitigation plan details how these methods would reduce the impacts to freshwater wetlands, but makes no mention of how these methods also perform brackish marsh restoration. As mentioned in a previous comment, the proposed flow altering features would actually result in impacts themselves. The plans involve filling subaqueous bottoms, dredging subaqueous bottoms, and potential filling of intertidal wetlands adjacent to plugs and weirs. The document should clearly indicate how it was determined that these flow altering plans actually restore impacted marshland. The location of the proposed restoration areas should be included in the document and made available for public review. The restoration areas should be monitored as part of the mitigation plan.

15. Section 5, Page 69, 1st Paragraph. The agencies could not determine any impact that could restore or enhance sturgeon habitats. The proposed project will

undoubtedly result in a take of the endangered shortnose sturgeon and the candidate Atlantic sturgeon which is proposed to be listed as endangered. As a part of the Endangered Species Act, the project would likely need to receive an incidental take permit. If an incidental take permit was issued, the USACE would be required to submit a habitat conservation plan. The habitat conservation plan would have to address the likely impacts of the project, steps the USACE will take to minimize and mitigate the impact, alternative considered and why the USACE did not pursue them further.

16. Section 5, Page 69, 2nd and 3rd Paragraphs. The USACE proposes the installation of a fish passage structure around the New Savannah Bluff Lock and Dam (NSBLD) in order to provide additional available habitat to the shortnose sturgeon. However, the DEIS hasn't provided any assurances that shortnose sturgeon historically used the habitat upstream of the NSBLD, that the shortnose sturgeon can and would navigate the fish passage structure, or that, even if sturgeon had historically used the habitat, the habitat above the NSBLD is currently of the quality that would provide benefits to sturgeon. Of important note, the proposed listing rule for Atlantic sturgeon states that measures "such as fish passage have not proven beneficial to Atlantic sturgeon, as they do not regularly use existing fish passage devices, which are generally designed to pass pelagic fish. To date, only four Atlantic sturgeon have been documented to have passed via a fish lift." Thus, there is no indication that the fish passage structure would adequately mitigate for the inevitable harm caused to shortnose sturgeon.

17. Section 5, Page 98, 1st Paragraph. Neither the DEIS or this document provide any documentation that shortnose sturgeon used habitat above the NSBLD or that the availability of this habitat would adequately compensate for the lost habitat that is used by sturgeon during different seasons and during different life stages than more upstream habitats.

18. Section 5, Page 99, 1st Paragraph. The appendix states that the agencies noted the fish passage structure was the only method that could effectively compensate for the predicted loss in sturgeon habitats. On the contrary, the agencies didn't appear to state that the fish passage structure would effective compensate for impacts. The agencies seemed to state that they could not think of any other compensation in the estuary and that the fish passage structure was the only mitigation measure that had been proposed that may provide some compensation. In the documentation provided in the agency correspondence appendix, the agencies did not mention that the fish passage structure would effective compensate for the predicted loss in sturgeon habitats.

19. Section 5, Page 99, 2nd Paragraph. What if the fish passage structure is paid for by other funding and cannot be used by this project as mitigation? No other mitigation has been proposed. This constitutes a substantial risk that should be addressed.

20. Section 5, Page 103, 2nd Paragraph. The calculation of costs needed for the stocking program appears to be flawed and may underrepresent the actual amount of costs needed for the stocking program. The cost determination assumes that the start-up of the hatchery is directly proportional to the amount of fish that would be produced i.e., that only a percentage of the $3.1 million initial expense is required to get the stocking program underway. Has the GA DNR-WRD provided information to verify that the percentage assumption provides an adequate amount of payment for stocking? There are probably economies of scale that would preclude the direct ratio apportionment proposed by the Corps.

21. Section 9, Page 114, Monitoring shortnose sturgeon distribution. Both shortnose and Atlantic sturgeon should be monitored given their respective status under the Endangered Species Act and the take of these species that will occur as a result of this project. Monitoring should include distribution as well as abundance determinations. Monitoring that does not include abundance information will not provide adequate information to determine if the project is resulting in population decreases.

22. Section 9, Page 114, Monitoring fish passage at NSBLD. What would result if sturgeon do not use the fish passage structure? Adequate mitigation would not be provided.

23. Appendix A, Page 149, 2nd Table. The table indicates that a value of 0.3 was used for the threat category for the preservation sites. The document fails to justify the use of this elevated value. The second-to-last paragraph on page 123 indicates that "adjacent lands" are being logged and/or developed for residential use. The document does not indicate that these lands are directly adjacent to the tidal wetlands proposed for preservation or speaks of how these lands (if developed and/or logged) will directly affect the proposed preservation area. The document itself indicates that the threat must be demonstrable and it fails to do so. A value of 0, for no threat, or 0.1, for low threat, should be used in the preservation worksheet or the document should be revised to demonstrate how the proposed preservation areas, are themselves, at a moderate level of threat. A lower threat value would require that additional land be acquired for preservation.

24. Appendix A, Page 149, 2nd Table. The table indicates that the values for in-kind and out-of-kind replacement are 0.6 and 0.2, respectively. The previous table indicates that these are the only options available for use within the preservation worksheet. However, a value of 0.4 was used within the preservation worksheet. If there are uplands included within the preservation area (as page 123 indicates there are), their acreage should be excluded from the preservation total, or at least included as out-of-kind replacement. The preservation worksheet should be updated and the required acreage purchased as compensation for the project should be adjusted accordingly.

25. Numerous figures within Appendix C do not have essential components like north arrows, scales or legends.

Comments on DEIS Appendix D –
Monitoring Plan and Adaptive Management Program

Appendix D Comments

Monitoring and Adaptive Management Plan
Draft Tier II Environmental Impact Statement for Savannah Harbor Expansion

1. Section 3.Goals of an Adaptive Management Plan, p. 7, 2nd Paragraph: The document indicates that the first goal of the adaptive management plan is evaluating the accuracy of the predicted environmental impacts. Post-construction, the goal should be to determine if the mitigation features are adequate to compensate for the impacts. This should be achieved with field results and not with predictive models. In situ conditions indicate whether the mitigation features are adequate or inadequate.

2. Section 5.B.Physical, p. 7, 1st Paragraph: The document indicates that the pre-construction monitoring "will better define the complex interactions between the estuarine ecosystem and the quantity and quality of water available." If these interactions are unknown, how were the potential impacts determined in the Tier 2 EIS? These interactions should be understood prior to permit issuance as the potential impacts may still remain undetermined.

3. Section 5.B.Physical, p. 7, 2nd Paragraph: The document indicates that the hydrologic and water quality monitoring data will be used to update the models, pre-construction. Who would determine if the model warrants an update?

4. Section 5.B.Physical, p. 7, 2nd Paragraph: If a calibration is warranted of the predictive models, prior to construction, and the models predict greater impacts then permitted, would a permit modification be acquired prior to the beginning of impacts?

5. Section 5.B.Physical, p. 7, 3rd Paragraph: Would the State of South Carolina have a chance to determine the location of proposed groundwater monitoring wells, as the Floridan aquifer extends into southern South Carolina.

6. Section 5.B.Physical, p. 7, 3rd Paragraph: The document indicates that chloride levels will be monitored in "up to four" groundwater monitoring wells annually in the pre-construction phase. However, in section 5.C.5 on page 13, the document indicates that no fewer than "four" wells will be monitored. Also, section 5.C.5 indicates that the wells will be monitored four times a year, the text in section 5.B should indicate this fact.

7. Section 5.B.Physical, p. 8, 1st Paragraph: Do the applicants plan to monitor the distribution of Atlantic sturgeon as well? The Atlantic sturgeon has been confirmed in the Savannah River and has been proposed to be listed as endangered in the South Atlantic DPS which contains the project area.

8. Section 5.C.Biological, p. 13, 1st Paragraph: Do the applicants plan to monitor the distribution of Atlantic sturgeon as well? The Atlantic sturgeon has been confirmed in

the Savannah River and has been proposed to be listed as endangered in the South Atlantic DPS which contains the project area.

9. Section 5.C.Biological.2, p. 13, 1st Paragraph: The monitoring should also include drift larval surveys for larva entering the project area. With the proposed salinity increases, the larva entering the project area from upstream may not survive, and their loss should be considered an impact.

10. Section 5.C.Biological.2, p. 13, 1st Paragraph: Please indicate the amount implied when it is determine that sturgeon "intensively" use an area. If the substrate is not "intensively" used is it not recorded? The substrate type should be recorded for each observation.

11. Section 5.C.Biological.3, p. 14, 1st Paragraph: The document indicates that up to 25 shortnose sturgeon would be collected and implanted with transmitters. Is there a minimum number proposed? There should be imposed minimum used to provide validity to the data.

12. Section 5.C.Biological.3, p. 14, 2nd Paragraph: Substrate type should also be recorded for each observation.

13. Section 5.D.Reporting, p. 14, 1st Paragraph: The text should be revised to replace the word "which" for the word "where" and the word "become" for the word "becomes."

14. Section 6.C.Details of the Monitoring, p. 17, 1st Paragraph: The document indicates that "not all monitoring that was included in the Pre-Construction monitoring will be duplicated each year during the construction period." Please indicate which monitoring will not be included during the construction phase.

15. Section 6.C.Details of the Monitoring, p. 18, 2nd Paragraph: Please explain what constitutes a "large/unforeseen increase."

16. Section 6.D.Reporting, p. 19, 2nd Paragraph: If the monitoring indicates that unforeseen or unpermitted exceedences are occurring, this data should be made available for review by all applicable State and Federal agencies when the exceedences are observed and should not be held until the annual or final reports.

17. Section 7.A.Goals, p. 20, 5th and 6th Paragraphs: Does the monitoring at the nearshore sediment placement sites include monitoring of benthic repopulation for two or three years?

18. Section 7.D.Reporting, p. 25, 1st Paragraph: If the monitoring indicates that unforeseen or unpermitted exceedences are occurring, this data should be made available for review by all applicable State and Federal agencies when the exceedences are observed and should not be held until the annual or final reports.

reviewer was not able to calculate and confirm the accuracy of the emissions reported in many of the emission summary tables using the information provided in the descriptions preceding the emission summary tables. To facilitate a review of the emission estimates, an example calculation should be provided for each primary emission summary table. Additionally, the emission estimates are presented using various terminology to represent vessel trips (e.g., tons per transit, tons per vessel, and ton/call). The use of consistent terminology is recommended.

The following comments are based on review the Air Quality Section in the DEIS.

Page 5-105, Section 5.6 – the word "volume" is used in the third sentence and in the second to last sentence of the first paragraph. Because mass emission rates are being referred to in these instances, "amount" or "quantity" should be used in lieu of "volume".

Page 5-107, second sentence of the first paragraph - replace the word "volume" with "amount".

Page 5-108, second paragraph – Table 6-4 in Appendix K is referenced comparing port emissions to total emission in Chatham County. The percentages indicated in the second sentence of this paragraph do not match those presented in Table 6-4. The percentage values presented in Table 6-4 and the percentages indicated in this paragraph should be re-calculated or checked to confirm their accuracy.

Page 5-109, end of Air Quality section – a discussion is presented to explain why a conformity determination is not required for the project. Simply, a conformity determination is not required because the project location is in an attainment area (and the area is also not a designated maintenance area). This is well covered in the discussion under item a. It is suggested that item b. be deleted since it is not needed to support the conclusion that a conformity determination is not required. Further, a summary of project emissions is not provided in item b. for comparison with prescribed de minimus levels to confirm that the project emissions are below the de minimus levels. The following comment is made on the Draft GRR:

Page 142, Section 8.2.3 - in recognition that federal projects of this magnitude are typically subject to conformity determinations under the General Conformity or Transportation Conformity regulations, include an introductory statement to indicate that the project is exempt from conformity determination requirements because the project site is located in an area that is designated as an Attainment Area with respect to the National Ambient Air Quality Standards and the project area is not a maintenance area.

6.4. Tidal Intrusion

Issues regarding water quality impacts from tidal intrusion are addressed in section 5.3, Water Quality. Ecological impacts from tidal intrusion are addressed primarily in the Wetland Impacts Section.

6.5. Dredging and Deepening

5.7.1.1.C. Dredge Plume – Pg 5-112, 2nd para – "Another source of turbidity and sedimentation from hopper dredges is through the deposition of their sediment loads at the placement site". Please discuss the potential impact of this type of turbidity.

5.7.1.1.C. Dredge Plume – Pg 5-112, 5th para – "Dredge-induced water quality conditions will only be short-term and impact a small cross-sectional area of the Savannah River". Please quantify "short-term" and estimate the cross-sectional area to be impacted.

5.7.1.1.C. Dredge Plume – Pg 5-113, 3rd para – "All three shellfish harvesting areas are located a sufficient distance from the dredging in the Savannah River channel that sedimentation and high turbidity would not adversely impact these resources". Please state the distance from the dredging activity to the shellfish areas. Section 5.8.4.3 Confined Disposal Facilities (CDFs),

Page 5-118 – This section discusses the minimal impacts predicted on various resources that utilize the CDFs; however, there is no reference to the work that was done regarding identifying cadmium as a contaminant of potential concern (COPC), primarily presented in the DEIS Appendix M-Final Sediment Quality Evaluation.

Section 5.13 - Beneficial use of Dredged Sediment, Page 5- 142- "Impacts to fish (including larvae and eggs), shellfish and benthic communities within the near shore sediment placement areas are discussed in 5.7- Marine and Estuarine Resources. No long term adverse impacts are anticipated to any fishery resources or benthic communities from the near shore beneficial sediment placement." Section 5.7 does not provide adequate information to support this statement.

6.6. Sediment Quality

4.01.2.1 Sediment Quality (potential contaminant impacts) – Pg 4-9, 2nd paragraph – "The evaluation found that most of the sediments did not provide an concern for potential contaminant-related impacts associated with the proposed dredging and dredged sediment placement". What screening criteria were used to reach that conclusion?

4.01.2.1 Sediment Quality (potential contaminant impacts) – Pg 4-9, 3rd paragraph – "Polycyclic aromatic hydrocarbons (PAHs) and cadmium were detected in a sample

taken at about Station – 75+000B near the old RACON tower where a spill of fuel, batteries and paint lacquer occurred in November 1996. Subsequent sampling conducted in 2005 revealed that sediments at that location do not pose a potential for contaminant-related environmental impacts". What screening criteria were used to reach that conclusion?

5.4.2.3 Expected Results of Monitoring Cadmium-Laden Sediments – Pg 5-102, 2nd paragraph – "In light of the information summarized above, the dredging and the placement of cadmium-laden sediment in CDF 14A, CDF 14B and covering these sediments with 2 feet of clean sediment is not anticipated to result in adverse impacts to the aquatic environment or biota found in the CDFs". A discussion of the potential impacts on the river's biota from the dispersion of cadmium-laden sediments during dredging is needed.

6.7. Navigation

The Savannah Harbor Expansion Project, if completed as currently described at either 47 or 48 ft of depth, does not likely provide sufficient harbor depth and width necessary to make the Jasper Ocean Terminal a viable project. We now know that over 80 percent of container ship capacity on order is post-panamax in size and will require harbors with 50 feet mean low water and unrestricted two-way ship traffic capability, such as offered by New York, Baltimore, and Norfolk today, to reliably make Panama Canal appointments. Thus, it is likely that investment in the Jasper Ocean Terminal would require a further harbor deepening project to be cost-justified.

If the Savannah Harbor Expansion Project is approved, the cost of dredging the 48 ft channel to the Garden City Terminal and the resultant environmental damage would make it extremely difficult if not impossible to get the additional dredging to 50 ft needed to make Jasper Ocean Terminal viable.

DEIS Section 5.17 Aesthetics and Recreational, on page 5-143 fails to evaluate how increase ship traffic or speeds may affect recreational boaters and kayakers along the entire length of the project.

The following comments pertain to the documents contained in the GRR Attachment 3, Engineering Investigations Supplemental Materials. The documents are:

- 1.1.11 Savannah Harbor Entrance Channel Simulations 2010 Report; dated 9 March 2010
- 1.1.12 Savannah Harbor Simulations Study 2009; 31 March 2009
- 1.1.13 Navigation Study for Savannah Harbor Channel Improvements; September, 2004

- 1.1.14 Impacts of the Savannah Harbor Expansion Projects; October 2006
- 1.1.16 Vertical Ship Motion Study for Savannah, GA, entrance channel; May 2010
- 1.1.17 Ship Forces on the Shoreline of the Savannah Harbor Project; August 2006
- 1.1.24 Savannah Harbor Expansion Bank Erosion Study; November 2006
- 1.1.25 Savannah Harbor Expansion Bank Erosion Study Update; June 2010
- 1.1.34 Sensitivity Analysis of Proposed Navigation Meeting Areas; September 2009
- 1.1.39 Dredged Material Management Plan; June 2010
- 1.1.43 Correspondence Regarding Pipeline Crossings; May 2008

These reports and studies verify previous shortcomings regarding navigation and operational capability of the proposed project.

SHIP DRAFT CAPABILITY: The inshore project depth will not support post-panamax traffic except on high tide. The ship draft this project will accommodate will roughly equate to what Charleston can do now. Based on Army Corps channel design standards, which recommend channel depths of 110 percent of ship draft in protected waters, this project will support a 24 hour maximum draft of approximately 42 ½ feet, and 47 feet on high tide, in the inshore channels.

SHIP SPEED LIMITATIONS: The narrow offshore channels are proven to be untenable for ships at 46 ft draft and greater. The maximum draft these channels can accommodate may be much less, but simulations were only done for 46 ft and 47.5 ft drafts. Additional simulations should be done to determine a viable draft. The findings were that ships at the drafts simulated must maintain speeds not greater than 6 knots. These speeds also require a range of tide that is exaggerated. The study assumed tide range offshore is the same as tide range in the mouth of the river. This is false. Offshore tide lift in this area is roughly 2/3 of the tide lift at Fort Pulaski.

No simulations were done to verify that ships could maintain sufficient directional control at such slow speeds to safely negotiate the unusually narrow offshore channel design incorporated this project. Narrow offshore channels often require 14 to 18 knots to maintain safe directional control depending on weather and currents. The draft capability of the offshore channels must incorporate a coordinated study to determine vertical ship motions at sufficient navigational speed. Until this study is done, the viability of the offshore channel is indeterminate, except that this report proves it will not support drafts of 46 feet or deeper.

SHIP TRAFFIC: This project will not support two – way traffic of post-panamax traffic. No simulations were done with two full beam post-panamax ships, so passing has not

been verified anywhere in the project. Simulations with smaller ships only identified one passing lane as viable, at Long Island Range. This lane is roughly in the middle of the project, meaning that one inbound may pass one outbound, provided timing two ships 32 miles apart at the start of their planned passing rendezvous can be precisely executed for an exact meeting in a location not longer than 6 1/2 ship lengths. This one marginally adequate passing lane is only viable if lengthened to 8000 feet, according to pilot feedback, requiring additional study.

ECONOMIC BENEFIT LIMITATIONS: Economic benefit must account for accurate capabilities. Ships must be lightly loaded to 42 to 47 feet draft, and traffic density is limited to one-way traffic. Full economic benefit as estimated of Post-Panamax shipping is unattainable in this project. The economic limitations of predominantly one-way traffic and light loading would be significant.

JASPER TERMINAL BENEFIT: This project preempts availability of a South Carolina terminal on the Savannah River, because this project occupies the dredge disposal areas in way of the notionally proposed Jasper Terminal through 2060. No extra dredge material capacity is apparent in the operations and maintenance plan to free up these sites.

This project also will not support navigability parameters to support a viable Jasper Terminal. The Jasper Terminal would only be viable if it can support fully loaded post-panamax ships largely unrestricted. The draft limitations of this project would only allow post-panamax ships that are substantially less than fully loaded. One –way traffic competing with the other terminals in the river would limit ship arrivals such that berth utility at jasper would be severely curtailed. If this project goes forward, and ship traffic density reaches maximum capacity on a one-way channel, there would be no extra capacity to handle increased traffic to a Jasper Terminal, and permitting of a Jasper Terminal would be difficult justify.

Within this plan is a projection of some 19 ship arrivals per day. With many of them dependent on the tide given the limited depth, this may be an unsustainable traffic load. Adding the Jasper Terminal would likely overwhelm the traffic density a one-way channel can support. Proceeding with this project may approach the environmental limits this waterway can sustain, leaving little or no capacity to add width or depth necessary to support a truly post-panamax capable Jasper Terminal.

In order to make a Jasper Terminal viable, a dredging project would have to be designed for full two-way traffic from the terminal to the end of the cannel at sea, with an inshore depth of 50 to 51 feet, and an offshore depth of 55 to 57 feet. This proposed project falls far short of those parameters and provides no utility to South Carolina's terminal expansion plans for the Savannah River.

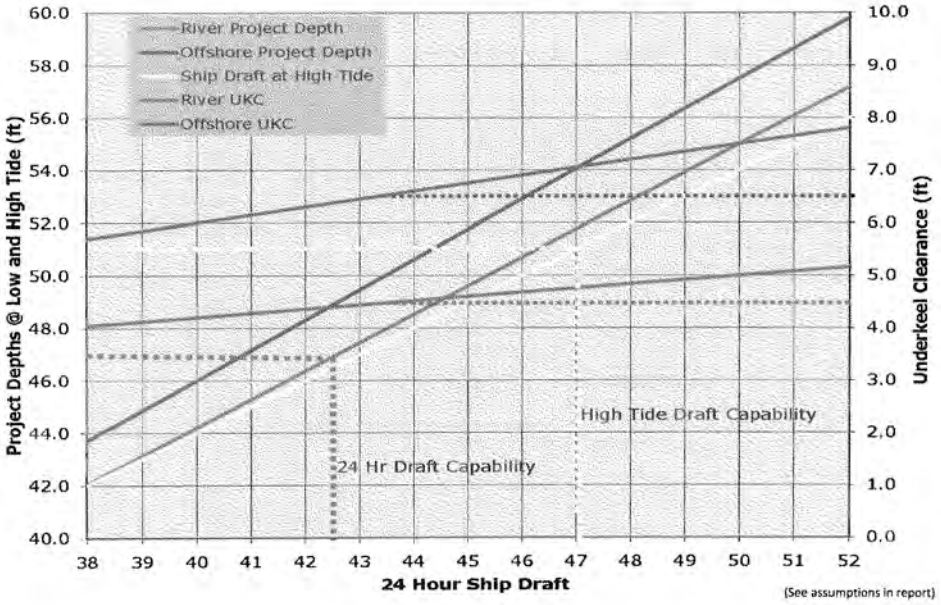
Figure 6-1 estimates draft and under keel clearance capability of various project depths at high and low tide for the Savannah River.

This chart depicts a difference of four feet between ship draft capability on any tide and on high tide based on the following assumptions:

1. Tide range at the seaward end of the project is four feet, at Fort Pulaski is six feet, and at Garden City is eight feet.
2. Tide lag from the sea buoy to Garden City is one hour.
3. Transit time from the sea buoy to Garden City would be three hours, on average.
4. The Army Corps of Engineers channel design standards per their engineering manual on channel design, which requires project depths to be 110 percent of the target ship draft in internal waters and 120 percent in exposed waters, is not being adhered to, as is apparent in the draft GRR and DEIS. Therefore, a lesser standard has been assumed to be 108 percent in internal waters and 115 percent in exposed waters for the purpose of these calculations. It should be noted that International Maritime Organization safe navigation standards for navigation mimic the USACE's standards of 110 percent and 120 percent respectively.
5. The result of the above assumptions is that an inbound ship will only be afforded 2/3 maximum tidal assistance at some point on their inbound voyage due to the duration of the voyage and the tide lag from the sea buoy to the terminal, and 1/3 of maximum tidal assistance on outbound voyages. The location of the ship at high tide, the speed of the ship, the length of a particular voyage within the project channel, and the actual tide range on a given day, determine actual tide assistance. The gross average of all these factors based on the above assumptions is 3 1/3 feet average benefit of high tide. For the purposes of this analysis, this has been rounded up to four feet, and therefore, this should be considered a liberal analysis, vice a conservative analysis. The USACE should report their findings and determinations on all of these factors and based economic projections on actual ship drafts this project can accommodate within Army Corps channel design standards.

FIGURE 6-1:

Savannah Draft vs Project



1.1.11 Savannah Harbor Entrance Channel Simulations 2010 Report; dated 9 March 2010

Pg.3, para 5: The ships modeled to investigate passing are a Panamax ship with a beam of 106 ft that no longer exists (this particular ship has been scrapped), and a less than post-panamax ship of only 140 ft beam (post-panamax beam is 160 ft). There is no testing done of two full post-panamax ships passing, so the channel has not been evaluated for post-panamax capacity. In some cases, they have considered a successful run where there was only 25 feet of clearance, indicating a true post-panamax ship would not have been successful.

Pg 3, para 7 & 8, Pg 4 Para 14.b & 15, Encl pg. 1 & 4: The inbound runs were reliable only when ranges were used, meaning the channel is only viable in clear visibility. Fog is prevalent in Savannah, as noted in the NOAA Coast Pilot, so dependence on ranges curtails the economic viability of the channel only to the extent of fair weather.

Pg 4, Para 13 & 14.c, Plates 12 & 14: The conclusion in paragraph 14c that two-way runs were successful is contradicted by paragraph 13 and Plates 12 & 14 that shows a ship left the channel in a passing run. It is also contradicted by the runs for one-way traffic that found that ranges were necessary for reliability.

Plate 5: While the ships outbound remained in the channel, the margin of safety was very thin. The report does not state a tolerance for satisfactory.

Encl, pg. 2, para 4 and 7: There are no simulations of steady steaming in the lengthy ranges offshore with limited width, especially considering the slow speeds necessary to limit squat per item 1.1.16, Vertical Motions. These notes indicate crabbing is common in "most transits". The width offshore is only 560ft. A post-panamax ship of 1050 ft length and 160 ft beam with 10 degrees crab takes up 330 ft of width, effectively doubling the beam. That leaves only 115 ft on each side. No runs evaluated the reliability of this channel in the long straight reaches, despite notes verifying crabbing is common. The narrow width of this lengthy offshore channel needs to be validated.

Summary: The offshore channel has not been validated as a safe channel for even one-way traffic of a full size post-panamax ship. Two way traffic has not been proven reliable in any segment of the channel, even with ships smaller than full post-panamax. The turn cannot be navigated safely inbound in limited visibility. The economic analysis needs to account for one-way traffic, high probability of ships leaving the channel, and closing the offshore channel in low visibility.

The channel needs to be simulated throughout the entire length with full size post-panamax ships both one way and passing.

1.1.12 Savannah Harbor Simulations Study 2009; 31 March 2009

Pg 2, para 5, Recommendations: The recommendation for an 8000 ft passing lane in Long Island Channel has not been studied. It is recommended by hypothesis based on the failure of the 7000 ft passing lane.

The Susan Maersk is only 140 ft beam. The project has not yet been studied for full post-panamax traffic. The population of ships greater than 140 ft beam is significant. Already, there are 347 container ships with a beam of greater than 140 ft in the world fleet. This represents 23 percent of the current post-panamax fleet. This population is certain to grow, and this project is not post-panamax capable without verifying the capability to handle full post Panama beam.

Enclosures: Almost every pilot recommended the entire Long Island Range be widened, vice just a segment of the Range, to allow for passing, citing that a minimal passing lane requires precise timing for each vessel to arrive in the lane, which is not realistic.

Plates 18 - 21 and Enclosures: Many pilots refuted the finding that passing in Oglethorpe Range is safe. The simulation runs do not show any appreciable margin of safety, even if the ships technically did not leave the channel. This reduces the passing opportunities to just the Long Island Range.

1.1.13 Navigation Study for Savannah Harbor Channel Improvements; September, 2004

This report is largely superseded by items 1.1.11 and 1.1.12. Shortcomings identified with the project in this report are reiterated and intensified in the two more recent reports noted above.

Pg 34, Plate 21: This study shows the Susan Maersk grounds in 6 ft seas in even a 52 ft deep offshore channel, verifying that the channel is not suitable for post-panamax drafts. At most, this simulation shows the channel is suitable for 44.5 foot drafts in 6 ft seas. At 44.5' (which would create only 2 feet of under keel clearance), the Susan Maersk is limited to some 600 fewer TEU's than fully loaded.

Pg 18 & Plates 3, 5, 7 & 11, 15, 17, 19, 23, 25, 27: Jones Island Range failed simulation runs.

Pg 25: Flats area failed simulation runs.

Pg 31: Jones Island Range failed even with a lightly loaded Susan Maersk.

Pg 32: Flats area failed even with a lightly loaded Susan Maersk.

Pg 36: Recommendations ignored that the Susan Maersk grounded in a 52 ft channel in 6 ft seas. The recommendation that the channel as proposed is satisfactory is unfounded.

Army Corps standards are that the offshore channel will provide for 120 percent depth compared to the target ship draft. On this measure, a 49 ft deep offshore channel will accommodate drafts up to 41 feet on low tide. Economic analyses must consider this limitation. The capacity of a typical 7000 TEU ship is some 200 TEU per foot of draft, so the capacity of a 7000 TEU ship limited to 6.5 less than full load draft foregoes 1300 TEU, or 19 percent of its cargo capacity.

1.1.16 Vertical Ship Motion Study for Savannah, GA, entrance channel; May 2010

This is a draft report. The project should be based on completed reports.

Pg 65: The simulated ship squats and grounds at speeds as low as 10 knots in channels deeper than the proposed. 10 knots has been found to be too slow to maintain control of a ship in a narrow channel subjected to ocean currents and waves. Maintaining control of the ship at 10 knots in a 550 ft wide channel needs to be studied carefully. 14 knots is widely considered the lowest safe speed to maintain control in confined offshore channels.

Pg 73: This shows that the channel only has viability for a fully loaded ship in a 49 ft channel 70 days a year at ten knots, an unsafe speed. A safer speed of 14 knots has zero days of viability.

This report verifies that the offshore channel cannot support 46 ft draft or 47.5 ft draft.

This report does not address channel depths as shallow as 49 feet, which is proposed. It does not evaluate the ability to maintain control of the vessels at slow speeds. It does not derive a maximum safe draft that is reliable most of the year (350 days plus).

This report does verify that this project is not suitable for post-panamax traffic.

A full-length simulation run needs to be conducted of a 160 ft wide ship at 47.5 feet draft at 6 knots as suggested here, or higher sped without inducing excessive squat, throughout the narrow 550 ft wide offshore channels. Controllability and under keel clearance must both be verified. A maximum safe draft for this channel should be derived and used as a basis for economic evaluations.

1.1.39 Dredged Material Management Plan; June 2010

Paragraph 1.1: The projection for how much maintenance material needs to be handled each year is not substantiated. Past actual volumes dredged are reported to be less than

the optimal volumes to keep pace with shoaling, but the amount reported for optimal maintenance, 6.225 million cubic yards (CY) is not substantiated.

The November 2010 ACOE Savannah District channel surveys show that all three offshore ranges have shallow quarters, as much as 1 ½ feet shy of project depth. Seven of thirteen river ranges have shallow quarters, as much as 4 feet shy of project. Over half of the Kings Island turning basin is 8 to 18 feet shy of project depth. This indicates that a significant amount of maintenance dredging is being deferred. It is entirely possible that some of this shoaling has reached equilibrium depth, having been deferred for so long, and, therefore, the current state does not indicate a linear progression of annual shoaling rates. It is safe to assume that with an improved channel, deferring maintenance as has been done in the past will no longer be tolerable, and therefore, annual maintenance dredged material will certainly increase. Due to the pattern of deferred maintenance and current shoaling, historical maintenance dredging data bears no credible indication of future annual demand, other than to indicate that proper maintenance dredging will greatly exceed historical dredging projects which have failed to keep pace with shoaling.

Table 3; Predicted O&M Volumes: This table projects maintenance dredging through 2060. It shows dependence on sites 13B, 14A, and 14B, which extend throughout the area notionally considered for an eventual Jasper County, SC marine terminal. The existing channel, unimproved, would likewise depend on the entire Jasper terminal site for annual maintenance perpetually. The Jasper terminal site is occupied by maintenance disposal demand indefinitely. With the increased maintenance load of a deeper channel, projected over an indefinite period, South Carolina's opportunities to develop a terminal on the Savannah River are even more obstructed.

Extended Notes Regarding Navigability:

The comparison to Charleston fails to take into account the salinity difference between the ports. Post –Panamax ships would sink approximately one foot as they enter the brackish water of the Savannah River. This phenomenon does not exist in Charleston where draft changes due to salinity are negligible. The other factor that differs is that the transit time is so long in Savannah that high tide only offers assistance for a portion of the transit. Even with the time lag between high tide at the sea buoy and high tide well into the port, and the higher amplitude of the tide inside the port, the ship will not be able to keep up with high tide throughout, and will be at half tide or worse at some point in the transit. Therefore, the tide only allows for an additional 4 1/2 feet of draft in optimal conditions. These factors contribute to the estimated potential of this channel project allowing only for the existing draft capability of the channel in Charleston, even though this project is two feet deeper.

The traffic density this project can support is severely constrained by the predominantly one-way capability. This limitation was documented in the Army Corps' letter to the

Savannah Pilots on March 28, 2002: "The channel was not designed for full two-way traffic for the design ship at all times." Given that the width is static, and is not afforded any benefit of tidal assistance, if the channel is only wide enough for one-way traffic some of the time, it is only wide enough for one-way traffic all the time for the design ship. It has also been noted, the design ship is not a full size post Panamx ship. The nearby Port of Charleston is currently wide enough for full post-panamax traffic all the time.

Therefore, the combined utility of this project would bring the ship handling capability of the Port of Savannah to roughly a one-way equivalent of the existing Port of Charleston. Economic and alternative studies should reflect this.

6.8. Environmental Justice

As noted in Section 5.20, Protection of Children and Environmental Justice, Federal agencies are required by Executive Order 12898 to identify and address "disproportionately high and adverse human health and environmental effects . . . on minority populations and low-income populations in the United States." Section 5.20, on Page 5-145, Paragraph 4 references figures that ". . . show the location of various poverty levels" in an area of Jasper County ". . . where the Garden City Terminal is located and most of the effects of the existing container terminal are experienced." The text further states ". . . that the closest area with the highest poverty level (40-100 percent) is located roughly a mile from the terminal", and this ". . . same area as being the closest one with the highest category of minorities (40-100 percent)." It is not clear in the text why this area is the focus of the analysis, rather than the area that may be potentially affected by the proposed action and alternatives. If the area identified on Figures 5-54 and 5-55 encompasses the region of influence, or area potentially affected by the proposed action and alternatives, it should be clearly stated as such in the text. If it does not, then the analysis needs to encompass that affected area, which needs to be defined based on the geographic extent of air quality and other impacts associated with the proposed action and alternatives that could potentially have adverse human health and environmental effects on minority populations and low-income populations.

Additionally, Section 5.20 does not define what low-income population was assessed as part of the environmental justice analysis. It would appear from the text to be the segment of the population with the highest category of people at or below the poverty level (40 – 100 percent), but that is not clear from the text. It is also not clear if the low-income population included in the environmental justice analysis comprised all people at or below the poverty level. The analysis should identify and assess disproportionately high and adverse effects on minority and low-income populations. Based on the mapping on Figures 5-54 and 5-55, it appears that minority and low-income populations may be closer to the project than one mile. What is not clear from the evaluation and needs to be included is an assessment (more than merely a statement) of whether or not minority and

low-income populations (not the highest category of minority and low-income populations) are disproportionately affected by any adverse human health and environmental effects of the proposed action and alternatives.

Section 5.20 also states that Executive Order 13045 requires that Federal agencies "identify and assess environmental health risks and safety risks that may disproportionately affect children;" and are required to "ensure that its . . . activities . . . address disproportionate risks to children that result from environmental health risks or safety risks." Figure 5-56 of the EIS shows the locations of schools, hospitals and child care facilities in the project area. It is presumed that the identification of these facilities is intended to represent locations where children would be exposed to environmental health risks or safety risks from the proposed action and alternatives. This is not clearly stated, however, but needs to be if that is the intent. There may be other locations in the affected area where children could be present and at risk, and they would include outdoor recreational areas (e.g., ball fields, playgrounds) and residential areas (for pre-school children not in child care facilities or all children present in residential areas if project activities would occur after school hours, for example, or during the weekend). If these areas exist in the area potentially affected by project activities, then they need to be included in the analysis.

Moreover, with regard to the evaluation under E.O. 13045, Section 5.20, Paragraph 1 on Page 148 states that ". . . schools, hospitals and child care facilities . . . are dispersed throughout the community and are not located disproportionately near the navigation channel." The disproportionate or non-disproportionate location of facilities, however, is not what needs to be evaluated. The analysis needs to identify and assess the effects of the proposed action on children and whether or not children may suffer disproportionately from environmental health risks and safety risks when compared to the adult portion of the population.

Section 5.20 concludes on Page 5-149, Paragraph 1 that "[t]he dredging activities, including deposition of the dredged sediment, will not have significant impacts on any populations, including minority populations and low-income populations." The basis for this conclusion is unclear from the text in Section 5.20 prior to this statement. The document needs to indicate the basis for this conclusion, i.e., whether it is from the results of air quality and other impact analyses of the proposed action and alternatives. If from air quality analyses, the document needs to explain how this conclusion was derived, as Section 5.6, Air Quality, indicates that the assessment of impacts on air quality ". . . did not include a detailed dispersion modeling assessment of air emissions of the alternatives", nor did it include " . . . a risk-based assessment of the health effects associated with the proposed project".

6.9. Cultural and Historic Resources

A South Carolina Department of Archives and History comment letter is provided in Appendix F of this comment document.

7. Comments on Proposed Mitigation

7.1. Wetlands

5.1.2.2 Impacts Without Mitigation – Pg 5-12, 2nd para – "Tidal freshwater marshes located outside the SNWR are subject to development threats and could be filled if the owner obtained a Department of the Army Permit". Please explain in detail the belief that those wetlands are threatened by development.

6.11 Executive Order 11990 (Protection of Wetlands) – Pg 6-3, 6th para – "A small amount of saltmarsh and brackish marsh (14.08 acres) would be lost through excavation of the turning basin and two wideners". The Corps estimates that approximately 1200 acres of tidal freshwater wetlands could be converted to another wetland type without mitigation, and over 300 acres of tidal freshwater wetlands will be impacted after mitigation. The Corps proposes as mitigation the preservation of existing tidal freshwater wetlands that are not under imminent threat of loss. How is that in compliance with Executive Order 11990, and how is that consistent with "no net loss"?

7.2. Water Quality

5.2.2 Mitigation for Impacts to Dissolved Oxygen – Pg 5-48, 2nd para – "Identified the use of Speece cones as the specific technique to inject oxygen into the water, although another land-based technique might be found later that could be more cost-effective." Where has this technology been employed to the degree needed for the SHEP and what was the result?

7.3. Fisheries

5.3.2 Mitigation for Impacts to Fisheries - Pg 5-91 – Adding a table to this section that identifies the quantity of fish habitat lost (by species) versus the quantity of habitat expected to be gained (by species) through mitigation would be helpful to understanding the magnitude of the potential impact.

6.04 Magnuson-Stevens Fishery Conservation and Management Act – Pg 6-2, 2nd para – "Conversion of freshwater marshes to brackish would require mitigation for all channel depths except the 44-foot project. Mitigation would be accomplished through the flow rerouting and preservation of wetlands in the Savannah River estuary". There appears to be no analysis of impacts to the plant and animal communities that reside in and adjacent to the streams that will have freshwater diverted from them, and no analysis of mitigation if impacts are likely to occur. Mitigation in the form of existing wetlands preservation

does not comply with "no net loss of function and value", a basic principal of the Corps' Section 404 regulatory program.

7.4. Other

5.22 Mitigation – Pg 5-157, 3rd para – "The project includes design features to avoid environmental impacts as well as features that reduce the amount of impacts that otherwise occur". The design features and features that reduce impacts should be identified in the text, or provide a reference to another section of the DEIS where those features are discussed in detail.

ATTACHMENT 1
COMMENTS ON DEIS APPENDICES

Comments on DEIS Appendix B –
Biological Assessments for Threatened and Endangered Species

Appendix B Comments

Biological Assessment of Threatened and Endangered Species for the
Proposed Savannah Harbor Expansion Project
Under the Endangered Species Act of 1973, As Amended
Draft Tier II Environmental Impact Statement for Savannah Harbor Expansion

1. Section 5.04.2.A. Line 5. How and to what degree will lighting affect sea turtles? Will it increase the likelihood of a take?

2. Section 5.04.2.D. Has the use of a bed leveler been cleared by NOAA? Endangered species surveys should be conducted prior to use. How will the project determine if use of a hopper dredge would result in equal or greater take of endangered species?

3. Section 5.04.2.E. The narrative states that noise above 150 dB is the level of a take. However, noise levels above 150 dB and below 180 dB are proposed to be allowed under monitoring even though they are above the level of a take. This is counterintuitive and against a tenant of the ESA, which is to prevent a take of an endangered species.

4. Section 6.00.f. Authorization of the sites through LTMS in 1996 does not preclude the need for study and assessment in this EIS. Since 1996, additional species have been listed as threatened or endangered. In addition, these areas may currently be used by protected species. If, in fact, the allowable timeframe in the LTMS was indeterminate, the LTMS process is flawed.

5. Page 46, 4th paragraph states "The proposed action *does not plan* to place any excavated sediment…on any upland beaches…" (*emphasis* added) The project should specify whether it will or will not. The words 'does not plan' suggest that it may occur at a later date if the plans change. This impact is not assessed in the EIS and should therefore be changed to either state that it will not occur or that it may occur and address the environmental impacts of the action.

6. Page 46, 2nd to last paragraph, line 2. ERDC Mearshore should be corrected to read ERDC Nearshore.

7. Section 7.01, 4th Paragraph. The text discusses how the increase in salinity and decreased DO will remain downstream of the I-95 bridge. How does this compare to existing levels? It is difficult to assess impact when the document does not state how this is a change from existing conditions.

8. Section 7.02.2 (c). The assessment does not account for the loss of salt marsh due to increased wave action from the larger ships that will be using the channel.

9. Section 7.02.5 (c & d). The last paragraph of section c and the first paragraph of section d are contradictory. Section c states that "[i]ncreases in ship traffic are expected to occur in the future…" Section d then states "the number of vessels…is expected to decrease…" Which is it? The data to back up this information should also be cited in order to substantiate the claim.

10. Section 7.02.7 (c). The document states that sediment deposition would be conducted in a manner to not interfere with nesting terns. There is no detail provided to substantiate this claim. Has a monitoring plan been developed in order to determine the location of nests prior to deposition of sediments? Will deposition occur near nesting terns? If so, how close? If CDF's are being used for breeding, feeding, and loafing for any listed species, the relevant laws related to protection of sensitive species would apply and mitigation should be required if the disturbance of the sensitive species habitats are not authorized by the specific law that protects the sensitive species.

11. Section 7.02.9 (d). Has a monitoring plan been developed? What monitoring protocol will be used and how will it be used in order to ensure adequate habitat is available during the project for nesting? If the entire area is disturbed in a short period of time, it is highly unlikely that any habitat will be available for nesting during the project.

12. Section 7.02.10 (c). Lines 6 and 7. There is nothing in the document to substantiate this claim. A reference should be cited.

13. Section 7.02.11 (c). Have any nest surveys been completed near the impact areas? Surveys should be completed prior to determination of no impact.

14. Section 7.02.14 (c). The document does not consider or mention the impacts from saltwater intrusion into freshwater, thereby reducing available habitat. The reduction in available freshwater habitats is an impact that must be considered.

15. Section 7.02.15 (c). The document states that sediment deposition would be conducted in a manner to not interfere with nesting yellow crowned night herons. There is no detail provided to substantiate this claim. Has a monitoring plan been developed in order to determine the location of nests prior to deposition of sediments? Will deposition occur near nesting areas? If so, how close?

16. Section 7.02.17 (b). The document states that no gopher frogs have been observed at the CDFs, but does not provide any reference to a study that has looked for the frogs. Information should be provided as to which studies would have been expected to document gopher frogs had they been present. Non-presence cannot be determined by a lack of study.

17. Section 7.02.20 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

18. Section 7.02.21 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

19. Section 7.02.22 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

20. Section 7.03.Savannah River. The document states that the overall effect on the river and its fisheries are not expected to be significant. The impact on fisheries was not adequately addressed considering the fact that over 400 acres of habitat is expected to be lost to the shortnose sturgeon alone. In addition, the lost habitat may have been underrepresented by the modeling. For example, a baseline level of 4.5 mg/l of dissolved oxygen was used to determine if habitat was available for shortnose sturgeon. This is a minimum level at which the agencies determined shortnose sturgeon can survive, but does not necessarily indicate the dissolved oxygen level that is necessary for foraging, resting, and moving. For example, the Collins et al. (2001) study of shortnose sturgeon habitat use cited in Section 8.02.7 of this appendix, reported minimum mean dissolved oxygen levels of 6.36 and 6.45 in areas where adults and juveniles were found, respectively.

    The habitat use information, in conjunction with agency comments reported on page 128 #4, 2nd paragraph in Appendix N, again suggests the habitat modeling overrepresented the available habitat for sturgeon by denoting it all as equally beneficial at the 4.5 mg/l dissolved oxygen threshold and thus failed to quantify the intensity of the impact to the fisheries. In the Appendix N documentation, Prescott Brownell, from NMFS requested that a range of suitable habitat thresholds be used for modeling habitat availability. The agency panel then redacted his comments from the record without providing an adequate basis for the redaction. The panel decided the current methods were "acceptable for now." This comment would suggest that additional work would be necessary in the future in order to adequately asses the impacts. The narrative does not provide adequate discussion as to why the pass/fail approach was more adequate than the range approach suggested by Mr. Brownell.

    Additional questions as to the validity of the fisheries assessment are based on the habitat models and their interpretation for impact determination. On page 132 of Appendix N, the memorandum for the record states that other fish were not

modeled for habitat suitability because the Corps did not wish to spend the time modifying existing models and they would instead use other species as surrogates. Avoidance of spending time developing models is a suspect reason for not pursuing the assessment of some species. This is especially true when no documentation, reference, or justification was given as to the acceptability of using modeled species as surrogates for those species that were not modeled. Furthermore, the completed models were not used to extrapolate the potential impacts to species that were not modeled when determining potential impacts.

21. Section 7.04. The note on Rafinesque's big-eared bat states that some bottomland hardwood tress could be affected by salinity. Other sections of the document state that upland areas will not be affected by the project; however, this area highlights that effects may occur in upland areas. The potential effects should be investigated in greater detail in order to provide quantifiable impacts for the assessment of loss of habitat for this species.

22. Section 7.04.2 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

23. Section 7.04.5 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

24. Section 7.04.7 (c). 2nd paragraph. The narrative states that ship encounters with pygmy sperm whale are extremely rare, but do not provide a reference or other information to substantiate this claim. The data to back up this information should also be cited in order to substantiate the claim. The last paragraph of section c and the first paragraph of section d are contradictory. Section c states that "[i]ncreases in ship traffic are expected to occur in the future…" Section d then states "the number of vessels…is expected to decrease…" Which is it? The data to back up this information should also be cited in order to substantiate the claim.

25. Section 7.04.8 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

    The narrative also provides 2 c sections and 2 d sections that have different impact and effect determinations. Which apply here?

26. Section 7.04.9 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

27. Section 7.04.11 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

28. Section 7.04.15 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

29. Section 7.04.16 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

30. Section 7.04.21 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

31. Section 7.04.22 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

32. Section 7.04.23 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

33. Section 7.04.24 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

34. Section 7.04.25 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

35. Section 7.05.Savannah River. The document states that the overall effect on the river and its fisheries are not expected to be significant. The impact on fisheries was not adequately addressed considering the fact that over 400 acres of habitat is expected to be lost to the shortnose sturgeon alone. In addition, the lost habitat may have been underrepresented by the modeling. For example, baseline levels of 3.5 to 4.0 mg/l of dissolved oxygen was used to determine if habitat was available for adult shortnose sturgeon. This is a minimum level at which the agencies determined shortnose sturgeon can survive, but does not necessarily indicate the dissolved oxygen level that is necessary for foraging, resting, and moving. For example, the Collins et al. (2001) study of shortnose sturgeon habitat use cited in Section 8.02.7 of this appendix, reported minimum mean dissolved oxygen levels of 6.36 and 6.45 in areas where adults and juveniles were found, respectively.

    The habitat use information, in conjunction with agency comments reported on page 128 #4, 2nd paragraph in Appendix N, again suggests the habitat modeling overrepresented the available habitat for sturgeon by denoting it all as equally beneficial at the 4.0 mg/l dissolved oxygen threshold and thus failed to quantify the intensity of the impact to the fisheries. In the Appendix N documentation, Prescott Brownell, from NMFS requested that a range of suitable habitat thresholds be used for modeling habitat availability. The agency panel then redacted his comments from the record without providing an adequate basis for the redaction. The panel decided the current methods were "acceptable for now." This comment would suggest that additional work would be necessary in the future in order to adequately asses the impacts. The narrative does not provide adequate discussion as to why the pass/fail approach was more adequate than the range approach suggested by Mr. Brownell.

    Additional questions as to the validity of the fisheries assessment are based on the habitat models and their interpretation for impact determination. On page 132 of Appendix N, the memorandum for the record states that other fish were not modeled for habitat suitability because the Corps did not wish to spend the time modifying existing models and they would instead use other species as surrogates. Avoidance of spending time developing models is a suspect reason for not pursuing the assessment of some species. This is especially true when no documentation, reference, or justification was given as to the acceptability of using modeled species as surrogates for those species that were not modeled. Furthermore, the completed models were not used to extrapolate the potential impacts to species that were not modeled when determining potential impacts.

36. Section 8.02.1, The section header misspelled Bachman's warbler. Backman's should read Bachman's.

37. Section 8.02.1 (c). This sections states that no upland habitats will be adversely affected by the proposed action. This is contradictory to information provided in a note in section

38. Section 7.04. The note on Rafinesque's big-eared bat states that some bottomland hardwood tress could be affected by salinity. Will upland habitats be affected or not?

39. Section 8.02.2 (b). What does the term 'the areas' refer to in lines 7,8, and 9. It is unclear from the text and therefore impossible to determine what the impacts would be.

40. Section 8.02.2 (c). The document does not adequately address the impacts of the project on the wood stork. Impacts to the CDFs, which are currently being used as feeding areas for an endangered species should be quantified and mitigated. More detail should be provided about these impacts, the recovery period, and the habitats that will result from the project.

41. Section 8.02.3 (c) 1. The narrative is lacking in providing references that substantiate the factual claims in the document. The data to back up this information should be cited in order to substantiate the claims that impacts will be minimal.

    Additional detail should be provided to indicate the degree to which habitat would be affected during the project and the amount of habitat that will remain unimpacted at any one point in time. Phrases such as "[o]nly a small portion of the forging habitat is directly affected at any point in time during sediment placement and adjacent habitat is still available..." does not provide adequate specificity to assess impacts. Additional detail should be provided on benthic recolonization rates to substantiate the as yet unsubstantiated recolonization claims in the document.

42. Section 8.02.3 (d) 1. The word 'we' should be deleted.

43. Section 8.02.4 (d). The document does not consider the effects that the larger ship traffic, that will result because of this project, may have on manatees. In its current form, the impacts section is inadequate to address potential impacts.

44. Page 136. The narrative does not discuss how the increase in boat traffic or deposition of material in the nearshore area of Tybee Island will affect loggerhead sea turtles. Failing to discuss all potential impacts suggests this analysis is inadequate.

45. Page 148. Conservation Measures (a). 2nd Paragraph line 2. The document credits turtle deflecting dragheads with significantly minimizing the risk of sea turtle

take. No references or sources have been cited to substantiate this claim. Since the avoidance of take claims stated later depend upon this assertion, the avoidance claims are not valid unless this claim is substantiated.

46. Page 154. A. 4. Are the dates correct? Will the observer only be onboard in December and March? The first paragraph of Section A states the dredging will occur from December through March. If an observer is only present for 2 of the 4 months, how will compliance with protocol be ensured?

47. Page 155. C. first paragraph, last sentence. An assessment in 1996 is not valid today due to changes in the endangered species list and in the environment. The areas should again be assessed for potential endangered species impacts.

48. Section 8.02.7. Shortnose sturgeon and Atlantic sturgeon are grouped together for purposes of assessing impacts from the project. The narrative justifies the grouping due to their "similarities in habitat use, distribution throughout the proposed action area, foraging behavior and prey base, and subsequent risk of take relative to dredging and trawling operations..." No citations or other reference information was provided to substantiate this decision to group the species. Other information provided in the appendix provides information that contradicts the claim that the species are similar enough to group together for impact assessment purposes. For example, on Page 170, last paragraph, the narrative states that Atlantic sturgeon primarily lead a marine existence and are therefore more likely to be impacted by hopper dredges than the more estuarine based shortnose sturgeon. The first sentence of the second paragraph on Page 174 also states that the habitat ranges for shortnose and Atlantic sturgeon are slightly different. In addition, the SRT 2007 report states that not all rivers that support Atlantic sturgeon, support shortnose sturgeon. This information again reiterates the differences between the two species, the need to assess them independently, and the shortcomings of an assessment that assesses them together.

49. Page 157, 1st paragraph, Unsubstantiated claims are made throughout this paragraph without any reference materials, peer-reviewed or otherwise, cited.

50. Page 157, 2nd paragraph, specifically lines 1-7. Unsubstantiated claims are made throughout this paragraph without any reference materials, peer-reviewed or otherwise, cited.

51. Page 160, present conditions, 1st paragraph. The use of 4.0 mg/l continues to be used in spite of the information provided by Collins et al. 2001 that mean DO levels in sturgeon habitat use areas were 6.45 and greater. The claim that prolonged exposure to low oxygen levels may not produce acute impacts to fish is unsubstantiated by any outside reference materials. This use of 4.0 mg/l is a minimum level at which the agencies determined shortnose sturgeon can survive, but does not necessarily indicate the dissolved oxygen level that is necessary for

foraging, resting, and moving. The agency comments reported on page 128 #4, 2nd paragraph in Appendix N, again suggests the habitat modeling overrepresented the available habitat for sturgeon by denoting it all as equally beneficial at the minimum dissolved oxygen threshold and thus failed to quantify the intensity of the impact to the fisheries. In the Appendix N documentation, Prescott Brownell, from NMFS requested that a range of suitable habitat thresholds be used for modeling habitat availability. The agency panel then redacted his comments from the record without providing an adequate basis for the redaction. The panel decided the current methods were "acceptable for now." This comment would suggest that additional work would be necessary in the future in order to adequately asses the impacts. The narrative does not provide adequate discussion as to why the pass/fail approach was more adequate than the range approach suggested by Mr. Brownell.

52. Page 160, present conditions, paragraphs 2 and 3. Information provided is unsubstantiated by any outside reference materials and are therefore considered baseless for assessing impacts.

53. Page 164, threats, paragraph 1, line 2. Information provided is unsubstantiated by any outside reference materials and are therefore considered baseless for assessing impacts.

54. Page 170, Dredging methods and associated impacts, line 7. The SRT 2007 report states that habitat loss due to dredging is not just a short-term impact to foraging and refuge habitat. Atlantic sturgeon rely upon deep holes for refugia and are substrate dependent fish. If the bottom of the river is dredged to create an anoxic, uniform bottom without substrate diversity the effects on Atlantic sturgeon would be detrimental over a long-term period.

55. Page 171, Section B, Line 4. What does fairly low mean? The impacts should be quantified and substantiated. Even a single take is not allowed under the ESA unless a permit has been issued.

56. Page 171, Section B, Lines 4-6 state that eggs and larval sturgeons 100 miles upstream where hydraulic dredges are proposed? Are hydraulic dredges proposed upstream from the project area? If not and the sentence is inaccurate it should be corrected. If it is intended to state that eggs and larval sturgeon are located 100 miles upstream from the project area and therefore are outside of the area where hydraulic dredges are being used it is inaccurate.

57. Page 160 of this document, first paragraph, last line, states that an Atlantic sturgeon larva was found 6.7 km (4 miles) upstream of the project impact area. This information suggests that some larva may drift into the project area. Additional information should be collected to verify the actual location of Atlantic sturgeon spawning to ensure the project dredging and upstream

movement of salinity and decreases in DO will not deleteriously impact Atlantic Sturgeon.

58. Page 175. Indirect impacts. The impacts to refuge habitat are actually likely to be long-term impacts according to the SRT 2007 report. In addition, the loss of deep holes with sufficient levels of DO are likely to result in unavailable habitat in which sturgeon may be able to survive, but will not utilize due to inadequate levels of DO.

59. Page 175. Benthic foraging, First paragraph, Line 7. Unsubstantiated claim about benthic recolonization.

60. Page 175. Benthic foraging, First paragraph, Line 8. Unsubstantiated claim without a reference cited.

61. Page 175, Second paragraph, Lines 6 and 13. Unsubstantiated claim without a reference cited.

62. Page 176, Line 2. Unsubstantiated claim without a reference cited.

63. Page 176, Second paragraph, First sentence. Unsubstantiated claim without a reference cited.

64. Page 176, Second paragraph, Second and third sentences. A correlation between river flow and season does not equate to a correlation between natural community shifts and river flow rates. The logic is flawed in this assertion and it may not be accurate.

65. Page 176. Impacts from cadmium-laden sediment. 2nd paragraph. The text suggests that exposed clay would prohibit benthic recolonization. This statement contradicts earlier assertions that benthos would recolonize quickly.

66. Page 177. First paragraph, lines 5-7 suggest that 28% of the substrate surface is a minor fraction of the system. 28% of the channel bottom is not minor.

67. Page 177. Section B. First line. The line claims extensive studies have been conducted, but cites none. Only two studies are included below and neither appears to deal directly with fishes that may be found in the Savannah River.

68. Page 177. Section B, Second paragraph, second sentence. Unsubstantiated claim without a reference cited.

69. Page 179, second paragraph. Line 11 claims fish could use different habitat upstream in order to avoid increased salinity. The studies cited throughout the text and in literature cited by the text highlight the necessary use of estuarine

habitats by shortnose and Atlantic sturgeon. Excluding these fish from the necessary habitats is a substantial impact that cannot be mitigated by the assumption that the fish can simply avoid saline habitats.

70. Page 180. The document explains that since no additional habitat can be modified to make it suitable for sturgeon, the project can mitigate impacts by adding upstream habitats. The addition of upstream habitats may be beneficial for some of the life stages of sturgeon, but it is not a substitute for the necessary nursery areas that will be lost due to the project. There is no evidence to suggest the sturgeon will utilize or benefit from the upstream areas or that any benefits would mitigate deleterious impacts from the loss of estuarine habitats.

Appendix C Final Comments

Mitigation Planning Evaluation
Draft Tier II Environmental Impact Statement for Savannah Harbor Expansion

1. Section 2, Pages 1-5. Fails to discuss what steps were taken to avoid wetland and many other impacts described within Section 5 of the DEIS.

2. Section 3, Page 9, Summary Table. States that salt marsh impacts would be -15.68 acres. A negative impact suggests that there would be a net gain in salt marsh, which is not the case. In addition to the negative impact issue, the quantity of the impact does not match what is provided in Section 5 of the DEIS.

3. Section 4, Page 11. This project should not result in a net loss of wetlands of any type. Preserving existing wetlands should not count as part of the mitigation unless a direct threat can be shown for each and every site.

4. Section 4, Page 15, 2nd Paragraph. Flow rerouting was proposed as a method to reduce the impacts to freshwater marshes, but what are the direct and indirect impacts associated with the planned alternatives? Deepening existing cuts should be considered an impact to subaqueous bottoms. Filling cuts should be considered a fill of subaqueous bottoms and potentially a fill of intertidal wetlands adjacent to the open water. These impacts should be determined and enumerated. These impacts should be mitigated as part of this project.

5. Section 4, Page 30, 7th Paragraph. States "the Contractor shall provide an Environmental Monitoring Plan for the job site, including land, water, air, and noise monitoring. Special emphasis shall be provided for the monitoring of wildlife resources (manatees and marine mammals)." What about other wildlife resources (i.e. shortnose sturgeon)?

6. Section 4, Page 31, 1st Paragraph. Monitoring periods for manatee before after the blast should be lengthened.

7. Section 4, Page 32, 3rd Paragraph. The paragraph states that if a manatee or marine mammal is injured or killed during blasting, all blasting operations shall be suspended and shall not resume until the contractor obtains written permission from the Contracting Officer. The District will coordinate the take with the NMFS to determine the appropriate course of action." What preparations will be in place to save any manatee or marine mammal wounded during the blast?

8. Section 4, Page 33, 2nd Paragraph. The paragraph states that the Marsh Succession Models were not ultimately used to evaluate the mitigation proposals. If this model was used to predict the impacts, the same model should be used to predict the benefits of the mitigation proposals. How was the wetland mitigation

alternatives evaluated to confirm that the freshwater wetland impacts would be reduced from 1,212 acres to 337 acres without the use of the model?

9. Section 5, Page 49, 1st Paragraph. The paragraph states that the proposed restoration site is currently "high ground." Has a wetland delineation been confirmed for the proposed site to determine how much of the site is currently a wetland and how much is non-wetland? Portions of the site which are currently a wetland under normal conditions (the site was last filled at least 20 years ago) should not be included within the proposed restoration acreage. If wetlands exist within the proposed restoration area and were counted as part of the restoration acreage, then the proposed wetland restoration acreage should be reduced accordingly.

10. Section 5, Page 49, 2nd Paragraph. How will the proposed restoration site be protected from invasive species such as *Phragmites australis* if left to revegetate naturally?

11. Section 5, Page 53, 2nd Table. The table indicates that 730 acres of saltmarsh will be impacted by the project. However, the 3rd paragraph on page 110 indicates that the impacts are to brackish marshes. Both cannot be correct.

12. Section 5, Page 53, 2nd Table. What method was used to determine the location and quantity of impacts to brackish or saltmarsh (see previous comment)? This method should be discussed in the document and the location and quantity of impacts at each location should be made available for public review.

13. Section 5, Page 53, 2nd Table. The document clearly states that the natural resource agencies in Georgia require that "acceptable mitigation should consist of at least 50 percent restoration." If the impacts are actually to saltmarsh, then the proposed restoration is out-of-kind restoration. Is this acceptable to the State?

14. Section 5, Page 53, 1st Paragraph. How are the flow altering methods restoring 1,068 acres of brackish marsh? The mitigation plan details how these methods would reduce the impacts to freshwater wetlands, but makes no mention of how these methods also perform brackish marsh restoration. As mentioned in a previous comment, the proposed flow altering features would actually result in impacts themselves. The plans involve filling subaqueous bottoms, dredging subaqueous bottoms, and potential filling of intertidal wetlands adjacent to plugs and weirs. The document should clearly indicate how it was determined that these flow altering plans actually restore impacted marshland. The location of the proposed restoration areas should be included in the document and made available for public review. The restoration areas should be monitored as part of the mitigation plan.

15. Section 5, Page 69, 1st Paragraph. The agencies could not determine any impact that could restore or enhance sturgeon habitats. The proposed project will

undoubtedly result in a take of the endangered shortnose sturgeon and the candidate Atlantic sturgeon which is proposed to be listed as endangered. As a part of the Endangered Species Act, the project would likely need to receive an incidental take permit. If an incidental take permit was issued, the USACE would be required to submit a habitat conservation plan. The habitat conservation plan would have to address the likely impacts of the project, steps the USACE will take to minimize and mitigate the impact, alternative considered and why the USACE did not pursue them further.

16. Section 5, Page 69, 2nd and 3rd Paragraphs. The USACE proposes the installation of a fish passage structure around the New Savannah Bluff Lock and Dam (NSBLD) in order to provide additional available habitat to the shortnose sturgeon. However, the DEIS hasn't provided any assurances that shortnose sturgeon historically used the habitat upstream of the NSBLD, that the shortnose sturgeon can and would navigate the fish passage structure, or that, even if sturgeon had historically used the habitat, the habitat above the NSBLD is currently of the quality that would provide benefits to sturgeon. Of important note, the proposed listing rule for Atlantic sturgeon states that measures "such as fish passage have not proven beneficial to Atlantic sturgeon, as they do not regularly use existing fish passage devices, which are generally designed to pass pelagic fish. To date, only four Atlantic sturgeon have been documented to have passed via a fish lift." Thus, there is no indication that the fish passage structure would adequately mitigate for the inevitable harm caused to shortnose sturgeon.

17. Section 5, Page 98, 1st Paragraph. Neither the DEIS or this document provide any documentation that shortnose sturgeon used habitat above the NSBLD or that the availability of this habitat would adequately compensate for the lost habitat that is used by sturgeon during different seasons and during different life stages than more upstream habitats.

18. Section 5, Page 99, 1st Paragraph. The appendix states that the agencies noted the fish passage structure was the only method that could effectively compensate for the predicted loss in sturgeon habitats. On the contrary, the agencies didn't appear to state that the fish passage structure would effective compensate for impacts. The agencies seemed to state that they could not think of any other compensation in the estuary and that the fish passage structure was the only mitigation measure that had been proposed that may provide some compensation. In the documentation provided in the agency correspondence appendix, the agencies did not mention that the fish passage structure would effective compensate for the predicted loss in sturgeon habitats.

19. Section 5, Page 99, 2nd Paragraph. What if the fish passage structure is paid for by other funding and cannot be used by this project as mitigation? No other mitigation has been proposed. This constitutes a substantial risk that should be addressed.

20. Section 5, Page 103, 2nd Paragraph. The calculation of costs needed for the stocking program appears to be flawed and may underrepresent the actual amount of costs needed for the stocking program. The cost determination assumes that the start-up of the hatchery is directly proportional to the amount of fish that would be produced i.e., that only a percentage of the $3.1 million initial expense is required to get the stocking program underway. Has the GA DNR-WRD provided information to verify that the percentage assumption provides an adequate amount of payment for stocking? There are probably economies of scale that would preclude the direct ratio apportionment proposed by the Corps.

21. Section 9, Page 114, Monitoring shortnose sturgeon distribution. Both shortnose and Atlantic sturgeon should be monitored given their respective status under the Endangered Species Act and the take of these species that will occur as a result of this project. Monitoring should include distribution as well as abundance determinations. Monitoring that does not include abundance information will not provide adequate information to determine if the project is resulting in population decreases.

22. Section 9, Page 114, Monitoring fish passage at NSBLD. What would result if sturgeon do not use the fish passage structure? Adequate mitigation would not be provided.

23. Appendix A, Page 149, 2nd Table. The table indicates that a value of 0.3 was used for the threat category for the preservation sites. The document fails to justify the use of this elevated value. The second-to-last paragraph on page 123 indicates that "adjacent lands" are being logged and/or developed for residential use. The document does not indicate that these lands are directly adjacent to the tidal wetlands proposed for preservation or speaks of how these lands (if developed and/or logged) will directly affect the proposed preservation area. The document itself indicates that the threat must be demonstrable and it fails to do so. A value of 0, for no threat, or 0.1, for low threat, should be used in the preservation worksheet or the document should be revised to demonstrate how the proposed preservation areas, are themselves, at a moderate level of threat. A lower threat value would require that additional land be acquired for preservation.

24. Appendix A, Page 149, 2nd Table. The table indicates that the values for in-kind and out-of-kind replacement are 0.6 and 0.2, respectively. The previous table indicates that these are the only options available for use within the preservation worksheet. However, a value of 0.4 was used within the preservation worksheet. If there are uplands included within the preservation area (as page 123 indicates there are), their acreage should be excluded from the preservation total, or at least included as out-of-kind replacement. The preservation worksheet should be updated and the required acreage purchased as compensation for the project should be adjusted accordingly.

25. Numerous figures within Appendix C do not have essential components like north arrows, scales or legends.

Comments on DEIS Appendix D –
Monitoring Plan and Adaptive Management Program

Appendix D Comments

Monitoring and Adaptive Management Plan
Draft Tier II Environmental Impact Statement for Savannah Harbor Expansion

1. Section 3.Goals of an Adaptive Management Plan, p. 7, 2nd Paragraph: The document indicates that the first goal of the adaptive management plan is evaluating the accuracy of the predicted environmental impacts. Post-construction, the goal should be to determine if the mitigation features are adequate to compensate for the impacts. This should be achieved with field results and not with predictive models. In situ conditions indicate whether the mitigation features are adequate or inadequate.

2. Section 5.B.Physical, p. 7, 1st Paragraph: The document indicates that the pre-construction monitoring "will better define the complex interactions between the estuarine ecosystem and the quantity and quality of water available." If these interactions are unknown, how were the potential impacts determined in the Tier 2 EIS? These interactions should be understood prior to permit issuance as the potential impacts may still remain undetermined.

3. Section 5.B.Physical, p. 7, 2nd Paragraph: The document indicates that the hydrologic and water quality monitoring data will be used to update the models, pre-construction. Who would determine if the model warrants an update?

4. Section 5.B.Physical, p. 7, 2nd Paragraph: If a calibration is warranted of the predictive models, prior to construction, and the models predict greater impacts then permitted, would a permit modification be acquired prior to the beginning of impacts?

5. Section 5.B.Physical, p. 7, 3rd Paragraph: Would the State of South Carolina have a chance to determine the location of proposed groundwater monitoring wells, as the Floridan aquifer extends into southern South Carolina.

6. Section 5.B.Physical, p. 7, 3rd Paragraph: The document indicates that chloride levels will be monitored in "up to four" groundwater monitoring wells annually in the pre-construction phase. However, in section 5.C.5 on page 13, the document indicates that no fewer than "four" wells will be monitored. Also, section 5.C.5 indicates that the wells will be monitored four times a year, the text in section 5.B should indicate this fact.

7. Section 5.B.Physical, p. 8, 1st Paragraph: Do the applicants plan to monitor the distribution of Atlantic sturgeon as well? The Atlantic sturgeon has been confirmed in the Savannah River and has been proposed to be listed as endangered in the South Atlantic DPS which contains the project area.

8. Section 5.C.Biological, p. 13, 1st Paragraph: Do the applicants plan to monitor the distribution of Atlantic sturgeon as well? The Atlantic sturgeon has been confirmed in

the Savannah River and has been proposed to be listed as endangered in the South Atlantic DPS which contains the project area.

9. Section 5.C.Biological.2, p. 13, 1st Paragraph: The monitoring should also include drift larval surveys for larva entering the project area. With the proposed salinity increases, the larva entering the project area from upstream may not survive, and their loss should be considered an impact.

10. Section 5.C.Biological.2, p. 13, 1st Paragraph: Please indicate the amount implied when it is determine that sturgeon "intensively" use an area. If the substrate is not "intensively" used is it not recorded? The substrate type should be recorded for each observation.

11. Section 5.C.Biological.3, p. 14, 1st Paragraph: The document indicates that up to 25 shortnose sturgeon would be collected and implanted with transmitters. Is there a minimum number proposed? There should be imposed minimum used to provide validity to the data.

12. Section 5.C.Biological.3, p. 14, 2nd Paragraph: Substrate type should also be recorded for each observation.

13. Section 5.D.Reporting, p. 14, 1st Paragraph: The text should be revised to replace the word "which" for the word "where" and the word "become" for the word "becomes."

14. Section 6.C.Details of the Monitoring, p. 17, 1st Paragraph: The document indicates that "not all monitoring that was included in the Pre-Construction monitoring will be duplicated each year during the construction period." Please indicate which monitoring will not be included during the construction phase.

15. Section 6.C.Details of the Monitoring, p. 18, 2nd Paragraph: Please explain what constitutes a "large/unforeseen increase."

16. Section 6.D.Reporting, p. 19, 2nd Paragraph: If the monitoring indicates that unforeseen or unpermitted exceedences are occurring, this data should be made available for review by all applicable State and Federal agencies when the exceedences are observed and should not be held until the annual or final reports.

17. Section 7.A.Goals, p. 20, 5th and 6th Paragraphs: Does the monitoring at the nearshore sediment placement sites include monitoring of benthic repopulation for two or three years?

18. Section 7.D.Reporting, p. 25, 1st Paragraph: If the monitoring indicates that unforeseen or unpermitted exceedences are occurring, this data should be made available for review by all applicable State and Federal agencies when the exceedences are observed and should not be held until the annual or final reports.

19. Section 8.B.Monitoring During Construction, p. 28, 2nd Paragraph: Please define "well outside." If the impacts are exceeding those permitted then these exceedences should be reported to all applicable State and Federal agencies when the exceedences are observed.

20. Section 8.B.Post-Construction Monitoring, p. 28, 2nd Paragraph: Establishing a threshold values during and post-construction would better protect natural resources and preserve water quality. They should be a goal or standard and they would provide all applicable State and Federal agencies with an "action" threshold and may reduce cumulative impacts.

21. Section 8.B.Post-Construction Monitoring, p. 29, 3rd Paragraph: Additional mitigation should be required if losses are greater than those described in the EIS, and not dependent on the observed flow conditions.

22. Section 9.B.Decision Process, p. 30, 1st Paragraph: The paragraph states that if through monitoring it is determined that impacts are "well outside the range of those expected" then the Corps would consult with the Cooperating Agencies to identify what actions may be appropriate. What amount constitutes "well outside?" If the permitted impacts are exceeded then addition mitigation should be proposed. The threshold amount should be the permitted amount and not the "expected" amount. Finally, the Corps should revaluate the impacts if they are exceeding the permitted amount and not wait for the Cooperating Agencies to begin the process. The Cooperating Agencies should be notified if exceedences are observed after each monitoring period.

23. Section 9.B.Decision Process, p. 30, 2nd Paragraph: Response should not be delayed until the post-construction monitoring period is completed if impacts exceed those permitted. If the mitigation features are not meeting their goals during the monitoring period action should be taken when deficiencies are observed. The applicants should not delay 4 years to act for exceedences which are observed in year 1.

24. Section 9.B.Decision Process, p. 31, 2nd Paragraph: Expecting complete agreement by the Cooperating Agencies for an adaptive measure to be implemented is unrealistic. The text indicates that an additional year of monitoring is possible but that it would reduce the funds to implement the adaptive measures. If the project has impacts which exceed those permitted, or if the final impacts remain unclear, then monitoring should continue. If the cost of the monitoring or adaptive measures exceeds the funds reserved then additional funds should be secured by the applicant. Monitoring or mitigation should not be reduced if permitted impacts have been exceeded or a determination on exceedences is reasonably attainable.

25. Section 9.B.Decision Criteria, p. 31, 1st Paragraph: This section should be changed to section 9.C Decision Criteria. The section titled Decision Process is section 9.B.

26. Section 10.B.Components of Approved Adaptive Management Plan, p. 33, 2nd Paragraph The fish passage improvements at the NSBL&D does not provide greater habitat for the sturgeon as compensation for the impacts. It provides a means to which the sturgeon could access potential habitat if they navigate the NSBL&D correctly.

27. Section 10.B.Components of Approved Adaptive Management Plan, p. 33, 2nd Paragraph The text indicates that "acquisition of additional bottomland hardwoods/freshwater wetlands would compensate for additional impacts to freshwater marshes beyond those that are predicted in the EIS." This is "out-of-kind" mitigation and does not constitute replacement. This form of mitigation does not satisfy "no net loss" as the preservation of non-threatened wetlands does not compensate for those impacted by the project.

28. Section 10.B.Components of Approved Adaptive Management Plan, p. 34, 2nd Paragraph If the impacts from the project have exceeded those permitted, and the adaptive management funds listed on page 34 have been exhausted, then additional funds should be made available by the applicant to provide additional mitigation. The funds listed on page 34 should not limit the response if impacts exceed those permitted.

**Comments on DEIS Appendix H –
Section 404(b)(1) Evaluation**

Appendix H Comments

404(B)(1) Evaluation
Draft Tier II Environmental Impact Statement for Savannah Harbor Expansion

1. This Appendix was formatted following 40 CFR 230, the 404(b)1 Guidelines. It generally contains all the necessary components of this regulation except for a mitigation component, which may be contained elsewhere in the Project's documentation.

2. Page 15, para. 6 – Refers to other fill activities on the project "...are associated with the various mitigation features of the project." "which is designed to minimize the increase in upstream salinity levels resulting from harbor deepening." Thus, espousing the value of the discharges as mitigative measures. The negative impacts of these fill activities are not considered. Is there mitigation proposed for impacts caused by the mitigation?

3. Page 17, para. 3 – Again, measures proposed to minimize impacts of increased salinity up the river, i.e., discharged of dredged material, are lauded as largely beneficial....

   "The discharge of dredged and fill sediments associated with the Savannah Harbor Expansion Project will actually be an integral part of minimizing these impacts."

4. Page 20, para. 3 – A number of references are made to significant changes in substrate elevation in the nine nearshore areas. Have these depth modifications been modeled regarding hydrodynamics and sediment transport at the mouth of the river?

5. Page 20, para. 6 – "Net loss of environmental value is expected to be minimal."- Regard the discharge of dredged material back into waters as part of the mitigation, this has not been shown.

6. Page 21, para. 1 – Refers to conducting benthic studies on the Tybee shelf prior to performing proposed discharges associated with habitat modifications here as part of the proposed mitigation. This is the first mention of conducting a site specific study on an area proposed for impact as part of the mitigation plan and should be a practice carried out on all other discharge locations.

7. Page 21, para. 5 – Discussion of berm construction off Tybee Island and "no significant changes in current patterns and water circulation are expected". Have adequate studies been done to support this statement? Are these berms resources that where historically located here but have eroded because of anthropogenic or storm activity?

8. Page 22, para. 2 and 3 – Again, statements such as, "No net loss of environmental value" and "The discharge of dredged and fill material into waters of the United States associated with the Mitigation Plan would minimize the upstream salinity increases…" appear to be unsubstantiated and do not adequate address impacts caused by the mitigation itself, respectively.

9. Page 23, para. 7 – CONTAMINATION DETERMINATION – See comments in the Appendix M (Sediment Quality Evaluation).

10. Page 24, para. 1 – CONTAMINATION DETERMINATION – References three rounds of sediment sampling but starts out summarizing the second round that was conducted in 2005 with no summary of the first round. Please summarize the first round (i.e., 1997) here as well for comprehension/organization purposes.

11. Page 32, para. 7 - AQUATIC ECOSYSTEM AND ORGANISM DETERMINATIONS – See comments on T&E and fisheries/sturgeon from Travis and JPD.

12. Page 33, para. 1 - AQUATIC ECOSYSTEM AND ORGANISM DETERMINATIONS, Fish, Crustaceans, Mollusks and Other Aquatic Organisms in Food Web – "The project would not involve any discharge of dredged or fill material into areas with high concentrations of shellfish." "Side scan sonar and benthic surveys would be conducted during the design phase to confirm this initial conclusion." These measures seem adequately protective. How and who will review the results of the additional studies and determine if impacts to benthics will be minimal?

13. Page 33, para. 4 - AQUATIC ECOSYSTEM AND ORGANISM DETERMINATIONS, Special Aquatic Sites – What alternatives were evaluated regarding replacement of the 337 acres of tidal freshwater marsh besides other than preservation?

14. Page 34, para. 4 – Potential Effects of Human Use Characteristics – This section should address the relocation of the municipal water intake and effects of the project on commercial and recreational fisheries. Alternatively, refer to sections where these issues are addressed.

15. Page 35, para. 1 - 8.0 DETERMINATION OF CUMULATIVE EFFECTS ON THE AQUATIC ECOSYSTEM – This section defers to Appendix L for the write up on cumulative impacts. This presentation is inconsistent with other sections in this Appendix that makes following the flow (and thus comprehension) of the data very difficult. Contamination Determination (6.4), for example, provides significant discussion on the ecorisk assessment performed as well as referencing Appendix M "Sediment Quality Evaluation."

16. The 404(b)1 Appendix does not contain the following information, as applicable, nor does it refer to other DEIS documentation that address the following material required under 40 CFR Part 230, Subpart J "Compensatory Mitigation for Losses of Aquatic Resources"

§ 230.91 Purpose and general considerations.
§ 230.92 Definitions.
§ 230.93 General compensatory mitigation requirements.
§ 230.94 Planning and documentation.
§ 230.95 Ecological performance standards.
§ 230.96 Monitoring.
§ 230.97 Management.
§ 230.98 Mitigation banks and in-lieu fee programs.

The Water Quality Monitoring Plan Attachment in the Appendix fulfills part of the Monitoring requirement under 230.97, above. Practically speaking, however, this plan should be contained within Appendix D, "Monitoring & Adaptive Management Plan".

**Comments on DEIS Appendix K –
Air Emission Inventory**

Appendix K Final Comments

Air Emission Inventory
Draft Tier II Environmental Impact Statement for Savannah Harbor Expansion

General Appendix K comments:

1. On pages 14 – 32, the reviewer was not able to calculate the emissions reported in many of the emission summary tables using the information provided in the descriptions preceding the emission summary tables. To facilitate a review of the emission estimates, an example calculation should be provided for Tables 5-10, 5-11, 5-12, 5-13, 5-19, 5-20, 5-21, 5-26, 5-29, 5-31 and 5-38.

2. Nitrogen oxides are referred to as "NOX", "NOx", "NO_x" and "NO2" throughout the appendix in various text sections, tables, and figures. A single acronym (e.g., "NO_x") should be used throughout the appendix.

3. The word "volume" is used numerous times starting on page 36 and through the end of the appendix to refer to the amount or quantity of mass emissions estimated (e.g., second sentence in the last paragraph on page 36, first and second paragraphs on page 45, and second sentence of the second paragraph on page 72, etc.). Because mass emission rates are being referred to in these instances, "amount" or "quantity" should be used in lieu of "volume".

Specific Appendix K comments:

1. Page 13 – the "Slow / Dead Slow" mode presented in Table 5-8 does not correspond with any of the mode categories presented in Table 5-6. The same mode terminology or designations should be used throughout both tables.

2. Pages 14 - 16 – the emission estimates shown in Tables 5-10 through 5-13 are presented as "tons per transit" or "tons per vessel". Also, the term "vessel call" is used in the preceding sections (e.g., Tables 4-1 through 4-4) and tug emissions are presented on a "ton/call" basis in Tables 5-19, 5-20 and 5-21. The use of consistent terminology is recommended to avoid confusion.

3. Page 18 – the emission formula presented on this page to calculate tug emissions is not clear and should be reformatted or revised.

4. Page 38 – CHE emissions for 2010 are presented in Table 5-48 and 5-49; however, the estimates for the Toplifts and the Empty Container Handlers indicate FY07 estimates. Most likely the reference to FY07 is incorrect and should be deleted.

5. Page 43 – a unit designation for the emission estimates provided in Table 5-60 is not provided as part of the table heading.

6. Page 44 – GPA vehicle fleet emissions are summarized in Table 5-62 for Calendar Year 2007. The tons of emissions indicated for the vehicle fleet are very low. It is recommended that the vehicle fleet emission calculations be checked to ensure they are not in error.

7. Page 45 – in the first paragraph, Table 5-61 is incorrectly referenced as showing the relationship of air toxic pollutants to other pollutants. Table 5-61 is presented on Page 44 and summarizes GPA's vehicle fleet by vehicle category.

8. Page 46 – 58 – the emission tables presented as Table 5-64 through 5-76 summarize emissions of 28 individual pollutants designated as air toxic pollutants. In the last row of these tables, the air toxic emissions are summed and reported as totals for each equipment category. This last row should be deleted since air toxic pollutants are normally viewed on an individual basis and not collectively with respect to air quality considerations. However, it would be appropriate (if desired), to sum the rows to show the totals for each individual air toxic pollutant.

9. Page 59, Section 5.18 – in the third paragraph, the method used to generate emission estimates are described for methane (CH4) and nitrous oxide (N2O), which are greenhouse gases (GHGs). Emissions of these GHGs are incorrectly calculated from the CO_2 estimates by applying their respective global warming potential factors of 21 and 310. Theses global warming factors are used to quantify CO_2 equivalent (CO_{2e}) emissions when emission rates of CH4 and N2O are known. Considering that CH4 and N2O emissions are not quantified in the preceding sections and are expected to be only 2 percent of the total GHG emissions, it is suggested to revise and simplify this section (Section 5.18) by including only the CO_2 emission estimates in the discussion and in Table 5-77 shown on pages 60-61.

10. Page 66, Section 6.0 – the last sentence of the first paragraph indicates a total of 10 emission sources were evaluated. However, the table which follows this sentence shows a total of 14 entries and one of these entries, "air toxics," should be removed because air toxics are pollutants and not an emission source nor an emission generating activity. This sentence should be revised to indicate 13 emission sources and the "air toxics" entry should be deleted from the table.

11. Page 70 and Page 71 – Figure 6-4 and Figure 6-5 appear to be identical yet they are supposed to present emissions under different conditions (i.e., with and without the 47/48-foot harbor deepening).

12. Page 96 – the first paragraph below Table 6-7 provides the total CO_2 emissions for a steam electric plant in Savannah. However, no direct comparison is made between the CO_2 emissions associated with this facility and the Port.

**Comments on DEIS Appendix L –
Cumulative Impact Analysis**

Appendix L Final Comments

Cumulative Impact Analysis
Draft Tier II Environmental Impact Statement for Savannah Harbor Expansion

Overall, the assessment of cumulative impacts presented in Appendix L is thorough and well prepared for the issues and resources addressed. In a number of instances it briefly points out that a terminal in Jasper County would have minimal adverse impacts on a number of resources, i.e. salinity intrusion, oxygen depletion, shortnose sturgeon, in comparison to the significant adverse impacts on these resources related to the deepening to the GCT. Further, it discloses the difficulty of developing a reliable mitigation approach to ameliorating the adverse impacts of the proposed deepening to the GCT on the endangered shortnose sturgeon. This issue remains unresolved. There several additional issues/resources that would lend themselves to cumulative impact assessment which could benefit the decision making process:

- With the projected large scale port expansion that may be implemented, it would be advisable to assess the effects on induced growth within the Savannah area. The area will likely require enhanced transportation but also will require increased community service support plus a growth of local industrial and commercial activity. A cumulative analysis of how growth was stimulated by port development in the past, currently and will be in the future could affect upcoming planning decisions.
- While the cumulative impacts to the shortnose sturgeon are analyzed, it would be advisable to perform a similar analysis for the Atlantic sturgeon as well. This species may be under considerable stress and may qualify for threatened or endangered status in the near future.
- The cumulative impacts of the Confined Disposal Facilities may be warranted. The specific concern is that if the CDFs in Jasper County are continued in use there may be a point in time when these sites would become unsuitable or infeasible for other uses. In particular, future development at one of these sites for a marine terminal as an environmentally preferable option could be obviated by onerous reclamation requirements owing to a need to remove or treat very large amounts of disposed dredge materials.

CEQ Guidance on the preparation of Cumulative Impacts Analysis states that "the analyst's primary goal is to determine the magnitude and significance of the environmental consequences of the proposed action in the context of the cumulative effects of other past, present, and future actions." Appendix L addresses seven major resources or issues of concern with regard to cumulative impacts. However, the analysis of each of the resources/issues lacks a statement of the magnitude and significance of the cumulative impact.

Specific Comments

1. Historic Basis - Pg 10, 2nd para – "Federal and State natural resource agencies agreed that 1999 would provide the baseline condition for wetlands under which this harbor deepening should be considered." What is the basis for establishing 1999 as the base year? Large acreages of wetlands within the project area experienced substantial impacts from a variety of actions prior to 1999, and they need to be considered in the cumulative affects analysis.

2. Past Actions/Stresses – Pg 10, 3rd para – "All of these deepening projects allowed the freshwater interface to migrate farther upstream." Given this statement, why would the cumulative loss of wetlands due to channel deepening not be included in the Cumulative Affects analysis?

3. Present Actions/Stresses – Pg 13, 4th para – "The District expects to begin the rehabilitation in the summer of 2010 and complete it in FY 2012." The rehabilitation refers to the water control structures in the Freshwater Control System. Has that work begun yet?

4. Future Actions/Stresses – Pg 14, 3rd para – "Another potential impact to upstream salinity levels and thus the SNWR is the proposed Jasper County Marine Terminal." If this proposed project is considered to be feasible enough for inclusion in the cumulative impacts analysis, then why is it not feasible enough to be considered an alternative to the SHEP?

5. Incremental Impact – Pg 14, 4th para – This discussion on the effects of past harbor deepening projects and their resultant increases in upstream salinity levels should include statements regarding the magnitude and significance of those cumulative impacts.

6. Past Actions/Stresses – Pg 23, 2nd para – "Over time some tidal freshwater marsh has been converted to either brackish or saltmarsh because of increased upstream salinity levels caused by deepening of the harbor." The use of the word "some" to quantify the historic losses of tidal freshwater marsh within Savannah Harbor that actually numbers in the hundreds of acres understates the magnitude and significance of the cumulative impacts.

7. Present Actions/Stresses – Pg 26, 4th para – "Those areas of tidal freshwater marsh outside of the SNWR could be filled after obtaining a Department of the Army Permit; such a permit would require mitigation for these impacts but not replacement of tidal marsh." Why would the Corps of Engineers issue permits for filling remaining tidal freshwater marsh within the Savannah River estuary knowing the history of that resources' considerable destruction and the value of the remaining resource to the ecology of the watershed? Also, given the Corps'

tenant of "no net loss of function or value" for wetland losses, why would wetlands replacement not be required?

8. Capacity to Withstand Stress – Pg 27, 2nd para – "Tidal freshwater marshes exist in a very specific environment and are greatly controlled by ground elevation, river and tidal flows, and salinity levels. Maintaining salinity levels that are 0.5 ppt or less is critical to their survival" Please explain how the above statement relates to the subject heading of Capacity to Withstand Stress.

9. Present Actions/Stresses – Pg 33, 4th para – "All marsh in the Savannah estuary is protected from development by the provisions of Section 404 of the Clean Water Act." This statement appears contradictory to the assertion that preservation of freshwater wetlands is appropriate mitigation for expected wetland losses within SNWR because they (the wetlands that would be preserved) are under threat of development. Please explain.

10. Present Actions/Stresses – Pg 34, 1st para – "Those who have obtained permits have been required to avoid wetland impacts where practicable and to provide in-kind mitigation where wetland losses are unavoidable." For its unavoidable wetland impacts from SHEP, the Corps is proposing to purchase existing wetlands that are under no threat of development and preserve them by having the acreage incorporated into SNWR. Why would the Corps consider that to be in-kind mitigation?

11. Capacity to Withstand Stress – Pg 34, 3rd para – "The philosophy of the Corps of Engineers and state wetland protection programs is a "no net loss" of wetlands policy. Please explain how the Corps' use of wetland preservation in its proposed mitigation plan for SHEP is consistent with its philosophy of "no net loss".

12. Incremental Impact – Pg 34, 5th para – "The SHEP would result in the loss of 3.0 acres of brackish marsh and 12.68 acres of saltmarsh. When compared to the total amount of brackish marsh and saltmarsh in the Savannah Harbor estuary, this loss might seem insignificant. However, it is the incremental impact of many small losses over time that can lead to significant adverse impacts to a resource." Please include a statement of the magnitude and significance of this incremental impact.

13. Mitigation – Salt Marsh and Brackish Marsh – Pg 35, 1st para – "Over time this site would be expected to re-vegetate with estuarine emergent wetlands (brackish marsh). Not planting the site with appropriate marsh vegetation leaves open the distinct possibility that the site will be colonized by Common Reed (Phragmites sp) or other undesirable plants. Please explain why planting with appropriate vegetation is not being proposed.

14. Pre-construction Monitoring – Pg 35, 5th para – "Monitoring of wetland vegetation for one year". Please explain the purpose and expected value of monitoring for one year.

15. Monitoring During Construction – Pg 35, 6th para – "The same monitoring activities described above would be continued throughout the construction process, which is estimated to take 3-4 years". The Corps has indicated in other sections of this DEIS that construction of the SHEP is dependent upon receipt of funding from Congress. Given the uncertainty of a continuous funding stream that would allow the project to be completed in 3-4 years, how would the monitoring plan and costs be adjusted if construction were to stretch over a longer period of time?

16. Past Actions/Stresses – Pg 39, 2nd para – "In addition to loss of riverine habitat, much of the fishery habitat in the Savannah River estuary has also been lost or adversely affected". This statement is in stark contrast to the last paragraph on Pg 41 where results of a UGA study on the temporal and spatial distribution of estuarine fishes in the Savannah River estuary showed that the estuary supports a diverse and abundant fish community. Please clarify the apparent discrepancy.

17. Present Condition – Pg 41, 1st para – "The shortnose sturgeon is the only endangered fish in the Savannah Harbor estuary". While that is a true statement at the moment, the National Marine Fisheries Service proposed in November 2010 that the Atlantic Sturgeon be listed as an endangered species under the Endangered Species Act. The Public Comment Period on the proposed listing closes in early January 2011, and the Atlantic Sturgeon may well be added to the Endangered Species List before the SHEP completes the NEPA and permitting processes. The potential impacts on Atlantic Sturgeon from the SHEP should be addressed in this DEIS (the Atlantic Sturgeon is acknowledged as an imperiled species in the 1st paragraph of page 43 in this appendix), or in a supplemental EIS at a later date when the species is listed.

18. Future Actions/Stresses – Pg 46, 3rd para – "A marine terminal has been proposed for Jasper County, South Carolina". Including the proposed Jasper Terminal in the discussion of cumulative impacts acknowledges that it is a reasonably foreseeable activity. Why then is it not also appropriate to evaluate the Jasper Terminal as a reasonable and feasible alternative to the SHEP?

19. Incremental Impact – Pg 47, 2nd para – "Average river flows were determined to be the most representative of conditions that would be expected over the long-term". Why would a modeling analysis of predicted impacts not be more meaningful based on low flow rather than on average flow?

20. Incremental Impact – Pg 47, 2nd para – "Fish habitat modeling was used to identify areas in the harbor where suitable habitat exists as well as how that habitat would change under various harbor deepening alternatives". Was any ground-truthing of areas in the harbor predicted by the model to be suitable fish habitat to confirm the model's accuracy?

21. Incremental Impact – Pg 48, 1st para – "Without mitigation, model studies indicate that there would be no effect on American shad habitat". What was done to confirm the accuracy of model predictions?

22. Incremental Impact – Pg 48 – The discussion on Incremental Impact ends on this page with no conclusion offered on the magnitude and significance of the cumulative impacts of the river's fisheries. Please add a discussion on this.

23. Alternatives to Mitigate for Cumulative Impacts – Pg 48, 2nd para, 5th bullet – "Restoring conditions in the estuary that are favorable to spawning of Striped bass to support the recovery of that species". How does stocking of striped bass achieve this objective, since the incremental loss of striped bass spawning habitat is unaffected by stocking?

24. Alternatives to Mitigate for Cumulative Impacts – Pg 51, 6th para – "Consequently, implementation of a stocking program was deemed to be the most effective means of mitigating for the remaining loss of Striped bass habitat associated with each alternative deepening plan". Its unclear how adding striped bass to a river with reduced Striped bass habitat will be able to sustain the fishery, and how that is considered to be acceptable mitigation. Please explain.

25. Alternatives to Mitigate for Cumulative Impacts – Pg 52, 2nd para – "Determining the appropriate level of stocking was accomplished by the SHEP study team in coordination with the Georgia DNR-WRD". Fishery resources in a river that is the common boundary between two states are shared resources of both states. Was the SC DNR involved in Striped bass mitigation development?

26. Issue – Pg 54, 3rd para – "These issues are addressed in Section 5 of the EIS, and while they are major issues, the SHEP study team did not believe they warranted a cumulative impact type of analysis". Both NEPA and CEQ guidelines on cumulative impacts analysis requires that issues identified during Project Scoping as being major need to be included in the cumulative impacts analysis. Temperature gradients in the estuary and chloride levels in Abercorn Creek were identified as major issues during Scoping. Therefore they need to be included in the discussion of cumulative impacts.
27. Issue – Pg 54, 5th para – "Dissolved oxygen concerns relating to harbor deepening can be divided into three issues: (1) as the channel depth increases, the ability of oxygen to reach the river bottom decreases, causing lower average concentrations of dissolved oxygen at the bottom, (2) as the channel prism.....throughout the water column". The decrease in DO levels at the river bottom has the potential to change both the benthic and plankton communities, which in turn may negatively impact the fish community. These impacts and their linkage should be discussed.

28. Issue – Pg 54, 5th para – "Lower dissolved oxygen concentrations also reduce the ability of the estuary to handle the point and non-point source loads of pollutants

entering the estuary". The SHEP's lowering of dissolved oxygen levels in the harbor effectively reduces the harbor's ability to sustain a higher aggregate TMDL. That could result in higher costs to point-source dischargers who would have their TMDL lowered because of SHEP's impact on the harbor DO levels. This point should be discussed.

29. Geographic Scope – Pg 55, 1st para – "Evaluation of impacts to the dissolved oxygen regime is critical because this segment of the river is on the State of Georgia's Section 303(d) list as impaired for dissolved oxygen". What is the status of that river segment under SC water quality criteria for dissolved oxygen?

30. Historic – Pg 55, 5th para – "In addition, since water quality in the harbor is – at a minimum not degrading – but likely to be stable or improving as tighter discharge standards are instituted and new industrial controls implemented, the present day conditions will be used as the baseline for this analysis". This does not follow NEPA nor CEQ guidelines on how impacts to specific resources are to be evaluated for cumulative impacts.

31. Past Actioons/Stresses – Pg 57, 1st para – "Monitoring indicates that the effects of this resuspension on dissolved oxygen levels are small, temporary, and localized". What monitoring? What is the reference for this statement?

32. Past Actions/Stresses – Pg 57, 4th para – "Overall, the studies revealed that this procedure does not degrade the quality of the river to unacceptable levels". The studies need to be referenced. Are state water quality standards (either Georgia or SC) violated?

33. Past Actions/Stresses – Pg 57, 4th para – "This procedure is not performed when background dissolved oxygen levels in the river are at or below Georgia water quality standards". Is the procedure performed when dissolved oxygen levels in the river are at or below SC water quality standards?

34. Present Condition – Pg 57, 5th para – "Water quality in the harbor is generally good". This statement is inconsistent with the another sentence in that paragraph that says "The dissolved oxygen levels can drop to concentrations that do not adequately support aquatic life". This discrepancy should be rectified.

35. Present Condition – Pg 58, 1st para – "This segment of the river failed to meet the dissolved oxygen use designation based on data collected in the summers of 1997 and 1999 (EPA 2006)." If there is recent data on summertime DO levels in that segment of the river, it should be referenced.

36. Present Actions/Stresses – Pg 59, 3rd para – "Model results from the EPA TMDL study for Savannah Harbor indicate that the Savannah Harbor Navigation Project has resulted in a 1 mg/l depression of dissolved oxygen in the upper water column". What is the magnitude of DO depression in the lower water column?

37. Present Actions/Stresses – Pg 59, 4th para – "If the background levels are at or below Georgia water quality standards, the dredging is not performed. This ensures that activities will not be conducted which would further exacerbate stressful conditions for wildlife". There seems to be an inconsistency here. Maintenance dredging is not performed if the DO is near or below water quality standards, but the Corps proposes to construct a project that (without mitigation, and maybe even with mitigation) would permanently worsen the DO problem.

38. Incremental Impact – Pg 66 - The discussion on Incremental Impact ends on this page with no conclusion offered on the magnitude and significance of cumulative impacts to the river's dissolved oxygen from past, present and future projects. Please add a discussion on this.

39. Alternatives to Mitigate for Cumulative Impacts – Pg 66, 3rd para – "Basically, these plans reduce the anticipated increase in salinity levels by reducing salt water flows into Back, Little Back , and Middle Rivers, while providing more freshwater inflow to these streams". Was consideration given to the likelihood that the freshwater inflow could include high oxygen-demanding organic materials from the large acreages of wetlands in the upstream part of the basin?

40. Alternatives to Mitigate for Cumulative Impacts – Pg 67, 2nd para – "This device was originally used to add oxygen to the bottom of lakes to enhance downstream fisheries". Where has this technology been successfully used on a scale commensurate with the SHEP? If it hasn't, then reliability is a significant issue, and the mitigation plan, which relies so heavily on the speece-cone technology for the success of other mitigation plan elements, is also significant issue.

41. Alternatives to Mitigate for Cumulative Impacts – Pg 67, 4th para – "The costs for operating the oxygen injection systems are based on their continued operation for a period of 4 months per year". However, the modeling results show that DO levels are expected to be below standards for more than 4 months a year. Why wouldn't the oxygen injection system be operated during each month that oxygen is expected to be below state standards?

42. Alternatives to Mitigate for Cumulative Impacts – Pg 68, Table 11 – Under the column labeled Scenario Description, the various incremental depth projects are listed, from a deepening project of 2 feet (44-foot depth in the channel), to a deepening project of 6 feet (48-foot depth in the channel). However, the DEIS acknowledges that under any of the channel deepening alternatives being considered, there would be 2 feet of allowable over-depth dredging and 4 feet of advanced maintenance added to each alternative. This means that the 44-foot channel alternative is actually a 50-foot channel, and the 48-foot alternative is actually a 54-foot channel. None of these depths were modeled with respect to their anticipated impacts on DO, fisheries, sediment disposal, etc. This should be done to accurately assess the project's true impacts to the Savannah Harbor.

43. Incremental Impact – Pg 78 – The discussion on Incremental Impact ends on this page with no conclusion offered on the magnitude and significance of cumulative impacts to the groundwater resources from past, present and future projects. Please add a discussion on this.

44. Issue – Pg 79, 1st para - "Right whales, sea turtles, West Indian manatee and Shortnose sturgeon are species that are protected by Federal law that are commonly thought of as being at risk from harbor operations". Atlantic sturgeon should also be acknowledged here since NMFS has proposed listing the species as Endangered under the Endangered Species Act.

45. Present Condition – Pg 82, 3rd para – "Although the Savannah River Shortnose population is considered to be improving since the species was placed on the endangered species list in 1967, the apparent low level of recruitment remains a major concern". What is the reference for the shortnose sturgeon population being considered to be improving?

46. Present Actions/Stresses – Pg 86, 2nd para – "Maintenance of the Savannah Harbor Project is believed to have only minimal impacts on the Shortnose sturgeon in Savannah Harbor". What is the reference for this statement?

47. Capacity to Withstand Stress – Pg 86, 3rd para – Given the uncertainties expressed in this paragraph on the proposed project's multiple potential impacts on the Shortnose sturgeon, why would the project not have a high likelihood of violating the Endangered Species Act? Where is the discussion of SHEP compliance with the Endangered Species Act?

48. Incremental Impact – Pg 88, 8th para – "A. Conceptual plans have been developed to construct a major container terminal in Jasper County, South Carolina". Since the Jasper Terminal has been developed to the conceptual level, why is it not considered a reasonable and feasible alternative to the SHEP?

49. Incremental Impact – Pg 89 - The discussion on Incremental Impact ends on this page with no conclusion offered on the magnitude and significance of cumulative impacts to endangered species resources from past, present and future projects. Please add a discussion on this.

**Comments on DEIS Appendix M –
Sediment Quality Evaluation**

Draft Review Comments Appendix M

Sediment Quality Evaluation
Draft Tier II Environmental Impact Statement for Savannah Harbor Expansion

The investigation appears consistent with guidance and comes to what would be considered reasonable conclusions. The document uses standard ecological risk assessment methodologies to assess the potential adverse effects from exposure to cadmium in sediment in four scenarios, including:

1) Cadmium in residual surface sediments exposed in the bottom of the channel after dredging activities that provide habitat for benthic and aquatic species.
2) Release of sediments impacted with cadmium to water column as a result of dredging activities.
3) Cadmium in "wet" spoils within a Dredge Material Containment Area that provide potential habitat for wetland/aquatic species, also fate and transport (leaching to groundwater, entrainment in stormwater runoff, air dispersion).
4) Cadmium in dried sediments used for construction/maintenance of existing levee and embankment structures that provide potential habitat for both upland and wet land species.

Taking each of these:

1) The risk evaluation of residual cadmium in the bottom of the water way after dredging required several "tiers" of evaluation to get to an acceptable risk conclusion. They needed to advance their risk assessment approach to a Tier III bioavailability study in benthic organisms to determine the site-specific uptake of cadmium from sediments. The reported body burdens of cadmium and nickel increased in a dose-response type relationship. Table 37 provides summary of the toxicity reference value (TRV) derivation to identify a No Observable Adverse Effect Level (NOAEL) concentration to support a 1.12 mg/kg concentrations in benthos as protective. The TRV derivation presented in the document does not present a strong case for selection of the species used to basis for TRV selection. A detailed description of the results of the benthic survey supporting the selection of representative species would strengthen this section. The NOAEL TRV selection currently appears to be the weakest portion of the evaluation. The ecological risk assessment used standard methodology to estimate potential adverse effects to the surrounding ecosystem. Estimates of potential exposure to fish and upper-trophic aquatic receptors were calculated from concentrations in benthic tissue. The risk assessment concluded that cadmium in benthos do not pose a risk to upper trophic receptors.
2) The evaluation uses standard practices. Concentrations of elutriate testing had elevated total concentrations of cadmium; however, surface water quality criterion for cadmium is based on dissolved, which as below chronic criterion, and well below the acute criterion for cadmium.

3) The evaluation of the "wet" sediments in the MDCA used standard practices as well. Once again, cadmium is not in the dissolved aqueous phase, so groundwater impacts are not a driving concern. Cadmium is not volatile and wet sediments are not generating dust, so these pathways are also adequately addressed. The ecological exposure of terrestrial wetland species was driven by the spotted sand-piper using traditional eco-risk assessment methodology. Specific assumptions for exposure factors, toxicity factors, body weights, etc., were not evaluated at this time but the overall approach used is sound. The report concluded that cadmium may pose a risk to avian populations that use the area for nesting and foraging (sand-pipers poking their beaks into sediments pulling out invertebrates is a reasonable conclusion for cadmium concentrations ranging from 14 to 31 ppm). The report addresses the risk in the recommendations by managing MDCA to minimize bird use of the facility (e.g., could use sound cannons or other disturbances to discourage bird use).
4) The last major eco-risk assessment evaluation was on dry sediments used for levee and flood control construction. Cadmium in dried sediments appear much more bio available to plants and animals. Capping is the approach for control for "wet" sediments and keeping cadmium sediments out of the rotation management plan for use in levee and food control structure construction and repair is the mitigation. The plan proposes monitoring to evaluate the potential uptake of cadmium into plants, the monitoring plan should be carefully planned with respect to decision triggers. EA and the Corps of Engineers has differences in the calculation and interpretation of Ecological Quotients (EQs). The Corps (CENOW-HX-S) defines their approach to interpreting the EQ based on USEPA Interim Superfund Guidance in Section 4.2.3.7. of the report, however, a detailed description of the EA interpretation of the EQ is not provided. A detailed review of the approach applied by EA would need to be made to offer an opinion on the difference in interpretations between the approaches used by CENOW-HX-S and EA.

Overall the evaluation is comprehensive, but does not appear to be overly in depth in the toxicity assessment for benthics.

Comments on DEIS Appendix N –
Record of Interagency Coordination

Draft Review Comments Appendix N

Record of Interagency Coordination
Draft Tier II Environmental Impact Statement for Savannah Harbor Expansion

An email between Heinz Mueller and Brenda Willet at the Corps on 3/29/2010 (page 32-33) suggests that the model to marsh proposal may not have been approved by the Water Division, but simply approved based on the lack of a response. Is this the case? Was the proposal ever approved or formally disapproved? The final approval status should be part of the public record.

Comments on DEIS Appendix Q –
Risk and Uncertainty in Environmental Evaluation and Approach

Appendix Q Comments

Risk and Uncertainty in Environmental Evaluation Approach
Draft Tier II Environmental Impact Statement for Savannah Harbor Expansion

1. Page 1. Section 2A. The DEIS did not include field studies to gather more information on Atlantic sturgeon even though the DEIS admitted there was a paucity of information about the sturgeon and it is a candidate species that has a proposed listing of endangered.

2. Page 2, 1st Paragraph. The appendix states that abundance information was satisfied by the studies. On the contrary, no solid estimates of shortnose sturgeon abundance was determined by the studies in the Savannah River even though varying abundance estimates have been proposed. In addition, no abundance information is known for Atlantic sturgeon in the Savannah River.

3. Page 2. Section B, 1st Paragraph. The appendix states that the agencies approved all of the models as acceptable for determining environmental impacts. However, the NMFS did express concern about the use of "acceptable vs. unacceptable" for determining available habitat for fish in the river and in the alternative proposed a gradient of scores in order to indicate the varying level of impact and available habitats. After much discussion NMFS conceded that the use of "acceptable vs. unacceptable" was okay for now. This would indicate that NMFS deemed it to be insufficient for a final determination of impacts to the fisheries resources in the river.

4. Page 3, Last paragraph. The appendix states that the use of multiple species will eliminate reliance on a narrow view of the ecosystem, thereby reducing the risk of not identifying a critical impact. The use of multiple species for impact assessment does provide breadth and depth of impact analysis. However, if the biological variables used in the impact assessment are flawed, the impact assessment is not an accurate representation of the total impacts. For example, the DO levels used to assess the acceptable habitat for shortnose sturgeon were determined as those levels at which shortnose sturgeon could survive in a laboratory setting. The DO values were much lower than DO values collected in a shortnose sturgeon habitat association study conducted in the Savannah River. Thus, the use of lower DO values than what the shortnose sturgeon would utilize would overestimate the acceptable habitat in the river after the project is constructed.

5. In Section 3 page 6. With the exception USFWS none of the resource agencies provided specific comments on the uncertainties associated with the salinity model. Why? The USFWS stated, "... we believe that salinity prediction performance is adequate to use in project planning. However, we must reiterate that there continues to be a limited understanding and modeling ability of the velocity and flow dynamics in the Middle River, Little Back River and Back River. This limitation will cause some uncertainty regarding salinity and water quality predictions for mitigation alternatives that involve channel modifications in the Savannah River system." We concur with the USFWS statement and believe this opinion is likely shared by other resource agencies. The Corps

should consider refining the model, collecting additional data and developing a more specific contingency plan.

6. Page 4, 2nd Paragraph, line 17. The appendix states that criteria used to determine the acceptability of fish habitat were on the conservative side. As stated in the comment above, the use of lower DO values than were documented in known fish use areas is not a conservative estimate, but instead provides an overrepresentation of available fish habitat.

7. Page 4, Section 3, 1st Paragraph. This will provide information that tells you how bad one dredging alternative is compared to other dredging alternatives, but it doesn't tell you how bad a dredging alternative is compared to a different non-dredging project. The DEIS doesn't consider other true alternatives that would allow shipping, but with less impacts. For example, there is no mention of any other ports that could be used without the need for the extensive upriver dredging.

8. Page 6. USFWS quote. The USFWS has accepted the use of the salinity model in project planning. Note: project planning should not include the detailed impact determination and mitigation modeling and monitoring that will need to be completed for endangered species consultation and incidental take permitting process, which is likely to be necessary due to the likelihood that the project will impact instream habitat to the degree that it will result in the take of a threatened or endangered species.

9. Page 11, 1st Paragraph. Did the USGS review the supplemental report to ensure the report addressed the concerns the USGS expressed about the previous draft. No mention is made that the USGS received the supplemental report or agreed with the findings.

10. Page 11, Section B, 3rd Paragraph. How much was the DO improved? Did the DO improvement corroborate the levels proffered in the DEIS? No mention is made as to how the DO improvement compared to that which has been provided as a basis for adequate mitigation.

11. Page 11, Section B, 4th Paragraph. The text claims that monitoring will reduce the risks associated with the effectiveness of the DO improvement system. Monitoring will not reduce the risk of the effectiveness of the DO improvement system. It will reduce the risk of not noticing a non-functional DO improvement system. A reduction in risk associated with effectiveness would be reduced via a proposal of alternative technologies that would also be effective. None have been discussed here as a fallback.

12. Page 12, Section 7A, 2nd Paragraph. Second to last sentence re: acceptable vs. unacceptable. In the case of shortnose sturgeon, the team ignored the field data collected on shortnose sturgeon habitat use in the Savannah River when determining acceptable DO levels. Ignoring the data from the river resulted in a DO threshold level far below that in which sturgeon are typically found thus creating undue risk that the models underestimated the impacts to fish, specifically demersal sturgeon that are potentially the most at risk to depressed DO levels.

13. In the last sentence of Section 4A. The Corps states that they consider the wetland impact acreages to be valid within +/- 50 acres. This is too large of a margin of error. The models should be refined and or additional data needs to be collected to reduce the margin of error.

**Comments on DEIS Appendix R –
Section 103 Evaluation**

Appendix R Comments

Section 103 Evaluation
Draft Tier II Environmental Impact Statement for Savannah Harbor Expansion

1. Section 8, Page 18, 1st Paragraph. The document states that the District believes there will be no significant environmental impact; however, the use of the disposal area was not reviewed in the DEIS. The DEIS simply states that the area was approved in 1996 and therefore environmental review of the disposal area was not necessary. Dependence upon an environmental review completed in 1996 is not adequate given the probability of changed circumstances as well as the new listing of a substantial number of threatened and endangered species since 1996.

2. Page 19, Subsection b(i). See above comment.

Comments on DEIS Appendix S –
Essential Fish Habitat Evaluation

Appendix S Final Comments

Essential Fish Habitat Evaluation
Draft Tier II Environmental Impact Statement for Savannah Harbor Expansion

1. Page 5, Section 2. Unsubstantiated claims about the absence of habitats in the project impact area. References or field work should be cited to corroborate this claim.

2. Table 3-1. The column headings are unclear. Column 2 appear to be total acres affected. Column 3 appears to be non-wetland acres affected. However, it is not readily discernible based on the information.

3. Page 6. First line. The narrative states that 14.08 acres could be considered wetlands. Are they or aren't they wetlands? Has a study been completed to verify any of the information? How do you know that the remaining 15.92 acres is high ground if no wetland delineation has been performed.

4. Figure 3-1. The image is of such poor quality that it is not legible for review.

5. Figure 3-2. Most of the image is missing precluding review.

6. Figure 3-3 is not cited in the text and does not include a legend. It is impossible to tell what this figure is trying to convey.

7. Page 10. Section 3.2- The document skips any discussion of avoidance or minimization of impacts. It does not discuss how the project was assessed for modifications to avoid or minimize impacts. Rather it assumes the project will move forward and begins a discussion of how it will be mitigated.

8. Typically, part of the NEPA process involves an alternative project that does not involve that which is proposed, but still accomplishes some or all of the project purpose. In this DEIS, the only options that are presented are variants of the same project. The presentation of a single project does not allow for sufficient evaluation of the environmental impact of a project under NEPA.

9. Page 11. Will the mitigation area provide fish access at an adequate level to replace the value of the essential fish habitat lost due to project impacts?

10. A common thread throughout this document is the failure to relate the project impacts and mitigation to the actual effects on fish and fish access to these areas.

11. Figure 3-4. poor quality figure, no key. No discussion of water elevations in ditch versus the wetland. Difficult to determine exactly where this area is located without an inset map.

12. Page 13, Section 4.1 - This section actually only provides one full sentence and one table discussion of project impacts. The narrative avoids discussion of the degree to which salinity will move upstream, any avoidance or minimization efforts, or methods of determining the amount of impact. The narrative's focus on mitigation measures without discussing impacts, avoidance, and minimization suggests the Corps has not adequately addressed ways to reduce impacts and it simply using the DEIS to justify the project that it has been authorized to construct.

13. Page 15. Table 4-3 is not referenced in the text.

14. Page 16. Under what flow scenarios was the model conducted? Did it account for field-truthed conditions? Did it account for boat wake effects?

15. Page 17. The bullet points intermix impact and mitigation discussions. Much of this text actually describes the impact, but the unclear delineation of the two makes this document difficult to read and understand.

16. Pages 28-30. Table 4-5 through 4-11 are labeled as x-foot deepening alternative. This is misleading and difficult to follow given the balance of the appendix and the DEIS refers to the alternatives as 4x-foot alternative.

17. Page 32. Paragraph 2, line 8. The mitigation includes enlarging a creek. The document should include this as an impact that should be mitigated by the mitigation plan. No discussion of mitigation for impacts due to mitigation is offered.

18. Page 34, Paragraph 1, lines 11-13. The text discusses using the Corps standard operating procedures (SOP) in order to quantify the ecological impacts including the type, duration, and preventability. Very little detail, if any, is provided in the document to show the type, duration, and preventability of any impacts proposed by this project.

19. Page 35. The text discusses how the SOP was used to assess the impact to wetlands and the acres of mitigation realized in the model. It does not, however, at any time put the loss of wetland or the replacement of wetland in the context of fisheries. The entire purpose of this section is to address essential fish habitat and at no time does the document discuss how fish populations will be affected by the destruction of essential fish habitat or the accessibility of the newly created essential fish habitat.

20. Page 37, 2nd to last line. The text should reference Figure 4-12. It is difficult to follow the text and figures without proper citations.

21. Page 39. Section 5.1

22. First line. The line claims extensive studies have been conducted, but cites none. Only two studies are included below and neither appears to deal directly with fishes that may be found in the Savannah River.

23. The lack of information on sturgeon is a critical information gap that precludes adequate assessment of the potential for impact.

24. Section 5.1, 2nd paragraph, lines 9 - 13. The information included in this sentence are unsubstantiated by any other study or reference material. Citations should be included. For example, how can the inference be made that the suspended sediment loads would likely be uniform without having data to corroborate that information? How would the sediment interact with the salt wedge that otherwise restricts mixing?

25. Page 40, 1st full paragraph. How far upstream will the salinity increase? This is crucial information for assessing impacts on essential fish habitat, but it is impossible to determine this information from the text.

26. Page 41, 1st full paragraph. The dates listed in lines 7 and 10 do not appear to be accurate. It is difficult to know which dates were actually modeled and what the respective dates are intended to represent.

27. Page 45. The Corps used a 0.25 mg/l decrease in DO as the determination of DO violations. However, this document is intended to asses essential fish habitat. The Corps has not shown how a 0.25 mg/l decrease relates to essential fish habitat and the fish that the habitat is intended to harbor. This is an example of the continual disconnect between use of the model to calculate a result with little discussion as to the meaning of the inputs or outputs as they relate to fish in the harbor.

28. Tables 5-3 through 5-7 do not appear to be referenced correctly in the corresponding text. The disorganization of the document makes review difficult.

29. Page 51, Section 5.3, 3rd paragraph. Line 7. - The screens should also be size to minimize impingement of fish. No sources have been cited to substantiate the velocity of flow being proposed. No estimates have been made of the species that may be entrained or impinged by the system and the mitigation that would be required for that mortality.

30. Page 52. Line 1. The text references Table 5-4 for the desirable oxygen levels. Table 5-4 does not include oxygen levels. It is impossible to asses this information with incorrect citations.

31. Page 54, 1st paragraph, last line. Table appears to be incorrectly cited in the text.

32. Page 57. Section 9.0. The text dismisses the mapped hardbottom areas without completing any assessments prior to doing so and does not provide any remedial

actions that will be taken if a hardbottom area is found. Will the channel be moved? Avoidance should be considered prior to mitigation.

33. Page 60. Section I. - The text dismisses the mapped hardbottom areas without completing any assessments prior to doing so and does not provide any remedial actions that will be taken if a hardbottom area is found. Will the channel be moved? Avoidance should be considered prior to mitigation.

34. Page 63. Section 11.0 - The impact summary states that the proposed action would have adverse impacts on an endangered species, an important game fish species, and two types of marshes, presumably upon which many species of fish depend. Nonetheless, the text dismisses the adverse impacts as non-significant without providing sufficient detail as to how the non-signficant status had been applied. Furthermore, the assessment provided little information as to how the project will impact essential fish habitat from an accessibility perspective. The mitigation of essential fish habitat through the restoration of inaccessible marsh habitats or the purchase of woodland does not provide adequate replacement for the essential fish habitats that will be lost due to this project.

ATTACHMENT 2
VERBATIM AGENCY COMMENTS

South Carolina Department of Natural Resources Comments

DRAFT TIER II ENVIRONMENTAL IMPACT STATEMENT FOR THE SAVANNAH HARBOR EXPANSION

Major points addressed in the DEIS and DNR responses:

The stated purpose of the proposed Savannah Harbor Expansion Project (SHEP) is to save current and future shipping costs due to draft restrictions on larger vessels. The DEIS presents an analysis of the impacts of project depth alternatives ranging from 42 ft (the "no action" alternative) through 48 ft. The US Army Corps of Engineers (USACE) has tentatively identified the 47-ft depth alternative as the National Economic Development (NED) Plan, i.e., *"the plan that maximizes net economic benefits to the Nation and fully complies with Army policy."* The Maximum Authorized Plan of -48 ft is supported by the non-Federal cost share sponsor. Although it is acknowledged in the DEIS that environmental impacts associated with shallower depths would be less than those associated with the NED plan, the DEIS concludes that *"the lesser impacts of the 44-foot depth, 45-foot depth, and 46-foot depth alternatives are not considered sufficient to justify recommendation of these alternatives instead of the NED Plan"*. The DEIS further concludes that all depth alternatives, with the inclusion of proposed mitigation features, are *"environmentally acceptable."*

- DNR disagrees with this conclusion, and believes that the only two deepening alternatives that might be considered environmentally acceptable are the 44-ft and the 45-ft alternatives, provided the proposed mitigation is effective in minimizing any adverse impacts of these alternatives. Obviously, the "no action" alternative (i.e., maintaining the channel at the currently authorized depth of 42 ft) would have the fewest adverse environmental impacts.

- The NED Plan (i.e., the 47-ft alternative) would involve the initial excavation of about 28 million cubic yards of dredged sediment, and would result in both direct and indirect impacts to natural resources. Direct impacts would result from the physical removal and disposal of sediments, while indirect impacts would result from increased salinity intrusion and reduced dissolved oxygen levels. These impacts include adverse effects on managed freshwater wetlands in the Savannah National Wildlife Refuge; loss of tidal freshwater wetlands; loss of foraging and nursery habitat for the endangered shortnose sturgeon (SNS); loss of fringing brackish marsh; and loss of striped bass habitat.

- As stated in the DEIS, the extent of direct wetland impacts resulting from the excavation of bend wideners would not differ substantially among the five deepening alternatives considered. In each case, a total of 14.08 acres of salt and brackish marsh would be affected. In the absence of an approved saltwater mitigation bank in the Savannah River Basin, the USACE proposes to mitigate for these direct losses by grading down approximately 42 acres of a former confined dredge spoil disposal site (CDF 1S) near the confluence of the Front and Middle rivers to an elevation that would support *Spartina alterniflora*. A "feeder" creek system would also be constructed toward the interior of the restored marsh. This area would then be allowed to revegetate naturally. Active planting of *Spartina* would only be conducted if the area did not revegetate naturally at a rate that would provide 15% vegetative

cover after 1 year and 80% vegetative cover after 5 years (with interim goals of 25, 40, and 60% cover at the end of two, three and four years, respectively). Conceptually, DNR concurs with this approach to mitigating for the direct loss of brackish and saltwater wetlands resulting from any of the deepening alternatives; however, DNR's overriding concern about the indirect effects of harbor deepening should be given greater weight.

- As stated in Chapter 5 of the DEIS, *"All of the deepening alternatives would adversely impact tidal freshwater marsh."* Model predictions indicate that, without mitigation, deepening the harbor would result in the conversion of tidal freshwater marsh to brackish marsh as a result of increased salinity intrusion. Under conditions of average flow and low sea level rise, the acreage of freshwater marsh that would be lost as a result of deepening is predicted to range from 551 acres for the 44-ft alternative to 1,212 acres for the 48-ft alternative, assuming no mitigation is implemented. With the flow-altering modifications proposed as mitigation by the USACE, however, the acreage of freshwater marsh is actually projected to *increase* by 332 acres with the 44-ft alternative; whereas, a net *loss* of freshwater marsh (ranging from 32 acres for the 45-ft alternative to 337 acres for the 48-ft alternative) would still result from the other deepening alternatives, even with mitigation. Considering the substantial loss of tidal freshwater wetlands that has already occurred as a result of past dredging operations and other modifications to the system, the DNR considers anything more than a *de minimis* loss of freshwater wetlands to be a significant adverse impact of the proposed deepening project.

- The USACE proposes to minimize indirect impacts due to increased salinity intrusion by implementing several flow-altering modifications of the Savannah River system. These include diverting more fresh water down the Little Back River at McCoy Cut; removing the Tidegate abutments and piers in the lower Back River; allowing the sediment basin below the Tidegate to fill in by constructing a submerged sill at the lower end of the basin; and closing Rifle Cut.

- As discussed in the DEIS, there are significant concerns related to the predicted decrease in dissolved oxygen that would result from the proposed deepening project. The primary area of concern for dissolved oxygen is the portion of the Savannah River between Fort Pulaski (River Mile 0.0) and the Seaboard Coastline Railroad Bridge (Mile 27.4). This is the section of the Savannah River estuary that would be directly affected by the deepening project. As noted in the DEIS, this segment of the river is on Georgia's Section 303(d) list as impaired for dissolved oxygen. Modeling studies conducted in support of the development of a Total Maximum Daily Load (TMDL) for dissolved oxygen in Savannah Harbor estimate that the existing dissolved oxygen concentration in Savannah Harbor is 1 mg/l lower than it was during the baseline year (1854) and condition (12-foot controlling depth) because of dredging operations that have been conducted since then. Model predictions from the SHEP studies indicate that further deepening will have additional impacts on the dissolved oxygen regime in Savannah Harbor.

- The USACE proposes to minimize impacts due to the incremental decrease in dissolved oxygen (DO) levels by installing several land-based oxygen injection

systems ("Speece Cones") at three locations in the estuary where DO levels are predicted to be lower as a result of deepening. The number of cones installed would range from eight to ten, depending on the depth alternative selected. Water would be withdrawn from the river through pipes, then super-saturated with oxygen and returned to the river. The systems would be operated to provide the needed amount of oxygen for the depth alternative selected during the summer months (July, August, and September). The DO system configuration is designed to remove the incremental effect of a deeper channel in 97 percent of the cells in the hydrodynamic model.

- As reported in the DEIS, hydrodynamic and water quality modeling conducted in support of the deepening project suggest that the proposed mitigation features (i.e., the flow-altering plans discussed above and the DO injection systems) would substantially reduce project impacts to freshwater wetlands and some species of fish. While DNR does not necessarily dispute the hydrodynamic and water quality modeling results, we are concerned that there is still substantial uncertainty regarding the predicted magnitude of adverse impacts and the effectiveness of the proposed mitigation measures, particularly, the oxygen injection system. The results of a demonstration project conducted to determine the effectiveness of the system in Savannah Harbor were inconclusive. The slight increase in dissolved oxygen in the vicinity of the Speece Cones was shown to be within the normal range of natural variability due to tidal influences, and could not be definitively attributed to the oxygen injection system itself. Furthermore, the long-term effectiveness and viability of this system in a tidal brackish water environment is highly questionable. The minimal net improvement in DO predicted by the model may not be sufficient to warrant the initial cost of the system or the long-term maintenance costs. Instead, DNR recommends that adverse impacts to dissolved oxygen levels be minimized by deepening to no more than -45 ft.

- DNR also is concerned that some or all of the flow-altering modifications could have unintended consequences that result in additional adverse impacts to natural resources. Significantly, the modifications proposed to reduce salinity intrusion into the Back River to protect tidal and managed freshwater wetlands could result in increased salinity intrusion into the Front and lower Middle rivers, where both juvenile and adult SNS have been found to concentrate, particularly during the winter when temperatures are below 22° C (Collins et al., 2001). In fact, Table 5-30 shows that the loss of adult SNS habitat in winter would be much greater *with* the flow alterations (maximum loss of 439 acres for the 48-ft alternative) than *without* them (maximum loss of 44 acres for the 48-ft alternative). Conversely, the loss of adult SNS habitat in summer and juvenile SNS habitat in winter is predicted to be *less* with the proposed flow-alterations than without them.

- The deepening alternative that is predicted to have the least negative impact on SNS habitat *overall* (including adults and juveniles during winter and summer) is the 44-ft alternative, which would result in a net loss of approximately 60 acres of SNS habitat with flow-altering mitigation, and 151 acres without flow alterations. By comparison, the NED Plan (i.e., the 47-ft alternative) is predicted to result in a net loss of 473 acres of SNS habitat overall with flow alterations (or a loss of 545 acres without flow alterations). The locally preferred plan (i.e., the 48-ft alternative) would result in even

greater net losses of SNS habitat overall. DNR considers magnitude of these impacts to the habitat of shortnose sturgeon to be unacceptable, with or without mitigation.

- Other unintended consequences of flow alterations could also occur. Recent and ongoing tagging studies suggest that SNS may move freely between the Front, Middle and Back rivers via Steamboat Cut and Rifle Cut *(cite report, in prep)*. If this proves to be the case, closing Rifle Cut could impede this movement, and limit SNS access to suitable foraging and nursery habitat. In addition, DNR field biologists have recently reported that the sediment basin in the lower Back River has already filled in to a large extent, and that any further deposition of sediments in this area could present another impediment to SNS migration throughout the system.

- The USACE proposes to provide compensatory mitigation for unavoidable impacts to SNS foraging and nursery habitat by constructing a fish passage structure around the New Savannah Bluff Lock and Dam (NSBLD) near Augusta, at a projected cost of $6.3 million. The structure (a rock ramp) would be located on the South Carolina side of the river, and would theoretically provide SNS access to approximately 20 miles of upstream spawning habitat. DNR believes the likelihood that this approach would be successful in passing SNS is highly doubtful. While such a fish passage structure might benefit other migratory fish, its success in passing SNS has never been demonstrated. Because of its unproven success, DNR is opposed to implementing active fish passage as mitigation for unavoidable impacts to SNS habitat, and believes that the best approach to protecting shortnose sturgeon habitat would be to minimize those impacts by selecting either the "no action" alternative or the 44-ft deepening alternative (with flow-altering mitigation).

- While impacts to SNS would be minimized by selecting either the no action alternative or the 44-ft alternative, modeling results presented in the DEIS suggest that the overall net loss of striped bass habitat (including suitable habitat for spawning, eggs and larvae) would be less with the 45-ft alternative. Because of this apparent benefit to striped bass, an important recreational species whose population in the lower Savannah River has been drastically reduced by earlier dredging operations and flow-altering modifications to the system, DNR would consider the 45-ft deepening alternative (with flow-altering mitigation) to be acceptable, as well.

- The USACE also proposes to provide compensatory mitigation for unavoidable impacts to tidal freshwater wetlands. Initially, an attempt was made to identify other sites in the Savannah River estuary that could be used for restoration or creation of tidal freshwater marsh; however, neither the USACE nor any of the stakeholders could find any suitable sites that were available within the Savannah River Basin. In the absence of any such sites, the USACE (in consultation with the USFWS and other natural resource agencies) used the Savannah District Standard Operating Procedures (SOP) to calculate the minimum number of acres that would need to be acquired and preserved to acceptably mitigate for unavoidable freshwater wetland impacts. Using this procedure, it was determined that the total acreage of wetlands that would need to be preserved ranged from 0 acres for the 44-ft deepening alternative (with flow-altering mitigation) to 2,683 acres for the 48-ft alternative (with flow-altering mitigation). The USACE proposes to acquire lands identified in the latest version of

the Savannah National Wildlife Refuge Acquisition Plan (dated July 2007), and provide them to the USFWS to manage as additions to the Refuge as compensatory mitigation for unavoidable wetland impacts from the deepening project. Priority will be given to acquiring properties that are dominated by freshwater wetlands. DNR concurs with this approach to mitigating for any unavoidable impacts to tidal freshwater wetlands, particularly since most of the indirect impacts of deepening would occur within the Savannah National Wildlife Refuge. DNR recommends that any such acquired properties be made accessible to the public for educational and recreational activities that are consistent with the wildlife management goals of the Refuge.

South Carolina Archives & History Center,
State Historic Preservation Office Comments

RECEIVED DEC 9 2010

December 7, 2010

South Carolina Archives & History Center

Mr. William Bailey
ATTN: PD
Corps of Engineers, Savannah District
100 W. Oglethorpe Ave.
Savannah, GA 31401-3640

Re: Savannah Harbor Deepening
Tier II Environmental Impact Statement, draft
Jasper County, South Carolina
SHPO Project No. 03-VM0063

Dear Mr. Bailey:

Thank you for your letter of November 15, which we received on November 17, regarding the above-referenced project. We also received a copy of the draft Tier II Environmental Impact Statement (DEIS) as supporting documentation for this undertaking. The State Historic Preservation Office is providing comments to the Corps of Engineers pursuant to Section 106 of the National Historic Preservation Act and its implementing regulations, 36 CFR 800. Consultation with the SHPO is not a substitution for consultation with Tribal Historic Preservation Offices, other Native American tribes, local governments, or the public.

As the proposed project will occur in both South Carolina and Georgia, we understand that all Section 106 consultation will be coordinated between our office and the Georgia State Historic Preservation Office (SHPO). Therefore, the comments in this letter only reference those portions of the overall project that have an area of potential effect (APE) in South Carolina.

Our office concurs with the determination in the DEIS on the "Previously Disturbed Areas within the Area of Potential Effect for which No Historic Property Investigations are Proposed" (sections 4.10.3 and 5.12.2). We understand that the following cultural resources investigations will be coordinated with our office:

- Full-channel-width Dredging Area (SC waters)—Stations +41+500 to +49+500: Previous underwater archaeological survey identified two anomalies/targets that will be relocated and assessed for their eligibility for the National Register of Historic Places. These targets are SH-R16-2 and SH-R17N-1.
- Meeting Areas (GA and SC Waters—Stations +55+000 to +68+500): Two Confederate crib obstructions were identified in a 2005 underwater archaeological survey of this portion of the project. Our office concurs that these crib obstructions are eligible for listing in the National Register. It is not clear from the DEIS if these historic properties will be affected by the project. Additional consultation with our office is needed on this portion of the project.

S. C. Department of Archives & History • 8301 Parklane Road • Columbia • South Carolina • 29223-4905 • (803) 896-6100 • http://scdah.sc.gov

- New Savannah Bluff Lock and Dam Fish Ladder: The Corps will construct a fish ladder at the New Savannah Bluff Lock and Dam as part of the environmental mitigation of this project. The Corps will conduct a cultural resources survey prior to construction. Additional consultation with our office is needed on this portion of the project.

Our office concurs with the determination that the proposed Savannah Harbor Deepening project will have an adverse effect on the *CSS Georgia*, a Confederate naval vessel listed in the National Register and located in the waters of both Georgia and South Carolina. We also concur with the Corps' proposal to mitigate the adverse effects on the *CSS Georgia* by conducting data recovery and conservation of the ship and associated artifacts. A draft timeline of the steps in mitigation is included in the DEIS.

In preparation for this complex undertaking, our office consulted with the Corps of Engineers in 2005 and 2006 on a programmatic agreement designed to manage the effects to historic properties. We request that the Corps update our office and consult with us on a revised programmatic agreement that encompasses the studies and the revised project area.

We look forward to continuing to work with the Corps on this project. If you have any questions, please contact me at (803) 896-6183 or dobrasko@scdah.state.sc.us.

Sincerely,

Rebekah Dobrasko

Rebekah Dobrasko
Supervisor of Compliance, Tax Incentives, and Survey
State Historic Preservation Office

cc: Chris Amer, SCIAA
Barbara Neal, SCDHEC-OCRM
Dean Moss, Savannah River Maritime Commission
Elizabeth Shirk, GA SHPO

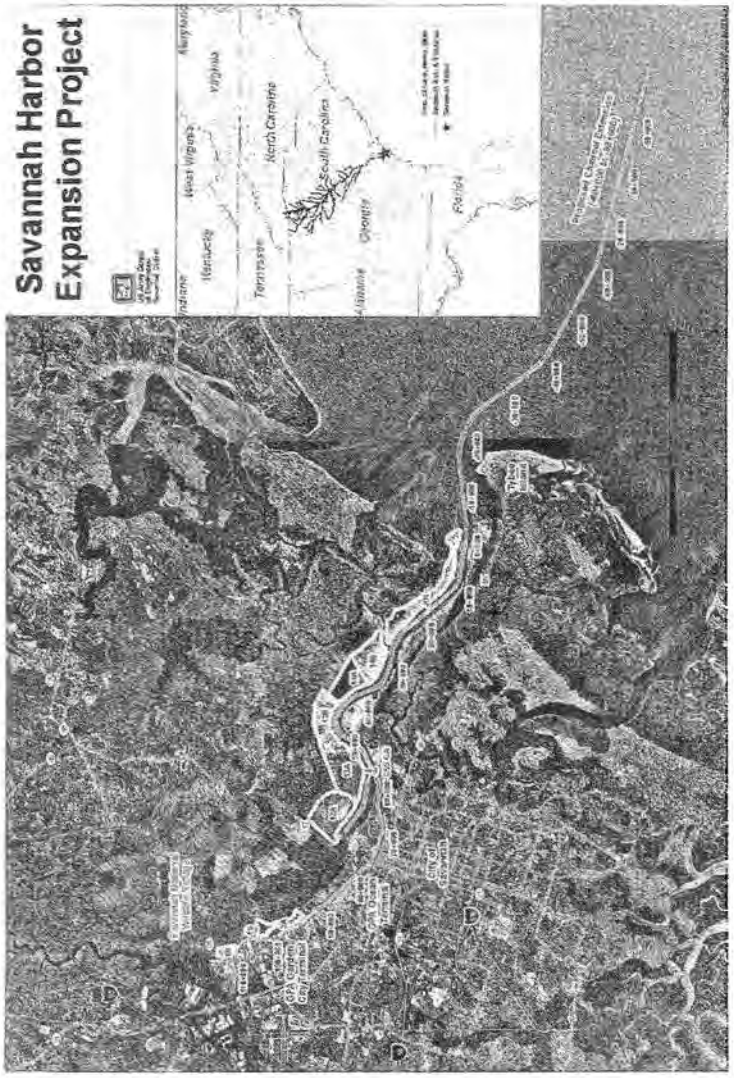


Figure 3-1. Project Area

3-5

South Carolina State Ports Authority Comments

South Carolina State **PORTS AUTHORITY**

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John F. Hartley, Jr.
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Parkers Island

Karen R. Floyd
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Douglas M. Robertson
Bluffton

Ex-officio Members:

H. B. "Rock" Lighthouse Jr.
Secretary of Transportation

Joe E. Taylor, Jr.
Secretary of Commerce

James L. Newtome, III
President & CEO

December 17, 2010

Mr. Dean Moss
Chairman, Savannah River Maritime Commission
c/o Beaufort-Jasper Water & Sewer Authority
6 Snake Road
Okatie, SC 29909

Dear Chairman Moss:

Please accept the following comments, to the Draft Environmental Impact Statement on the Savannah Harbor Expansion Project, in response to your request for input from member representatives on the Savannah River Maritime Commission.

As a co-owner of approximately 1500 acres of property in Jasper County with the State of Georgia Department of Transportation, the South Carolina State Ports Authority has certain interest in the disposition of this harbor deepening project.

The Savannah Harbor Expansion Project, if completed as currently described at either 47 or 48 Ft of depth, does not likely provide sufficient harbor depth and width necessary to make the Jasper Ocean Terminal a viable project. We now know that over 80 percent of container ship capacity on order is post-Panamax in size and will require harbors with 50 feet mean low water and unrestricted two-way ship traffic capability, such as offered by New York, Baltimore, and Norfolk today, to reliably make Panama Canal appointments. It is thus likely that investment in the Jasper Ocean Terminal would require a further harbor deepening project to be cost-justified.

If the Savannah Harbor Expansion Project is approved, the cost of dredging the 48 ft channel to the Garden City Terminal and the resultant environmental damage would make it extremely difficult if not impossible to get the additional dredging to 50 ft needed to make Jasper Ocean Terminal viable.

Additionally, if the disposal cells on which the Jasper Ocean Terminal is presently sited are used, as is currently in the Savannah Harbor Expansion Project, then this would preclude the construction of the terminal.

Since both Georgia and South Carolina have agreed to proceed with the Jasper Ocean Terminal we believe that the Jasper Ocean Terminal must be considered in the review process.

Sincerely,

Colden R. Battey, Jr.

Colden R. Battey, Jr.

Lowcountry Economic Alliance Comments

917 bay street, suite 207, beaufort, sc 2990
www.lowcountrynet.or

January 7, 2011

Mr. William Bailey
ATTN: PD, US Army Corps of Engineers, Savannah District,
100 West Oglethorpe Avenue
Savannah, Georgia 31401-3640

Dear Mr. Bailey,
Thank you for the opportunity to review and submit comments relating to the Environmental Impact Statement (EIS) of the Savannah Harbor Expansion Project (SHEP). As the neighboring region, we certainly appreciate the significance of this project and massive scope of the work presented.

The Lowcountry Economic Alliance (LEA) is a regional economic development group jointly formed by Beaufort and Jasper counties to promote the region and create a format for evaluating and supporting projects of significance to our area.

To that, we have reviewed the SHEP EIS and specifically the Economic Impact Section and have consulted with Dr. James Kleckley of East Carolina University for additional review.

In summary, we did not find any fatal flaws in the economic analysis contained in the EIS. We can conclude from the data that the project will create a more competitive shipping environment, but the report stops short of translating that eventual cost savings into relevant economic impact data for the purpose of community stakeholder review.

The analysis does not provide us with information whereby we can determine the value of the project to our region. Additional economic review must be done in order to properly understand the economic value of this project on counties in South Carolina and Georgia.

This project is critical to our economic development efforts. The market is clearly demonstrating that to us in our business recruitment efforts. The residents of both states need to be aware of the immediate and long-term benefits.

We respectfully request your consideration of more in-depth economic analysis as we move forward with our regional partners to do the same.

Sincerely,

Kim Statler

Summary of Findings: Review of Savannah Port Studies

January 5, 2011

James W. Kleckley, PhD

This memorandum summarizes the findings of my review of an economic impact study prepared by the University of Georgia (GA Study) and an economic appendix prepared by the U.S. Army Corps of Engineers (Corps Study). I have examined these documents with respect to data, analysis, statements, and implications contained therein with respect to the impact of a proposed dredging project for the port of Savannah, Georgia (Savannah Port) on the economy of South Carolina and, in particular, Jasper County, South Carolina.

More fully described, the documents under review are:

1. The Economic Impact of Georgia's Deepwater Ports on South Carolina's Economy in FY 2009, Selig Center for Economic Growth, The University of Georgia, April 2010 (GA Study)

2. Economics Appendix: Savannah Harbor Expansion Project, US Army Corps of Engineers, Savannah District, South Atlantic Division, November 5, 2010 DRAFT (Corps Study)

Based on my review of the two studies, I did not find any "fatal flaws" in these analyses. However, the economic impacts found in the studies are either inadequate or incomplete.

I have identified several shortcomings with respect to my area of focus, which is the measurement and forecasting of economic impacts in the region that is served by and serves the Savannah Port, with particular emphasis on impacts that may occur in Jasper and Beaufort Counties and other parts of the State of South Carolina. Based on my review of these studies it is clear that neither document does an adequate job of assessing the operational economic impacts of the Savannah Port upon the South Carolina economy. The GA Study makes no attempt to measure such an impact. The Corps Study does explore the impact of port operations in Savannah, however the methodology is weak and the region of study is improperly defined. Although the latter report does include a brief discussion of planned port improvements, neither study provides insights or analyses with respect to the stimulative economic impact of construction and equipping of new port facilities that have been planned by the Georgia Ports Authority (GPA) in connection with the Savannah dredging project.

I will provide brief overviews of these documents later in this summary, but first I think that I need to explain what I was searching for in the reports.

Impact Background

I would argue that there are two types of economic impacts that can be measured in regard to a deepwater port. The first would be the Port Client/User Impacts. These impacts are best measured in terms of the trade flow generated by consignees and shippers that are dependent upon the port as a transshipment point. The second impact category is seen in measures of ongoing port operations, or activities and expenditures associated with port services and capital improvements.

These two categories of impacts go hand-in-hand. Increased trade activity associated with the port should generate more activity at the port (and more jobs). Moreover, the larger or better the port facilities, the more likely that firms will use the facilities. Again, more use translates into more activity and jobs.

A good example of a study that explored both user and operational impacts was produced by Wilber Smith and Associates for the South Carolina Ports Authority (SCPA) in October 2008. Although I have not evaluated its conclusions, I find that the approach that the report's authors took to complete a comprehensive evaluation of the impacts of a port was methodologically sound. The SCPA report also addressed substate or regional impacts, which I would argue are important with regard to understanding operations (i.e., how many workers are directly and indirectly supported by port activities) associated trade activity.

For example, if one looks at the available commuting pattern data[1] they will see that the counties of Jasper and Beaufort impact and are impacted by Chatham County, the location of the Savannah Port. We know from these data that 1,135 Beaufort residents commuted to Chatham County while the number from Jasper was 820. One would suspect that a good portion of these commuters work at the port or for service companies associated with the port. Thus, the regional impact of the business (i.e., the port) should be included in the assessment.

The Wilber Smith Study, which used IMPLAN to measure impacts, divided the State's 46 counties into six regions. The port operations are contained within the *Tri-County Region* (Berkeley, Charleston, and Dorchester Counties). Jasper and Beaufort Counties are contained within the *Lowcountry Region* along with the counties of Colleton and Hampton. As one would expect, most of the operational impacts (i.e., the jobs) are close to the port (the Tri-County Region). Still, operational impacts occur throughout the state, according to the authors. The majority of the Port User Impacts are associated with the Piedmont (i.e., Greenville, Spartanburg, and surrounding counties). This result is not unexpected, as the upstate is a principal manufacturing region of South Carolina, so this region should logically ship more goods to other areas (i.e., to other countries via the Charleston port).

The SCPA report identifies the economic activity around port operations and demonstrates how different parts of South Carolina benefit from the Authority's Charleston and Georgetown operations. In a similar fashion, an impact report addressing Savannah Port operations should include the impact upon Chatham County (GA) and its surrounding communities, including those in South Carolina. Further, and as an extension to the work done by Wilber Smith, a separate and distinct report should be generated to understand the regional impact of a large capital investment like the proposed Savannah dredging project.

(1) The Economic Impact of Georgia's Deepwater Ports on South Carolina's Economy in FY 2009

It is my opinion that the authors of the GA Study have adequately presented historical trade flows (imports and exports) from the Georgia ports to and from South Carolina. The report also appears to have relied on credible sources for the data presented. Like the South Carolina Ports report, this study uses IMPLAN to conduct the analysis. However, the focus of this study is directed solely at the trade flow component, or Port User Impact as defined in the SCPA study. There are no regional impacts

[1] The most reliable commuting pattern data currently available comes from the 2000 Census. While the numbers will change with the 2010 update, the share of commuters to surrounding counties should be fairly consistent.

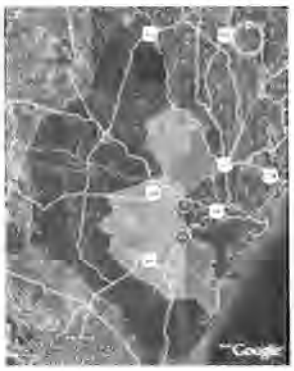
defined within South Carolina, although I suspect that the authors could have produced such a report if asked. The major shortcoming of this analysis, with respect to my task, is the fact that the operational impact of the Savannah Port upon the South Carolina economy was omitted from the study. Additionally, these authors do not address any of the investment or construction activity impacts that can reasonably be expected to occur in connection with the proposed Savannah dredging project.

(2) Economics Appendix: Savannah Harbor Expansion Project

On the cover of the report by the US Army Corps of Engineers it is explicitly stated that the expansion project is in Chatham County, Georgia and Jasper County, South Carolina. However, the report ignores any economic impact that would occur in South Carolina, thereby telling me that the economic analysis is seriously flawed.

The majority of this report I will call a transportation feasibility study. In other words, the content is primarily centered on shipping and the arguments for expanding the port to capture additional cargo demand. The exception is Chapter 8, Regional Economic Impact Analysis. Here, the authors make an attempt to model the impact of operations solely within Georgia and some of its counties. The omission of South Carolina and its counties (particularly Jasper) from the analysis makes no sense if part of the capital improvements associated with the dredging project will be located in Jasper County, South Carolina. Moreover, the inadequate regional definition is not the only problem I have with the Corp's assessment.

The Corp's methodology uses a multivariate least-squares regression analysis to forecast impacts. It argues that additional tonnage at the port should generate additional income. While I agree with the correlation of activity, I feel that it is difficult to reach a reasonable conclusion about impacts in this manner due to the oversimplification that is inherent in the authors' approach. Realistically, the growth of income (or Domestic Product) should be highly correlated with additional tonnage but with variations that reflect local conditions, such as workforce make-up, availability of transportation and the presence or lack thereof of certain industries. Thus, an increase in tonnage may or may not have an impact upon the state or substate areas. The economic impacts of a project will be determined by the mix of activity within a study area – which is the reason most economists use an input-output model such as IMPLAN to measure operational impacts.



The regional impact in the Corps study is defined for Chatham and its surrounding counties in Georgia. There is an inner ring of Chatham's Contiguous neighbors (Effingham, Bryan, and Liberty) and an outer ring of the seven counties contiguous to the inner ring (Bulloch, Evans, MacIntosh, Long, Tattnall, Candler, and Screven).

It is interesting that the Corps would omit the South Carolina County that is contiguous to Chatham to the north, Jasper. Even though there is a river between the land masses, there are bridges that provide good access for transportation of people and goods between Savannah and Chatham County, Georgia,

on one side of the Savannah River and Jasper County and other South Carolina points of origin and destinations, on the other. Moreover, from a statistical point of view, it has been shown that Beaufort County (Jasper County's northern neighbor) experiences a greater employment impact from the Port of Savannah home (Chatham County) than six of the Georgia counties in Savannah's "outer ring," so there is no methodologically-sound argument for omitting Beaufort from the Corp's analysis either. In fact, given the commuting pattern data mentioned earlier, one could easily argue to include two other South Carolina counties, Hampton and Colleton, in the Corp's report. It is noteworthy that Standard & Poor's cites the importance of the Savannah economy to the credit of Jasper County in its rationale for the ratings of Jasper's bonds (Standard & Poor's).

Summary and Conclusion

From this economist's point of view, the inherherent weaknesses of data, scope and analytical focus contained in the two reports make it impossible to obtain a reasonable understanding of the economic impact of port operations at Savannah on the affected communities from a reading of either document. As mentioned at the beginning of my review, I do not believe that either the GA Study or the Corps Study has done an adequate job of assessing the operational economic impacts of the Savannah Port or the construction and installation-related economic impacts of the planned dredging-dependent port facilities improvements at Savannah. I do believe that the University of Georgia study, The Economic Impact of Georgia's Deepwater Ports on South Carolina's Economy in FY 2009, does a reasonable job of exploring existing trade patterns with South Carolina, but does not take this analysis to the level of providing an adequate economic impact analysis and conclusions with respect to impacted communities on the South Carolina side of the Savannah River.

The Corps Study makes an attempt to look at the regional impact of the dredging project. However, I believe that the methodology is weak and that the regional definition is inappropriate – especially given the fact that the Savannah Port expansion will physically affect Jasper County. Additionally, any impact model should include the impacts of capital investment. Although Section 3 of the Corps Study contains a description of planned improvements that go hand-in hand with the proposed dredging project, there is no discussion of the stimulative economic impact of such investments in that document or the impact on the tax bases of the impacted South Carolina communities.

I have several suggestions for the modeling improvement by assessing the impact of Port Operations.

1. Produce a stand-alone construction impact analysis. While the Corp's report includes a brief mention of capital investment and improvement, these aspects of the expansion of the port demand a separate study. Because the footprint of the planned port expansion improvements will include Jasper County, it is extremely important to correctly include Jasper in the analysis. One should note that the direct construction impact will be short lived. That is because when the construction is completed, the construction workers on the project will go work elsewhere, and no additional direct construction impact will ensue. (Additional construction-related impacts that result from the new and expanded port will be realized over a number of years. These impacts should be included below in the second suggestion).

2. Produce an on-going operational impact analysis. This type of analysis was performed by Wilber Smith in its analysis of South Carolina Port operations. Since Chatham County sits on the South Carolina state line and we know workers already commute from South Carolina to jobs in Savannah and Chatham County, one would expect that the appropriate analysis would include

the impact upon South Carolina counties from expansion of port operations at Savannah. Further, and importantly, this analysis should be explored over a number of years. In addition to the current impact, the impact following construction of new and expanded services should be assessed within the on-going impact modeling scheme.

3. Use IMPLAN (or another input-output type model) to assess the impacts noted above. These models, which directly incorporate the industrial structure of the regions within their structure, include direct and indirect effects in the analysis. The indirect effects (which also are often called induced effects) take into account the spending of households and secondary industries. And importantly, the properly defined regional impact in any model should include (at a minimum) the South Carolina counties of Jasper and Beaufort.

In summary and with respect to South Carolina and Jasper County, I believe that the Savannah Port operations currently have an important economic impact upon these areas. While the studied reports did not address these impacts, guidance as to what could be achieved in one or more thorough studies of the economic impact of the Savannah Port dredging project and port expansion can be seen in a number regional economic impact studies that are readily available in the public domain. A common feature of these reports, several of which I have reviewed in connection with the preparation of this summary, is that they credibly demonstrate that the affect of expansion by a large employer upon a contiguous region would be substantial. Additionally, many of the data that I have reviewed indicate that a major construction project should have a substantial stimulative impact upon the construction industry in both Jasper and Chatham Counties – even though these neighbors are in two different states. And, given the current depressed state of the construction industry, the dredging project should be a godsend for the unemployed/underemployed construction workers, whose services can be expected to be required in connection with the construction and installation of the improvements listed in Chapter 8 of the Corps Study. The extent of the impacts that I have discussed here can only be measured within the framework of a properly defined economic impact study that, to my knowledge, has yet to be undertaken.

References

The Economic Impact of Georgia's Deepwater Ports on South Carolina's Economy in FY 2009, Selig Center for Economic Growth, The University of Georgia, April 2010.

Economics Appendix: Savannah Harbor Expansion Project, US Army Corps of Engineers, Savannah District, South Atlantic Division, November 5, 2010, DRAFT.

South Carolina State Ports Authority Economic Impact Study, Prepared for the South Carolina State Ports Authority, Wilbur Smith Associates, Inc., October 2008

Summary: St. Peter's Parish/Jasper County, Public Facilities Corp., South Carolina; General Obligation; Note, Global Credit Portal, Standard & Poor's, June 23, 2010.

Journey to Work and Place of Work, Census 2000, US Census Bureau.

IMPLAN, MIG, Inc., Hudson, WI.

Lowcountry Office of Government, Planning Department Comments

Gerry Kozak
12/16/10
LCOG

Review: Savannah Harbor Expansion Project—Draft GRR

Introduction

These brief comments will concentrate only on the Grant Re-Evaluation Report, especially Section 12, "Uncertainty Considerations." They will deal with land transportation and economics because those are the two areas in which the LCOG Planning Department has expertise and experience.

In those areas, it seems that some key subject areas are either not addressed, or addressed unconvincingly.

Competition

I could find nothing in the document that addresses the competition among Southeastern US ports to provide docking facilities and services to the upcoming generation of very large ships that will be coming through the enlarged Panama Canal in approximately five years. This is a very important consideration for the Lowcountry Region's economic future. If one of the other key competitors (namely Norfolk, Miami or Jacksonville) beats an enlarged Savannah and/or new Jasper County port to the "punch," it will have an adverse effect not just on future economic growth but also on existing economic conditions.

Interestingly, on Sunday, December 12, the *New York Times* had an article in the Business section about the proposed Savannah deepening and expansion and the competition. http://www.nytimes.com/2010/12/12/us/12port.html?pagewanted=2&sq=PortofSavannah&st=Search&scp=1

The article implies that Charleston is not even in the running.

At the SRBAC meeting last week, consultant William Bailey seemed unfamiliar with this matter when asked about it.

Land Transportation as a Growth Limitation

I could also find no mention of the fact that at the current time one of the major inhibitors on expansion of the Port of Savannah is the road network (it is definitely NOT a system) that serves the port's operations. Trucks pulling the larger containers directly off the ships to the import distribution centers located within five miles of the port's gates have no choice but to travel on an old street and road network built to handle the residential and commercial traffic of at least 30 years ago. As a result, it is both inconvenient and unsafe for the trucks and also for the people who still live in the small homes along the streets. Passenger vs. freight conflicts are a problem.

1

As well, there are freight train grade crossings that hold up other both cars and commercial truck traffic near the port.

The Savannah MPO reports that they are working on plans to alleviate some of the problems, but the investment that will be required is extremely large, and no commitments for funding have been made at any level of government. In addition to the financial costs, adding new highways will result in residential and small commercial dislocation and relocation, which will likely be considered environmental justice issues.

This was another subject that the consultant admitted he knew nothing about.

Economic Analysis

I assume that the Economic "Uncertainty" analysis in the report represents only the summary of all the work done, but I could not find the economic and marketing justifications, sources of data or assumptions used in their sensitivity analyses. While I also assume that the model that they used is a reliable one, the results are only as credible as the data and the assumptions that serve as input. Therefore, I have a lack of confidence in the consultants' economic analysis. This was increased at the SRBAC meeting when the consultant responded to a question about the economic impact of the port expansion on South Carolina, saying, "The only thing I can think of is that it will keep consumer prices low."

Savannah River Maritime Commission

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760-JK-400-EV01

Comment: *CEQ NEPA Regulations (1502.13) require that the section on Purpose and Need "specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action." The DEIS section on Purpose and Need describes existing conditions and presumed benefits of the proposed action, and is vague on whether these individually or collectively comprise the underlying purpose and need. There is no clear statement of the proposed action's purpose and need.*

Response: EIS-Section 2 clearly describes the project's purpose and need.

760-JK-400-EV02

Comment: *CEQ NEPA Regulations (1502.14(a)) require that the proponent agency "rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated", The DEIS section on Alternatives evaluates no "build" alternatives other than deepening the channel to Garden City (i.e. no other locations for a marine terminal were given serious consideration). There is no discussion of alternatives that were eliminated from detailed study, and no reasons are given for their elimination*

Response: The Corps has satisfied its obligations under NEPA and the CWA to consider reasonable and practicable alternatives. The SHEP NEPA alternatives analysis ranged from considering other potential options or sites for the project, including other South Atlantic ports, to evaluating potential specific locations for disposal of dredged or fill material along Savannah Harbor and in the Atlantic Ocean along the entrance channel. The SHEP NEPA alternatives analysis is found in various places in the EIS and GRR, including EIS Section 2.0, Purpose and Need for Action; EIS Section 3.0, Alternatives; EIS Appendix H, Section 404(b)(1) Evaluation (Practicable Alternatives); EIS Appendix O, Formulation of Alternatives; GRR Section 6, Formulation of Alternatives; various other sections in the GRR; GRR Appendix A, Economics; GRR Appendix A, Attachment 6 (Regional Port Analysis); GRR Appendix A, Attachment 4 (Multiport Analysis); and GRR Appendix D, Plan Formulation Appendix.

The SHEP NEPA alternatives analysis includes the following key elements: (1) the statement of project purpose and need (EIS Section 2.0); (2) a Regional Port Analysis (GRR, Appendix A, Attachment 6); (3) a Multiport Analysis (GRR, Appendix A, Attachment 4); (4) analysis of various structural and non-structural alternatives (EIS, Section 3.0; GRR, Appendix D); (5) analysis of deepening to eight alternative locations or sites for a port/terminal along the Savannah River (EIS, Section 3.0 and Appendix O; GRR Section 6 and Appendix D); (6) analysis of six different depths of harbor deepening along the Savannah River (EIS, Section 3.0 and Appendix O; GRR, various sections); (7) analysis of alternative disposal sites, methods, or beneficial use of dredged sediments (EIS, Section 3.01.1 and 3.07); (8) analysis of related maintenance dredging requirements (EIS, Section 3.08-3.10); and (9) analysis of the no-action alternative (EIS, Section 3.01.1and Appendix O; GRR Section 6.12.1).

In addition, the Corps considered practicable alternatives under the Clean Water Act (CWA), as explained in EIS Appendix H, 404(b)(1) evaluation. The practicable alternatives analysis was largely co-extensive with the SHEP NEPA alternatives analysis.

Although NEPA requires that all reasonable alternatives be evaluated, it does not require detailed study of options eliminated early in the planning process. As described in various places in the EIS/GRR, the Corps considered numerous potential alternatives and methods [structural/nonstructural] to address the project purpose and need. The evaluations were conducted in accordance with criteria established by the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (U.S. Water Resources Council, 1983) and the policies and procedures established by ER 1105-2-100, Planning Guidance Notebook [April 22, 2000].

Alternative terminal locations were determined and then evaluated. Sites in Georgia and South Carolina within the environs of Savannah Harbor, as well as more remote locations [Brunswick, GA] were examined. The District assessed three locations in Jasper County, SC that were being considered for a "Jasper Terminal". Modifications to the existing harbor (meeting areas, bend wideners, aids to navigation, etc.) were also reviewed.

The analyses conducted in these early stages of project formulation resulted in several conceptual alternatives being eliminated from further consideration. The District prepared a document that described this work and its conclusions (Formulation of Alternatives, May 2005, Appendix O). It was circulated to interested state/federal agencies as well as the public for review/comment. Four terminal locations were judged as having either MEDIUM or HIGH potential and were compared on their economics (including mitigation costs). When the landside development costs are included, deepening to the Garden City Terminal proved to be the most cost effective. The next site option was 45 percent more expensive. Therefore, the Garden City Terminal was the only option [along with no-action] considered in the detailed evaluations.

760-JK-400-EV03

Comment: *Section 1502.14 of the CEQ NEPA Regulations states that the Alternatives section of the DEIS "should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision-maker and the public". This is not done.*

Response: GRR-Section 11 contains a system of accounts' analysis, which was used to identify and compare the impacts of the alternatives, including the no-action plan. A reference to this system of accounts' analysis will be added to the beginning of FEIS-Section 3.00. Additionally, [EIS-Section 3.03] Tables 3-7 and 3-8, "Summary of Project-Related Impacts Without Mitigation" and Summary of Project-Related Impacts with Mitigation" include a comparison of hydrodynamic-related impacts (with and without mitigation) to numerous resources for each of the subject alternative harbor depths. EIS-Section 5 contains numerous tables that show the environmental impacts of the various alternatives considered. These tables clearly show the potential impacts of the proposed project with and without mitigation.

760-JK-400-EV04

Comment: *In the Introduction to the 2010 General Re-Evaluation Report (GRR) it states that "the Panama Canal Expansion Project will be fully operational by 2014, which will allow passage for vessels with up to 50 feet of draft. The Georgia Ports Authority has planned and funded improvements at Garden City Terminal to coincide with the Panama Canal Expansion Project." Would the GPA be making this major investment in the Garden City Terminal if it were concerned about the risk of some other alternative (perhaps a different Terminal site) being proposed in the DEIS?*

Response: Savannah District believes that GPA will expand the GCT to 6.5 million TEUs/annually by about 2030, regardless of whether the Savannah Harbor navigation channel is deepened. This capacity [6.5 million TEU] is the maximum number of containers that could reasonably be processed based on the size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the container cranes, the number of jockey trucks that move the containers within the terminal, how the containers are stacked within the terminal, the number of railroads that service the terminal and the frequency of their trains. It is projected that without deepening, more vessels will be required to transport the cargo expected to call at the port. With deepening, the total number of vessels would decrease (when compared to without project condition) as vessels would be able to load/unload without the current constraints of draft.

: The Georgia Ports Authority (GPA) has embarked on a 10-year capital improvement program to increase container capacity at the Garden City Terminal (GCT) to a maximum capacity of 6.5 million TEUs annually by the year 2020. This program includes equipment purchases and upgrades, transportation infrastructure improvements, and container area expansion. The GPA capital improvement program is not tied to deepening the navigation channel, but instead is based on projected growth in volume of shipping traffic in the South Atlantic region over time.

The improvements to the Garden City Terminal and associated highway infrastructure have been ongoing for some time independent of the SHEP studies and preparation of the EIS.

760-JK-400-EV05

Comment: *The DEIS states that the Harbor Expansion Project will likely result in impacts to over 1,200 acres of tidal freshwater wetlands, marc than 1,000 acres of brackish water wetlands, and several acres of tidal saltwater wetlands. Mitigation (by rerouting freshwater flow from adjacent streams and offering to purchase and preserve more than 2,000 acres of existing wetlands) is estimated to reduce the permanent wetlands impacts to 330 acres of freshwater wetlands and 730 acres of brackish water wetlands. The re-routing of freshwater flow would have its own impact (which may be significant) on the environment and this impact was not evaluated in the DEIS. Further, the use of preservation (for wetlands that are under no current threat of development) as mitigation for the permanent loss of hundreds of acres of wetlands is inconsistent with Federal "no net loss" policy.*

Response: Re-routing freshwater flow was evaluated [comprehensively] as part of the hydrodynamic studies conducted for the harbor deepening. The studies included the assessment of numerous potential alterations to water flow (brackish and freshwater) within the estuary. The District analyzed a total of 38 modifications at seven locations [Figure 3 of Appendix C – Mitigation Planning]. Natural resource agencies reviewed initial modeling results [July 2006] and identified those revisions which should be pursued more thoroughly.

As detailed in other agency responses and the EIS, deepening the harbor to a 47-foot operating depth would convert 223 acres of freshwater marsh to its brackish marsh counterpart. It is important to note that many of the emergent plant species associated with these freshwater marsh systems would still be readily observed in environments then defined as brackish marsh (Latham et. al., 1994). A comparison of wetland function elements for freshwater marsh versus brackish marsh indicates that there are only negligible differences with respect to water purification, flood protection, shoreline stabilization, groundwater recharge, stream flow maintenance, retention of particles, surface water storage, subsurface storage, nutrient cycling, and values to society.

Likewise, the 47-foot operating depth [with mitigation] could eventually convert 740 acres of saltmarsh communities to brackish marsh. Once again, dominant saltmarsh species like *Spartina alterniflora* would still be observed in areas which have salinities that would define them as brackish marshes. However, the overall basic wetland functions typically associated with these systems would not change. A comparison of potential changes in wetland function for both conversion scenarios is provided below.

Changes in Wetland Function as a Result of Wetland Conversion

Elements of Wetland Function	Freshwater to Brackish Marsh (Approximately 223 acres)	Saltmarsh to Brackish Marsh (Approximately 740 acres)
Water Purification	Negligible	Negligible
Flood Protection	Negligible	Negligible
Shoreline Stabilization	Negligible	Negligible
Groundwater Recharge	Negligible	Negligible
Stream flow Maintenance	Negligible	Negligible
Retention of Particles	Negligible	Negligible
Surface Water Storage	Negligible	Negligible
Subsurface Storage	Negligible	Negligible
Nutrient Cycling	Negligible	Negligible
Values to Society	Negligible	Negligible
Fish and Wildlife Habitat	Minor Adverse	Negligible

As illustrated above, the only indirect effect the 44-foot project would have on the function of these wetlands systems would be associated with fish and wildlife habitat values. All other elements of wetland function associated with predicted shifts in wetlands categorization would be negligible as a result of the anticipated increase in salinity. Previous studies have noted that areas of the Savannah Harbor identified as saltmarsh or brackish marsh often support similar fish and wildlife assemblages. Any anticipated conversion of saltmarsh to a brackish marsh system is expected to have a negligible impact on the overall wetland functioning from a long-term perspective. The District recognizes that a comparison of fish and wildlife habitat between freshwater and brackish marsh systems yields fewer similarities, but this difference would still be quantitatively minor.

The proposed preservation lands consist of various community types, viz., bottomland hardwoods, maritime forest, and uplands dominated by deciduous forest and re-growth. The bottomland hardwoods are categorized as palustrine, forested, broad-leaved deciduous systems that are both temporarily and/or seasonally flooded. Preserving these areas would ensure this wildlife habitat is preserved in perpetuity. Moreover, the additional lands would buffer the Savannah National Wildlife Refuge from future threats of development. Hence, changes in land use would not occur immediately adjacent to existing areas of the Refuge that do contain emergent wetlands. The acquisition/preservation of wetland and upland buffer would provide a functional replacement for the minor conversion of the only wetland function [fish and wildlife habitat] that would be expected when freshwater marsh converts to a brackish counterpart. Based on these determinations, the District's functional assessment concluded that the noted preservation satisfies the intent of the no-net-loss of function criterion.

All adverse impacts to tidal freshwater marsh would occur in the State of Georgia. With the flow diversion measures in place, the State of South Carolina should experience an area increase in tidal freshwater marsh along Little Back River in the vicinity of the SNWR.

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760-JK-400-EV06
Comment: *The DEIS contains a paucity of information about impacts to essential fish habitat or how the project will impact essential fish habitat from a fish accessibility perspective. Instead the DEIS focused on the mitigation of essential fish habitat in the majority of the discussion. The lack of detail on the impacts or consideration of realistic options that would avoid the impacts suggests that the "full disclosure" intent of NEPA may not have been met.*

Response: EFH is discussed in EIS-Sections 4.05 and 5.14. Also EFH is discussed in more detail in Appendix S, which is referenced in EIS-Sections 4.05 and 5.14.

760-JK-400-EV-07
Comment: *Extensive areas of essential fish habitat will be lost because of the project. The mitigation of essential fish habitat through the restoration of inaccessible marsh habitats or the purchase of woodland does not provide adequate replacement for the essential fish habitat.*

Response: EFH discussions cover much more information than indicated in the comment. EFH is addressed in EIS-Sections 4.05 and 5.14. EFH is also discussed in more detail in Appendix S, which is referenced in EIS-Sections 4.05 and 5.14.

760-JK-400-EV08
Comment: *Regarding Shortnose sturgeon, a federally-listed Endangered Species, the Corps conducted a preliminary review of the 2001 fishway design and confirmed that conditions had not changed that would reduce its effectiveness or implementability. Does the Corps have documentation that Shortnose sturgeons have used fishways in the Savannah River, or any other river of similar characteristics?*

Response: The Shortnose sturgeon has not been documented using constructed rapids fish ways for the simple fact that there are none within this species' current geographic range. However Lake sturgeon have been observed negotiating both constructed and natural rapids [entire river width] in the upper mid-west [US]. Some were observed at more shallow water depths than would be the case [3.5 to 5.5 feet] for the fish passage at the New Savannah Bluff Lock and Dam (Aadland 2010). Since the Lake sturgeon is a larger species than the Shortnose, the latter should have little difficulty [physically] passing the constructed fish bypass.

760-JK-400-EV09
Comment: *There was a lack of discussion and a lack of recent evaluation of the project's impacts on commercial and non-commercial pelagic and benthic invertebrates. In that this trophic level serves as the base of the food chain, more analysis is needed to determine the impacts on these resources.*

Response: DEIS-Section 4.12 discusses recreational/commercial fishing, while DEIS-Section 5.17 explains the project's impact[s] on these activities. Shellfish harvesting areas (figure 4-3), spawning sites of Black Drum, Weakfish, and Spotted Seatrout (figure 4-4), spawning seasons of Spotted Seatrout, Red Drum, Weakfish, and Black Drum are shown in the documentation. Habitat locations of American shad, Southern flounder, Stripped bass, and Shortnose sturgeon are provided in DEIS-Section 5. DEIS-Sections

4.04 and 5.07 discuss impacts to marine and estuarine resources. DEIS-Section 4.05 and 5.14 [essential fish habitat] discuss these same issues in more detail.

Originally, dredged sediments would have been placed within the nearshore of Tybee Island and adjacent to the deepened channel as depicted in Figure 3.2. However, the State of Georgia expressed concerns with this proposal; so the subject excavated material would now be placed either in existing upland disposal areas and/or the EPA approved ODMDS. As stated in the EIS : *Commercial and sport fishing within Savannah Harbor is low due to heavy vessel traffic levels and high shoaling rates which limit benthic communities and requires recurring maintenance dredging.*

The proposed action would primarily take place within the confines of the existing navigation channel. Moreover, all sediments dredged from the entrance channel would be placed either within the upland CDFs and/or the ODMDS. Therefore, any adverse impacts to commercial or non-commercial fish [shell/fin] and/or benthic invertebrates would not be significant.

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760-JK-400-EV10

Comment: *Some of the conclusions made in the documents were sound; however, many were based on unsubstantiated claims. In some cases conclusions were based on existing conditions without determining the impacts of the proposed conditions. Comparisons were made between alternatives which were not the proposed alternative, while ignoring differences in impacts between the existing condition and the proposed alternative. Data which could be used to allow peer review of some of the models was missing or omitted. Some conclusions were based on incomplete models and impacts to some resources were not determined because they were not under the scope of the current study. It remains unclear whether impacts to these resources were determined. Finally, none of the studies examined the impacts resulting from the use of Generation 2 post-panamax vessels within the deepened channel.*

Response: These are general comments that will be addressed later in the responses to the more specific comments (on the same subjects) received by SRMC.

760-JK-400-EV11

Comment: *The documentation does not clearly quantify the impacts to the Confined Sediment Placement/Disposal Facilities, City Front, Ft. Pulaski, and Tybee Island. The conclusions drawn from these studies have not been substantiated and continuation of the NEPA process without disclosing the potential impacts to these resources would be in error.*

Response: The CDFs are existing sediment disposal areas and the recurrent impacts they receive have already been addressed in previous NEPA documents. The District is working with the Georgia Department of Transportation to extend the useful life of these dredged material placement areas [EIS-Section 3.01.1]. As an overall strategy, beneficial uses are sought for the dredged sediment to (1) reduce the ultimate storage volume required for existing sites, and (2) increase secondary benefits resulting from beach disposal or habitat creation. Impacts [or the lack thereof] to Fort Pulaski and Tybee Island are addressed in EIS-Section 5.09. There would be no channel widening in the vicinity of the City Front, therefore impacts are not expected to be measureable in that area.

760-JK-400-EV12, 760-JK-400-EV13

Comment: *The DEIS lacked information that is critical to make an assessment on listed and candidate species, did not substantiate its determination of non-significant impacts when adverse impacts were acknowledged, and often relied upon unsubstantiated assumptions and conclusions to make its determinations. If the assumptions and conclusions were based on peer-reviewed or project related studies, the DEIS should cite that source as a basis upon which the assessment occurred.*

Response: The evaluation of project impacts on threatened and endangered species is in compliance with ESA [see FEIS-Sections 4.09, 5.11 and Appendix B].

The discussion on threatened and endangered species is in compliance with ESA [see FEIS-Sections 4.09, 5.11 and Appendix B]. All appropriate citations have been added to the FEIS including Appendix B.

760-JK-400-EV14, 760-JK-400-EV15, 760-JK-400-EV16

Comment: *The shortnose and Atlantic sturgeon are examples of the incompleteness of the assessment. Shortnose sturgeon and Atlantic sturgeon were grouped together for purposes of assessing impacts from the project. The DEIS justifies the grouping due to their "similarities in habitat use, distribution throughout the proposed action area, foraging behavior and prey base and subsequent risk of take relative to dredging and trawling operations ... " No citations or other reference information was provided to substantiate this decision to group the species. Other information provided in the DEIS provides information that contradicts the claim that the species are similar enough to group together for impact assessment purposes. For example, the narrative states that Atlantic sturgeon primarily lead a marine existence and are therefore more likely to be impacted by hopper dredges than the more estuarine-based shortnose sturgeon. The document states that shortnose sturgeon spawn 100 miles upstream of the project area, but also states that an Atlantic sturgeon larva was found 6.7 km (4 miles) upstream of the project impact area. This information not only suggests that shortnose and Atlantic sturgeon spawn in different areas, it also highlights the possibility that some larva may drift into the project area and may be affected by the upstream increases in salinity that would occur as a part of this project. Additional information should be collected to verify the actual location of Atlantic sturgeon spawning to ensure the project dredging and upstream movement of salinity and decreases in DO will not deleteriously impact Atlantic Sturgeon.*

Response: The Shortnose and Atlantic sturgeon can be grouped together based on their similarities in habitat use, distribution throughout the proposed action area, foraging behavior, prey base, and subsequent risk of take in the course of dredging and trawling operations. Information on these species can be obtained from the following link. http://sero.nmfs.noaa.gov/pr/sturgeon.htm

The District recognizes there is not a complete overlap in the habitat, distribution, foraging behavior, and prey base of these two species. However, there are substantial similarities between these two species in their habitat use, distribution throughout the proposed action area, foraging behavior, and prey base. Potential impacts to both species from hopper dredges are addressed in the EIS-Appendix B.

With the proposed mitigation, NOAA determined that the project would have acceptable impacts on both Atlantic and Shortnose sturgeon. The BO in Appendix Z provides reasonable and prudent measures to be implemented for SHEP to protect these species.

In addition to information presented in the EIS, an extensive five-year monitoring study on the Atlantic and Shortnose sturgeon is being conducted in the southeastern US. It is being funded by NOAA and began in the spring of 2011. The work in the Savannah River segment is being conducted by SC DNR. http://www.nmfs.noaa.gov/pr/conservation/states/funded.htm. NOAA and the Corps will consider the new information as it becomes available.

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760-JK-400-EV17, 760-JK-400-EV18, 760-JK-400-EV19

Comment: *The impact summary to the Essential Fish Habitat in Appendix S, acknowledges that the proposed action would have adverse impacts on shortnose sturgeon, an endangered species. Nonetheless, the text dismisses the adverse impacts as non-significant without providing sufficient detail as to how the non-significant status had been applied. Over 400 acres of habitat is expected to be lost to the shortnose sturgeon alone. Moreover, the lost habitat may have been underrepresented by the modeling. For example, a baseline level of 3.0 to 4.0 mg/l of dissolved oxygen was used to determine if habitat was available for shortnose sturgeon. This is a minimum level at which the agencies determined shortnose sturgeon can survive, but does not necessarily indicate the dissolved oxygen level that is necessary for foraging, resting, and moving. For example, the Collins et al. (2001) study of shortnose sturgeon habitat use cited in the DEIS, reported minimum mean dissolved oxygen levels of 6.36 and 6.45 in areas where adults and juveniles were found, respectively. In the Appendix N documentation, Prescott Brownell, from NMFS requested that a range of suitable habitat thresholds be used for modeling habitat availability. The agency panel then redacted his comments from the record without providing an adequate basis for the redaction. The panel decided the current methods were "acceptable for now." This comment would suggest that additional work would be necessary in the future in order to adequately asses the impacts. The narrative does not provide adequate discussion as to why the pass/fail approach was more adequate than the range approach suggested by Mr. Brownell.*

Response: This section is only a summary and is not intended to provide detailed information. The particulars of this issue are provided in the body of EIS and Appendices B, C, and S.

The observed dissolved oxygen values of 6.36 and 6.45 mg/l are just that, observed values, not life requisites. The values used by the Corps were those recommended by the Fisheries Interagency Coordination Team as defining acceptable habitat for SNS.

Mr. Brownell's comments have not been redacted from the record. In fact, they are still available for inspection, if desired, as evidenced by your comment. The Fisheries Interagency Coordination Team considered Mr. Brownell's comments, but decided not to recommend them to the Corps for use. NOAA Fisheries did not separately request that information when they provided their agency comments on the Draft EIS.

760-JK-400-EV20, 760-JK-400-EV21

Comment: *A number of the state-listed sensitive species were dismissed from further discussion without sufficiently detailed information to determine if any impacts would occur and how impacts would be avoided. As an example, the DEIS often stated that sediment deposition would be conducted in a manner to not interfere with nesting of various sensitive species. There was no detail provided to substantiate this claim. There was DO monitoring plan cited nor detailed deposition plan cited to document that the sensitive species will be avoided. Modification of presently licensed or future licensed disposal areas will require endangered species review in with a sufficient level of detail to ensure impacts will be avoided.*

Moreover, other sensitive species were dismissed because they were not known to exist in the project area even when habitat existed that may support the species. If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.

Response: State-listed sensitive species have ecological value, but since they are not federally listed as threatened or endangered species, a detailed survey was not conducted [limitations of scope/documentation]. In addition, all areas that would be physically impacted during deepening (CDFs, ship channels) have been previously/routinely disturbed and are not likely to harbor extensive populations of sensitive species. The Corps would continue its routine monitoring of its sediment deposition operations in the confined disposal facilities during the spring nesting season.

As required under the Endangered Species Act, the District continues to coordinate with the National Marine Fisheries Service and US Fish and Wildlife Service on all aspects of the proposed project. Threatened and endangered species compliance [ESA] is discussed in Sections 4.09, 5.11 and FEIS-Appendix B. The report of the US Fish and Wildlife Service for species for which they have responsibility and the Biological Opinion prepared by the National Marine Fisheries Service are included in Appendix Z.

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760-JK-400-EN01, 760-JK-400-EN02

Comment: *Regulatory officials from both South Carolina and Georgia agree that future pumping from the Upper Floridan aquifer must decrease in order to limit the impacts of salt-water intrusion in the coastal area. A recently-released GAEPD document entitled Coastal Georgia Water and Waste Water Permitting Plan for Managing Salt-Water Intrusion (2006) indicates that Georgia will reduce withdrawals from the Upper Floridan aquifer by 5 MGD by the end of 2008; therefore keeping the pumping rate constant provided a conservative assessment of future ground-water production in the area.*
Has groundwater use in the Upper Floridan aquifer decreased in Georgia and South Carolina as assumed in the model and analysis?
Did groundwater withdrawals from the Upper Floridan aquifer decrease by at least 5 MGD between 2006 and 2008 in Georgia?

Response: According to USGS data (USGS SIR 2009-5251), groundwater withdrawals from the Upper Floridan aquifer in the "Red Zone" counties of Chatham and Effingham in Georgia, and Beaufort and Jasper Counties in South Carolina [2000/2004] were as follows [high/low in mgd]:

Chatham	68.15 / 67.00
Effingham	4.62 / 6.85
Jasper	3.34 / 2.65
Beaufort	21.44 / 19.74

Data from the City of Savannah [city wells only] indicate that withdrawals from 2005 through 2010 have remained fairly constant [from 23.5 to 25.5 mgd].

Data for the Upper Floridan [2006-2008] for the Georgia "Red Zone" was unavailable.

760-JK-400-EN03

Comment: *Groundwater use trends and restrictions by GAEPD are discussed in various sections of the GRR and supporting appendices. There appears to be a lack of corresponding discussion on groundwater use and restrictions by SDHEC in South Carolina.*

Response: According to the annual South Carolina Water Use Reports [2001- 2009], groundwater withdrawal in Beaufort and Jasper Counties has remained rather steady. Namely, Beaufort County had a high of 6.9 billion gallons [2001], a low of 5.9 billion gallons (2005), and an annual average of 6.4 billion gallons. Over the same period, Jasper County had a high withdrawal of 1.09 billion gallons [2007], a low of 706.6 million gallons [2004], and an annual average of 903.6 million gallons. This would put the low for Beaufort County at about 16 mgd and the high at about 19 mgd. The low for Jasper County is about 1.9 mgd and the high at about 2.5 mgd.

Beaufort, Jasper, Hampton, and Colleton Counties in South Carolina comprise the *Low Country Capacity Use Area*. In order to regulate groundwater withdrawals in the capacity use areas, any withdrawal greater than or equal to 3 million gallons in **any** month requires a permit from SCDHEC.

760-JK-400-EN04

Comment: *While the overall conclusion that the impacts to groundwater are not expected to be significant appear reasonably well substantiated, quantifying the increased flow through the confining unit to 3-4% does not appear to be well substantiated given the uncertainty in leakage though this unit.*

Response: The intent of groundwater modeling was to bracket a range of vertical hydraulic conductivities which would produce a *'best fit'* with observed/ simulated groundwater heads [and gradients] on a calibrated USGS groundwater scale. Notably, simulated migration of chlorides through the Miocene confining layer appeared to be most sensitive to the vertical hydraulic conductivity assigned to the clay layer. After deliberation, a range of vertical hydraulic conductivity [which *best-fit* actual data] was chosen. As verification, both lower and higher conductivity values produced unrealistic heads and chloride concentrations when compared to actual data. [As discussed in the General Re-Evaluation Report for SHEP, Appendix C: Engineering, Supplemental Studies, Potential Ground-Water Impacts to the Upper Floridan Aquifer, June 2007]

Applying the derived range of vertical hydraulic conductivities to the proposed deepened channel length would yield an increase of 3 to 4% vertical flow through the confining clay unit. Importantly, this increased flow applies **only** to the confining unit below/along the actual width of deepened channel. The increased flow would be insignificant when compared to the much larger horizontal flow in the aquifer.

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760-JK-400-EV22

Comment: *Acquire but not use a permit from the State to withdrawal fresh water from the Upper Floridan aquifer.*
Reduce pumping of groundwater by acquiring - but not using – permitted rights from industries to remove freshwater from the Upper Floridan aquifer.
These potential mitigation measures, in particular the last two, have significant ramifications on water use in the region by reducing overall water availability. The ability to acquire permitted rights in Georgia and presumably South Carolina, including existing permitted rights without replacing them with an alternate source raise significant questions regarding the viability of these conceptual alternatives.

Response: The potential mitigation alternatives referred to in the comment were *conceptual*, as noted in the preceding paragraph of the GRR. As demonstrated later in the GRR-Section 9 and EIS-Section 5, the impacts to the aquifer are minimal and do not warrant mitigation.

760-JK-400-EN05

Comment: *Available input data relating to chloride/salinity changes over tidal cycles and over cross-sectional areas of critical river reaches appear to be sparse to absent. There is reference to proposed or on-going chloride / salinity monitoring, however these does not appear to be any detail on this monitoring effort. Given the highly stratified nature of the chloride distribution in conjunction with tidal effects, understanding the temporal and spatial distribution throughout the estuary may prove critical to evaluating peak chloride levels at the Abercorn Creek intake. Clarification on the existing data and any proposed monitoring would be useful in evaluating potential future impacts at the intake.*

Response: Additional data are included in the final report. From information collected to date, it appears that chlorides do not stratify in the vicinity of Abercorn Creek. Conversely, stratification is a factor in the lower harbor and upstream through Houlihan Bridge. However, as the river shallows further upstream [in the vicinity of I-95], the chloride stratification is no longer significant.

760-JK-400-EN06

Comment: *As a potential mitigation measure, cost for a supplemental water intake approximately 10-miles upstream from the current intake was presented in a document titled "Review and Costs for Supplemental Water Supply - City of Savannah intake at Abercorn Creek" dated 17 Sep 2009. It is not clear if environmental impacts from this proposed new intake have been evaluated, including the potential in increase salinity in Abercorn Creek further upstream from the current intake location.*

Response: The Corps has revised the mitigation plan in the FEIS to address impacts at the City's water intake. The project now includes construction of a raw water storage impoundment, one of the measures evaluated in the DEIS. The impoundment would be located on high ground. Appendix C of the FEIS describes procedures the Corps would undertake as the design phase progresses to address additional mitigation that may be needed.

760-JK-400-EV23, 760-JK-400-EV24

Comment: *The water quality-related sections of the DEIS include detailed assessments of the project's impacts on dissolved oxygen and chloride concentrations. The analysis relied on models and field testing of mitigation techniques. Much of this information is useful for identifying the potential water quality impacts and mitigation strategies. However, the DEIS understates that uncertainty and risks associated with both the water quality impacts and the proposed mitigation. The DEIS also does not explicitly consider the manner in which the water quality of the harbor is currently being managed and regulated. For example, the DEIS does not address impact of the project on the 2010 draft TMDL for oxygen demanding substances, nor the related regulatory framework for achieving full compliance of water quality standards.*

Response: In EIS-Section 5.01.2 [Procedures] notes: *The Water Quality Interagency Coordination Team assisted in the application of EPA's model on this project. EPA, USFWS, NMFS, USGS, SC DHEC, GA DNR-EPD and the Corps agreed in 2006 that the enhanced model was suitable for use in evaluating potential impacts from this proposed harbor deepening project. The Corps had an Independent Technical Review performed of the model by ERDC. Their review focused on the model grid representation, input parameters, and existing conditions calibration. The reviewer stated that the model was acceptable for*

impact evaluation purposes on this project. The ERDC ITR did not include analysis of the model programming but rather the application of the model to Savannah Harbor. The EFDC and WASP models are on a Corps' "allowed for use" list of approved engineering models.

The Corps used these state-of-the-art hydrodynamic models because it did not want to underestimate the degree of risk and uncertainty associated with the project's water quality impacts or the necessary mitigation thereof.

The DEIS is replete with discussion regarding the uncertainties attendant to using models. GRR-Section 12 contains the following examples for inspection: Economic Analysis Uncertainty , Jasper County Terminal Sensitivity Analysis, Alternative Sensitivity Analyses Cost Risk Analysis, Chloride Mitigation Costs, Environmental Impact and Mitigation Uncertainty, Uncertainty in Salinity Predictions, Risk with Salinity Predictions, Uncertainty in Dissolved Oxygen Predictions , Risk with Dissolved Oxygen Predictions, Uncertainty in Biological Responses, Risk in Biological Responses, Risk in Sea Level Change Assumptions. Engineering Appendix-Tables 15-1 and 15-2 also discusses risk and uncertainties associated with model use.

The EIS does address the Draft 2010 TMDL. Approved hydrodynamic and water quality models were used to design a dissolved oxygen system that would compensate for each alternative's incremental [adverse] impact on this parameter. Modeling results indicate this objective has been realized, together with a modest net improvement in DO levels in the project's impact area. DEIS-Table 5-28 [Incidental Effects of DO Improvement Systems - Bottom Half of Water Column] shows the extent of improvement to the harbor DO levels. It should be emphasized that this mitigation was never intended to restore historical DO levels in the harbor and/or bring the harbor into compliance with state water quality standards.

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760-JK-400-EN07, 760-JK-400-EV25, 760-JK-400-EV26

Comment: *Much of the DEIS 's analysis of potential water quality is based on models that are have some capability to predict "average" dissolved oxygen or chloride conditions, but limited ability to characterize the trends and variability in water quality. Therefore, it is unclear whether the models are accurately predicting the critical conditions for water quality protection. The DEIS provided little indication that model uncertainties were explicitly considered in either predicting impacts or designing mitigation strategies. This is an especially important concern for the mitigation of dissolved oxygen impacts, because the proposed technology is somewhat experimental and of highly uncertain benefit.*

Response: The models used to identify project impacts and develop mitigation plans were calibrated and validated [multiple times] prior to their approval. The approved, calibrated, and validated models are appropriate to identify project impacts and develop mitigation plans. The hydrodynamic and water quality models simulate the complex estuarine dynamics, viz., hourly, daily, and monthly tidal variations, salinity and dissolved oxygen dynamics together with their spatial distribution within the system. The models are applicable over a wide range of conditions including low and high freshwater flow. The model grid incorporates surveyed bathymetry and includes point and non-point pollution sources in the watershed. The grid extends from Clyo, Georgia (river mile 61, USGS stream gage 02198500) downstream through the harbor to Fort Pulaski (river mile 0), and out to 17 miles offshore [Atlantic Ocean]. The model was calibrated and validated using observed data from 1997 to 2006 and has been designed to meet the expectations of the SHEP Water Quality Interagency Coordination Team, which followed in the footsteps of the modeling technical review group that was established in the late 1990s

to oversee development of a technically valid model for determining SHEP's environmental impacts and attendant mitigation features. The group included representatives from the District, US EPA Region 4, USGS, Georgia DNR-EPD, South Carolina DHEC, and private sector technical modeling experts [tasked with actual model development]. An independent technical review and uncertainty analysis have been conducted on the models and the resulting comments/concerns were incorporated into the final version. Details regarding the hydrodynamic and water quality model development process, extensive reviews, and uncertainty analysis can be found in the report, "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project" dated January 2006 [included in the Supplemental Materials to the Engineering Appendix]. Acceptance letters from agencies involved in the modeling technical review group can be found in the document, "Correspondence Regarding Hydrodynamic & Water Quality Model Acceptability" [included the Supplemental Materials to the Engineering Appendix]. The models were used to evaluate conditions specified by the SHEP Water Quality Interagency Coordination Team, including the critical conditions defined by the States.

The EIS is replete with discussion regarding the uncertainties attendant to using models. GRR-Section 12 contains the following examples for inspection: Economic Analysis Uncertainty , Jasper County Terminal Sensitivity Analysis, Alternative Sensitivity Analyses Cost Risk Analysis, Chloride Mitigation Costs, Environmental Impact and Mitigation Uncertainty, Uncertainty in Salinity Predictions, Risk with Salinity Predictions, Uncertainty in Dissolved Oxygen Predictions , Risk with Dissolved Oxygen Predictions, Uncertainty in Biological Responses, Risk in Biological Responses, Risk in Sea Level Change Assumptions. The Engineering Appendix also discusses risk and uncertainties associated with model use.

Studies by independent engineering firms identified oxygen injection as the most cost-effective method to raise DO levels in the harbor [post-project]. The approved hydrodynamic and water quality models were used to design a dissolved oxygen system that would compensate for each alternative's incremental [adverse] impact on this parameter. Modeling results indicate this objective has been realized, together with a modest net improvement in DO levels in the project's impact area. EIS-Table 5-28 [Incidental Effects of DO Improvement Systems - Bottom Half of Water Column] shows the extent of improvement to the harbor DO levels. The District would conduct post-construction monitoring to ensure that the model predictions [oxygen levels at/above the status quo ante] are realized.

760-JK-400-EV27, 760-JK-400-EV28, 760-JK-400-EV29

Comment: *The pending dissolved oxygen TMDL is expected to have a major regulatory and economic impact on both industrial and municipal dischargers, many of which will have to make large capital investments to reduce wasteloads. It tends to be controlled by the location in which attainment of dissolved oxygen concentrations is most difficult. From this perspective, it would not matter if 97% of the system experienced oxygen improvements if the critical location(s) experienced degradation, or if the wasteload allocations to achieve full attainment would be lower. The DEIS currently does not allow this determination. Similarly, it is unclear if how the proposed mitigation approach would affect the ability of point source dischargers to use the same technology for TMDL compliance.*

Response: Implementation of the TMDL is intended to produce substantial effects on DO levels in the harbor. Depending on how it is implemented, it could have substantial effects on some industrial and municipal dischargers.

The project includes mitigation (oxygen injection) to offset reduced dissolved oxygen levels that would result from deepening [all alternative depths] without mitigation. Hence, concern about ramifications to the Savannah Harbor Draft TMDL is misplaced.

The applicability [and value] of dissolved oxygen injection to other users of the Savannah River would have to be determined by each discharger, possibly in consultation with the Georgia DNR-EPD and South Carolina DHEC.

760-JK-400-EV30, 760-JK-400-EV31, 760-JK-400-EV32

Comment: *The analysis should be revised to (I) more accurately characterize the uncertainties associated with water quality impacts; (2) more explicitly consider those uncertainties in designing environmentally conservative mitigation strategies; and (3) specifically examine the impact on the project on water quality management of the estuary under the draft 2010 TMDL.*

Response: These risks and uncertainties have already been addressed for water quality impacts. See response to previous comment, above.

The risks and uncertainties with all project elements were considered during the design of SHEP's mitigation strategies. See response to previous comment, above.

The EIS did address the Draft 2010 TMDL. See response to previous comments, above.

760-JK-400-EV33

Comment: *Abstract - Pg I, 2nd para - "The Corps of Engineers issued a Chief of Engineers' Report later in 1999 which provided further direction on the additional studies that needed to be conducted". Please include the Chiefs Report as an Appendix to the EIS.*

Response: The 1999 Chief of Engineers' Report has been added as an appendix to the FEIS.

760-JK-400-EV34

Comment: *Section 1.02 Areas of Concern and Issues - Pg 1-4, 1st para - "The proposed deepening of the Savannah River Federal Navigation Channel would impact the endangered Shortnose sturgeon and Striped bass habitat. tidal freshwater wetlands, brackish marsh, increase salinity at the City of Savannah's Water Intake at Abercorn Creek, and decrease dissolved oxygen in the harbor". Atlantic sturgeon, recently proposed for listing as an endangered species by NMFS, should also be identified as a resource that would be impacted by the SHEP.*

Response: Impacts to the Atlantic sturgeon and mitigation are addressed in EIS Section 5.11, EIS Appendix B (BATES), and the NMFS Biological Opinion, EIS Appendix Z.

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760-JK-400-EV35

Comment: *Section 2.04 Study Authority - Pg 2-3, 4th para - " (ii) the Secretary of the Interior, the Secretary of Commerce, the Administrator of the Environmental Protection Agency and the Secretary approve the selected plan and determine that the associated mitigation plan adequately addresses the potential environmental impacts of the project". The mitigation plan needs to adequately compensate (not just address) for the potential environmental impacts.*

Response: The EIS/GRR demonstrate that the proposed mitigation would adequately compensate for the project's potential environmental impacts.

760-JK-400-EV36

Comment: *Section 5.16 Cumulative Effects of the Proposed Action - Pg 5- 142, 6th para - "The cumulative effects analysis is found in Appendix L of the EIS". A summary of the findings of the cumulative impacts analysis, that includes text on the magnitude and significance of the collective impacts, would be appropriate for inclusion in this section of the DEIS.*

Response: A summary of the findings of the Cumulative Impact Analysis has been added to Chapter 5.0.

760-JK-400-EC01

Comment: *Section 5.19 Socio-Economic Resources - Pg 5-144, 1st para - "The harbor deepening project is expected to reduce the cost of shipping containerized goods through the port". This statement needs elaboration with specific details, or a reference to a document that contains those details.*

Response: The Economic Appendix describes the transportation cost savings computations. The analyses were performed in accordance with Corps guidelines and policies and underwent rigorous internal as well as independent technical review. The FEIS has been revised to refer to the GRR Economics Appendix.

760-JK-400-EC02

Comment: *Section 5.19 Socio-Economic Resources - Pg 5-144, 2nd para - "'None of the alternatives conflicts with long term land use plans outlined in 1987 Special Area Management Plan for the Lower Savannah River which was prepared by the SC Coastal Council (SCCC)". The referenced document is more than 20 years old and has almost certainly been updated or replaced with a more current land use plan. To be accurate, the Corps' impact analysis should be based on the most recent land use planning information available.*

Response: The FEIS has been revised to state that SC DHEC-OCRM does not currently have a Special Area Management Plan for the Savannah River, Savannah Harbor, or Jasper County.

760-JK-400-EV37

Comment: *Section 5.20 Protection of Children and Environmental Justice, Overview - Pg 5- 144, 6th para - "The Corps collected and analyzed information concerning the potential impact on minority populations, low-income populations, and children from the proposed Savannah Harbor Expansion Project. The information shows that the proposed action would not cause disproportionately high and adverse impacts on minority populations". What specific information lead the Corps to this conclusion and where is the analysis located?*

Response: This section of the document has been expanded in the FEIS to provide greater detail.

760-JK-400-EC03

Comment: *Section 5.21.E. Community and Regional Growth - Pg 5-155, 2nd para - "No additional cargo is expected to pass through the harbor as a result of the proposed project". This statement appears to be inconsistent with recent and future planned actions taken by the GPA to increase the container through-put capabilities of their Garden City Terminal. The Corps should elaborate on their statement above, and reconcile the disparity.*

Response: The GPA, the Corps and independent economic forecasting firms predict that significant cargo growth will continue at Savannah Harbor. The Corps believes that the same volume of cargo would move through Savannah with or without a harbor deepening project.

A multi-port analysis of alternate ports and networks indicated that most of the cargo imported and exported out of Savannah serves a distinct hinterland with little cargo being rerouted from other ports. A deepening project would allow the same volume of cargo to be moved more efficiently via larger or more fully-loaded vessels. This basic position is supported by the fact that PPX 1 vessels are calling at Savannah in increasing numbers and are anticipated to call in greater numbers once the Panama Canal is enlarged.

760-JK-400-EV38

Comment: *Section 7.01 Public Involvement and Review - Pg 71-, 1st para - "Comments on these scoping meetings were received from the following;" Were no scoping comments received from South Carolina interests?*

Response: The FEIS-Section 7.01 has been revised to further describe the public's involvement in this project.

Representatives from Jasper County provided comments on the SHEP at the initial public meeting [2000]. Further, the record reveals that SC DHEC, SCDNR, and SC DHEC-OCRM as well as the SC Conservation League participated in the NEPA scoping meeting [2002]. Numerous South Carolina residents were also in attendance at this meeting. FEIS-Section 7.01 was updated to discuss more thoroughly how the public was given the opportunity to become involved and provide review/comment on the proposed harbor deepening.

760-JK-400-EV39

Comment: *The maximum authorized plan of -48 ft is supported by the non-Federal cost share sponsor. Although it is acknowledged in the DEIS that environmental impacts associated with shallower depths would be less than those associated with the NED plan, the DEIS concludes that "the lesser impacts of the 44-foot depth. 45-foot depth and 46- foot depth alternatives are not considered sufficient to justify recommendation of these alternatives instead of the NED Plan". The DEIS further concludes that all depth alternatives, with the inclusion of proposed mitigation features, are "environmentally acceptable." DNR disagrees with this conclusion and believes that the only two deepening alternatives that might be considered environmentally acceptable are the 44-ft and the 45-ft alternatives, provided the proposed mitigation is effective in minimizing any adverse impacts of these alternatives. Obviously, the "no action" alternative (i.e., maintaining the channel at the currently authorized depth of 42 ft) would have the fewest adverse environmental impacts.*

Response: The term "environmentally acceptable" generally means that, among other items, that the plan/action meets all federal laws and Corps policies. However, for clarity purposes, the term "environmentally acceptable" has been removed from the document. The Corps recognizes the plans with lesser environmental impacts would be preferred from an environmental perspective; however, the Corps must consider multiple factors when evaluating proposed actions. For this project, when considered as a whole, the benefits derived with greater incremental depths outweigh the other incremental adverse impacts, especially considering mitigation.

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760-JK-400-EV40

Comment: *As stated in the DEIS, the extent of direct wetland impacts resulting from the excavation of bend wideners would not differ substantially among the five deepening alternatives considered. In each case, a total of 14.08 acres of salt and brackish marsh would be affected. In the absence of an approved saltwater mitigation bank in the Savannah River Basin, the USACE proposes to mitigate for these direct losses by grading down approximately 42 acres of a former confined dredge spoil disposal site (CDF I S) near the confluence of the Front and Middle rivers to an elevation that would support Spartina alterniflora. A "feeder" creek system would also be constructed toward the interior of the restored marsh. This area would then be allowed to revegetate naturally. Active planting of Spartina would only be conducted if the area did not revegetate naturally at a rate that would provide 15 percent vegetative cover after I year and 80 percent vegetative cover after 5 years (with interim goals of 25, 40, and 60 percent cover at the end of two, three and four years, respectively). Conceptually, DNR concurs with this approach to mitigating for the direct loss of brackish and saltwater wetlands resulting from any of the deepening alternatives; however, DNR's overriding concern about the indirect effects of harbor deepening should be given greater weight.*

Response: The District considered DNR's concerns about the indirect effects of the harbor deepening and addressed them in responses to their comments.

760-JK-400-EV41

Comment: *As stated in Chapter 5 of the DEIS, "All of the deepening alternatives would adversely impact tidal freshwater marsh." Model predictions indicate that, without mitigation, deepening the harbor would result in the conversion of tidal freshwater marsh to brackish marsh as a result of increased salinity intrusion. Under conditions of average flow and low sea level rise, the acreage of freshwater marsh that would be lost as a result of deepening is predicted to range from 551 acres for the 44-ft alternative to 1,21 2 acres for the 48-ft alternative, assuming no mitigation is implemented. With the flow-altering modifications proposed as mitigation by the USACE, however, the acreage of freshwater marsh is actually projected to increase by 332 acres with the 44-ft alternative; whereas, a net loss of freshwater marsh (ranging from 32 acres for the 45-ft alternative to 337 acres for the 48-ft alternative) would still result from the other deepening alternatives, even with mitigation. Considering the substantial loss of tidal freshwater wetlands that has already occurred as a result of past dredging operations and other modifications to the system, the DNR considers anything more than a de minimis loss of freshwater wetlands to be a significant adverse impact of the proposed deepening project.*

Response: The conversion of 223 acres of freshwater wetland to brackish marsh [outside of the SNWR] represents the only major [functionally quantifiable] wetland change resulting from deepening the harbor to 47-feet. As noted previously, the subject freshwater wetlands would retain most of their current functional characteristics. The District's calculation of the number of acres of freshwater wetland potentially converting to brackish marsh is based on a shift of 0.5 ppt salinity, a traditional rule-of-thumb for differentiating between freshwater marsh and brackish marsh. However, data in literature for Savannah Harbor suggest that a shift in vegetation [from freshwater marsh to brackish marsh] in this estuary does not occur until salinity concentrations approach 2.5 ppt (Latham et al., 1994). Even at oligohaline marsh sites with average salinity concentration of 2.1 ppt, a discriminant function analysis revealed that only 47% of cases resulted in the correct pairing of environmental variables with vegetative species composition and dominance. At those same oligohaline sites, 37% of the vegetative

species composition and dominance were more closely aligned with a freshwater classification (Latham et al., 1994).

The 0.5 ppt salinity threshold [to define a shift from freshwater to brackish marsh] is approximately 5 times lower than often observed with 100% vegetative shifts *in situ* within the Lower Savannah Watershed (Latham et al., 1994) and other coastal marsh systems in the southeastern United States (NOAA, 2010). Thus, many of the existing freshwater emergent plant species, and associated ecological parameters, would likely be sustained in areas predicted to experience salinity concentrations in the range of 2.5 ppt. Those areas that do transition to more brackish characteristics would still continue to provide the traditional ecological functions associated with all emergent wetland systems. See also other responses on this issue.

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760-JK-400-EV42

Comment: *As discussed in the DEIS, there are significant concerns related to the predicted decrease in dissolved oxygen that would result from the proposed deepening project. The primary area of concern for dissolved oxygen is the portion of the Savannah River between Fort Pulaski (River Mile 0.0) and the Seaboard Coastline Railroad Bridge (Mile 27.4). This is the section of the Savannah River estuary that would be directly affected by the deepening project. As noted in the DEIS, this segment of the river is on Georgia's Section 303(d) list as impaired for dissolved oxygen. Modeling studies conducted in support of the development of a Total Maximum Daily Load (TMDL) for dissolved oxygen in Savannah Harbor estimate that the existing dissolved oxygen concentration in Savannah Harbor is I mg/l lower than it was during the baseline year (1854) and condition (12-foot controlling depth) because of dredging operations that have been conducted since then. Model predictions from the SHEP studies indicate that further deepening will have additional impacts on the dissolved oxygen regime in Savannah Harbor.*

Response: The SHEP's impacts on the dissolved oxygen regime in the environs of Savannah Harbor are discussed in the EIS, but are described in greater detail in the GRR-Engineering Appendix. Based on the potential adverse impacts to dissolved oxygen caused by harbor deepening, the project's mitigation includes an oxygen injection system. This system has been designed to compensate for the incremental impacts on the dissolved oxygen regime. Due to the spacing of the system's "Speece Cones", the dissolved oxygen regime would improve in over 90 percent of the project effect's area compared to the status quo.

760-JK-400-EV43

Comment: *As reported in the DEIS, hydrodynamic and water quality modeling conducted in support of the deepening project suggest that the proposed mitigation features (i.e., the flow altering plans discussed above and the DO injection systems) would substantially reduce project impacts to freshwater wetlands and some species of fish. While DNR does not necessarily dispute the hydrodynamic and water quality modeling results, we are concerned that there is still substantial uncertainty regarding the predicted magnitude of adverse impacts and the effectiveness of the proposed mitigation measures, particularly, the oxygen injection system. The results of a demonstration project conducted to determine the effectiveness of the system in Savannah Harbor were inconclusive. The slight increase in dissolved oxygen in the vicinity of the Speece Cones was shown to be within the normal range of natural variability due to tidal influences, and could not be definitively attributed to the oxygen injection system itself. Furthermore, the long term effectiveness and viability of this system in a tidal brackish water environment is highly questionable. The minimal net improvement in DO predicted by the model may not be sufficient to warrant the initial cost of the system or the long-term maintenance costs. Instead, DNR*

recommends that adverse impacts to dissolved oxygen levels be minimized by deepening to no more than -45 ft.

Response: While the injection of oxygen into an estuary [to improve dissolved oxygen levels] is a relatively new concept, the technology is not. There is little objective doubt that oxygen injection can add oxygen to the water column, the concern is whether the injected oxygen would spread throughout the estuary. An oxygen injection demonstration verified the efficacy of the Speece cones to add oxygen to estuarine waters. The Transfer Efficiency Study will identify the rate at which the oxygen injection system is able to add oxygen to the receiving water. The post-construction monitoring plan includes a comparison of the observed effects on dissolved oxygen levels with those expected to occur. The Adaptive Management Plan contains provisions to modify the oxygen injection system [as necessary]. These changes could include increasing the amount of injected oxygen, use of different equipment, altering the locations/number of the oxygen injections sites, etc.

760-JK-400-EN08

Comment: *ONR also is concerned that some or all of the flow-altering modifications could have unintended consequences that result in additional adverse impacts to natural resources. Significantly, the modifications proposed to red.uce salinity intrusion into the Back River to protect tidal and managed freshwater wetlands could result in increased salinity intrusion into the Front and lower Middle rivers, where both juvenile and adult SNS have been found to concentrate, particularly during the winter when temperatures are below 22' C (Collins et al., 2001). In fact, Table 5-30 shows that the loss of adult SNS habitat in winter would be much greater with the flow alterations (maximum loss of 439 acres for the 48-ft alternative) than without them (maximum loss of 44 acres for the 48-ft alternative). Conversely, the loss of adult SNS habitat in summer and juvenile SNS habitat in winter is predicted to be less with the proposed flow-alterations than without them.*

Response: Shortnose sturgeon habitat impacts are evaluated for both winter and summer periods and for juvenile and adult life-stages. The coordination efforts between the District and National Marine Fisheries Service [member of the SHEP Fisheries Interagency Coordination Team], have been extensive. Special attention was given to ensure habitat suitability criteria are appropriate for species life-stage and time of year. Moreover, care was taken to structure the modeling so that it accurately reflects observed Shortnose sturgeon habitat in the Savannah River estuary [under existing conditions].

Regarding mitigation for Shortnose sturgeon, there was consensus that impacts to this species are difficult to mitigate completely. EIS Section 5.03.1 addresses this and states: The adverse impacts that would remain to Shortnose sturgeon and Striped bass after the flow altering and dissolved oxygen components of the mitigation plan are included remain at levels which warrant further mitigation. The Fisheries Interagency Coordination Team was queried about potential ways that habitats within the harbor could be improved for these two species. For Striped bass, structural modifications, such as timber or rock flow diverters, were discussed. In the end, agency fishery experts could not identify measures that would improve its habitat over the wide range of river flow conditions. Similarly, no structural measures could be identified within the estuary to compensate for Shortnose sturgeon habitat losses.

The decline of Shortnose sturgeon is attributable to many factors, but none is more important than the loss of its upstream spawning habitat. Appendix L provides an historic account of this and other endangered species in Savannah Harbor and details the reason[s] for their decline. Harbor deepening would not affect the Shortnose sturgeon's spawning habitat since it is located over 100 miles upstream

from the SHEP's effects area. Rather, this project would have a long-term positive impact on adult sturgeon summer habitat in the lower Savannah River and an adverse impact on sturgeon winter habitat [Appendix L-page 89]. Most of the project-induced impact is caused by an increase in upstream salinity levels and a decrease in dissolved oxygen levels. While no critical habitat for Shortnose sturgeon has been designated in the Savannah River, the importance of protecting [and even improving] the habitat for all resident species in the lower Savannah River is obvious.

Of course, there are uncertainties with any project, but the Cooperating Agencies and the Fisheries Interagency Coordination Team all support providing fish passage beyond the lock and dam, since anadromous fish such as SNS would have access to their historic spawning areas at the Augusta Shoals. The expectation of the agency fishery experts is that increasing the spawning habitat of anadromous fish like SNS would increase their population levels.

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760-JK-400-EN09

Comment: *The deepening alternative that is predicted to have the least negative impact on SNS habitat overall (including adults and juveniles during winter and summer) is the 44-ft alternative, which would result in a net loss of approximately 60 acres of SNS habitat with flow-altering mitigation, and 151 acres without flow alterations. By comparison, the NED Plan (i.e., the 47-ft alternative) is predicted to result in a net loss of 473 acres of SNS habitat overall with flow alterations (or a loss of 545 acres without flow alterations). The locally preferred plan (i.e., the 48-ft alternative) would result in even greater net losses of SNS habitat overall, DNR considers magnitude of these impacts to the habitat of shortnose sturgeon to be unacceptable, with or without mitigation.*

Response: The District has worked closely with technical staff of NOAA's National Marine Fisheries Service to ensure accuracy in identifying and quantifying impacts to Shortnose sturgeon habitat within the Savannah River estuary. Since publication of the DEIS and GRR [November 2010], these impact predictions have been updated as a result of adjustments in the modeling parameters, specifically inclusion of point source loadings, dissolved oxygen injection, and the Middle River sill mitigation feature. The changes have been approved by technical staff of NOAA's National Marine Fisheries Service.

For the -47 foot project depth, there would be an 89-acre gain (6.5%) in adult habitat [summer] in the estuary largely resulting from improvements in dissolved oxygen levels in the Back and Middle Rivers. In the winter, modeling predicts a 278-acre loss of adult habitat (7.2% loss). Model predictions also show a loss of juvenile habitat [winter] of 326 acres [9.9%] in the harbor. The forecast losses to adult/ juvenile habitat [winter] result from increases in salinity on Front River.

Regarding mitigation for Shortnose sturgeon, there was consensus that impacts to this species are difficult to mitigate completely. EIS Section 5.03.1 addresses this and states: The adverse impacts that would remain to Shortnose sturgeon and Striped bass after the flow altering and dissolved oxygen components of the mitigation plan are included remain at levels which warrant further mitigation. The Fisheries Interagency Coordination Team was queried about potential ways that habitats within the harbor could be improved for these two species. For Striped bass, structural modifications, such as timber or rock flow diverters, were discussed. In the end, agency fishery experts could not identify measures that would improve its habitat over the wide range of river flow conditions. Similarly, no structural measures could be identified within the estuary that would compensate for Shortnose sturgeon habitat losses. As a result, the Team agreed [2007] that a fish bypass around the New

Savannah Bluff Lock and Dam would compensate for losses within the estuary by providing 20 additional miles of upstream spawning/foraging habitat.

760-JK-400-EV44

Comment: *Other unintended consequences of flow alterations could also occur. Recent and ongoing tagging studies suggest that SNS may move freely between the Front, Middle and Back rivers via Steamboat Cut and Rifle Cut. If this proves to be the case, closing Rifle Cut could impede this movement, and limit SNS access to suitable foraging and nursery habitat. In addition, DNR field biologists have recently reported that the sediment basin in the lower Back River has already filled in to a large extent, and that any further deposition of sediments in this area could present another impediment to SNS migration throughout the system.*

Response: After careful deliberation, the Cooperating Agencies and the Fisheries Interagency Coordination Team [SCDNR is a member] developed the SNS habitat criteria. Closure of Rifle Cut is part of the flow diversion mitigation and is designed to impede [reduce] saline flows from Middle River into Little Back River. Although Shortnose sturgeon would be blocked [post-construction] from using this passage from Middle River to Little Back River, individuals would still have access via other routes, as well as entry to all other waterways in the study area.

760-JK-400-EV45, 760-JK-400-EV46

Comment: *The USACE proposes to provide compensatory mitigation for unavoidable impacts to SNS foraging and nursery habitat by constructing a fish passage structure around the New Savannah Bluff Lock and Dam (NSBLD) near Augusta, at a projected cost of $6.3 million. The structure (a rock ramp) would be located on the South Carolina side of the river, and would theoretically provide SNS access to approximately 20 miles of upstream spawning habitat. DNR believes the likelihood that this approach would be successful in passing SNS is highly doubtful. While such a fish passage structure might benefit other migratory fish, its success in passing SNS has never been demonstrated. Because of its unproven success, DNR is opposed to implementing active fish passage as mitigation for unavoidable impacts to SNS habitat, and believes that the best approach to protecting shortnose sturgeon habitat would be to minimize those impacts by selecting either the "no action" alternative or the 44-ft deepening alternative (with flow-altering mitigation). While impacts to SNS would be minimized by selecting either the no action alternative or the 44-ft alternative, modeling results presented in the DEIS suggest that the overall net loss of striped bass habitat (including suitable habitat for spawning, eggs and larvae) would be less with the 45-ft alternative. Because of this apparent benefit to striped bass, an important recreational species whose population in the lower Savannah River has been drastically reduced by earlier dredging operations and flow-altering modifications to the system, DNR would consider the 45-ft deepening alternative (with flow-altering mitigation) to be acceptable, as well.*

Response: The Fisheries Interagency Coordination Team concluded that construction of a fish bypass at the New Savannah Bluff Lock and Dam would be acceptable mitigation for the adverse impacts of the SHEP on the Shortnose sturgeon. The horseshoe rock ramp was selected as the best design to allow passage of Shortnose sturgeon, as well as be able to pass other anadromous fish [American shad]. Based on comments received on the DEIS and input from an April 2011 workshop, the off-channel rock ramp design has been selected as the design for this mitigation feature. The use of fish passage structures has a successful history. Lake sturgeon have been observed negotiating both constructed/natural rapids [entire river width] in the upper mid-west [US]. Some of these observations were made at more shallow water depths than would be the case [3.5 to 5.5 feet] for the fish bypass at

the New Savannah Bluff Lock and Dam (Aadland 2010). Since the Lake sturgeon is a larger species than the shortnose, the latter should have little difficulty [physically] passing the constructed bypass.

The Monitoring Plan includes provisions to ascertain Shortnose sturgeon use of the bypass and their overall success in moving to upstream spawning grounds. The Adaptive Management Plan provides the means to modify the fish bypass if required.

The potential acceptability of the 45-foot project to the SC DNR is based on the predicted increase in suitable habitat for Striped bass eggs and larvae. However, this prospective concurrence is predicated on implementation of the project's mitigation plan, including flow diversion features along with annual payments to the GA DNR for stocking of Striped bass fingerlings.

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760-JK-400-EV47

Comment: *The USACE also proposes to provide compensatory mitigation for unavoidable impacts to tidal freshwater wetlands. Initially an attempt was made to identify other sites in the Savannah River estuary that could be used for restoration or creation of tidal freshwater marsh; however, neither the USACE nor any of the stakeholders could find any suitable sites that were available within the Savannah River Basin. In the absence of any such sites, the USACE (in consultation with the USFWS and other natural resource agencies) used the Savannah District Standard Operating Procedures (SOP) to calculate the minimum number of acres that would need to be acquired and preserved to acceptably mitigate for unavoidable freshwater wetland impacts. Using this procedure, it was determined that the total acreage of wetlands that would need to be preserved ranged from 0 acres for the 44-ft deepening alternative (with flow-altering mitigation) to 2,683 acres for the 48-ft alternative (with flow-altering mitigation). The USACE proposes to acquire lands identified in the latest version of the Savannah National Wildlife Refuge Acquisition Plan (dated July 2007), and provide them to the USFWS to manage as additions to the Refuge as compensatory mitigation for unavoidable wetland impacts from the deepening project. Priority will be given to acquiring properties that are dominated by freshwater wetlands. DNR concurs with this approach to mitigating for any unavoidable impacts to tidal freshwater wetlands, particularly since most of the indirect impacts of deepening would occur within the Savannah National Wildlife Refuge. DNR recommends that any such acquired properties be made accessible to the public for educational and recreational activities that are consistent with the wildlife management goals of the Refuge.*

Response: As part of the project's mitigation plan, the District proposes to purchase property [2,245 acres] for inclusion in the Savannah National Wildlife Refuge. The USFWS has the authority to accept these lands since they are already listed in the Refuge's approved acquisition plan. The USFWS would manage these properties [for education/recreation] using funds obtained through the Department of Interior's normal budget process.

760-JK-400-EN10

Comment: *Channels: The channel is shallower and narrower than Army Corps design standards for fully loaded post-panamax ships. This indicates margins of safety for navigation will be lower than normal. The Engineering Investigations section promotes accepting greater than normal levels of risk without further justification (page 59).*

Response: The preliminary channel design was determined using the Corps of Engineers' design standards and procedures outlined in EM-1110-2-1613, Hydraulic Design of Deep Draft Navigation Projects. In accordance with ER-1110-2-1403, the District developed final channel dimensions and

navigation requirements using the Corps' state-of-the-art Ship Simulator, with input from the Savannah Harbor Pilots Association (SHPA). The use of ship simulators to establish final design parameters for deep-draft navigation channels is standard practice worldwide. It ensures that channels are safe and economical and minimizes environmental impact and long term maintenance requirements. The use of ship simulators also provides the harbor pilots who will actually use the channel with the opportunity to provide input into the design and ensure the navigability and safety of the channel.

The existing channel dimensions can accommodate meeting between the deepening design vessel (post-panamax Generation 2; 140' beam) and a smaller vessel. Ship simulation verified that the channel could be deepened and widened at 2 bends in the inner harbor to maintain two-way traffic capability for the design vessel and a smaller vessel. Two meeting areas are also included to provide for meeting of two design vessels.

In reference to "Army Corps design standards" for depth of channel, the Corps, ASCE, and PIANC recommend a preliminary or concept design of channel depth in exposed entrance channels using the ratio of channel depth(h) to ship draft (T)of at least h/T =1.2. However, this standard is empirically derived and very conservative. For Savannah Harbor, a detailed design study was performed using more extensive laboratory models, field measurements, numerical model simulations, and probabilistic models to refine the required channel depths.

Currently the Savannah Harbor Pilots safely bring in vessels with a minimum of 4' underkeel clearance (UKC). This practice would continue with the deepened channel. Depending on the draft of the vessel, use of tide may be required to maintain that UKC throughout transit. The vertical ship motion study conducted for this study used a ratio channel depth h to ship draft T of h/T =1.09, which for the light-loaded vessel drafting 46' corresponds to a channel depth of 50'. This condition matches the SHPA policy of 4' UKC. The vertical motion study confirmed that the light-loaded vessel would not touch bottom if sailing with 4' UKC and if vessel speed does not exceed 12 knots (kt). The study also showed that given additional water depth, and therefore higher h/T values, ships could travel at higher speeds without causing enough squat to cause grounding. Vertical ship motions including squat and waves are discussed in subsequent responses.

For the fully loaded 47.5 draft, using a channel depth (h) to ship draft (T) of h/T =1.09, would correspond to a water depth of 52' requiring at least a 3' tidal advantage for the 49' entrance channel depth (47' project). The vertical motion study showed that a ship speed of 14 kts or less would not cause grounding due to squat for this condition. Greater speeds would require additional depth to prevent grounding due to squat.

Documentation for both the ship simulation and vertical motion studies can be found in Engineering Appendix Supplemental Materials.

The margin of safety for the project is in accordance with Corps of Engineers Guidance for Channel Design. We do not agree that there is a greater than normal risk for the project. Although there is always a degree of "risk" inherent with any project, this project was designed by sound engineering practices to minimize the risk to the maximum extent practicable.

760-JK-400-EN11

Comment: *Channel Depth and ship draft: The project will not accommodate post-panamax draft even on high tide. It will most likely handle drafts of 43 feet on any tide, and 47 feet on high tide, well under post-panamax. Tide range in the offshore channel is reported at 50 to 75 percent in excess of the actual tide range offshore, distorting estimates.*

Response: Savannah Harbor Pilots Association (SHPA) policy is to move vessels through the harbor provided 4 feet of underkeel clearance is available throughout the transit. This policy would be maintained for the deepened channel. Depending on the draft of a particular vessel, use of the tide may be required to maintain 4 feet of underkeel clearance throughout transit. In reference to "Army Corps design standards" for depth of channel, the Corps, ASCE, and PIANC all recommend a preliminary or concept design of channel depth in exposed entrance channels using the ratio of channel depth (h) to ship draft (T) of at least h/T =1.2. However, this h/T=1.2 standard is very conservative. A detailed design is recommended using more extensive laboratory models, field measurements, numerical model simulations, and/or probabilistic models to refine the required channel depths. The Corps conducted a vertical ship motion study (performed by ERDC) specifically for the entrance channel, including the channel extension from Station -60+000 to -98+600. Documentation of this study can be found in the Engineering Appendix Supplemental Materials. The CADET program used in this study for the vertical ship motion predictions is a probabilistic or risk-based model which includes probabilities of waves over a 20-year wave hindcast.

NOAA confirmed that at the most distant extent of the design channel, tidal range is equivalent to tidal range at Ft. Pulaski multiplied by 0.91-0.94. The CADET risk-based model used to predict vertical ship motion indicates that a total depth of 50 to 52 feet (gross underkeel clearance of 4 to 4.5 feet) should be acceptable for T=46 and 47.5 ft draft *Susan Maersk*, respectively. The tide range in the offshore portion of channel would provide the equivalent to 53+ feet for 365 days per year for durations of 4 hours if needed.

Economics analyses took into consideration that ships will not always operate fully loaded and at times might require use of a tidal advantage.

760-JK-400-EN12

Comment: *Channel Width and Ship Width: The proposed channel width will be narrower than present, and therefore will decrease the number of ships the project can handle. This is contrary to the objectives. The channel is only wide enough for ships up to 11 7 feet wide, and then only in one-way traffic, according to Army Corps channel design standards. Post-panamax beam is 160 feet.*

Response: The deepened channel would be slightly narrower than the status quo. The District used the *Susan Maersk* (post-panamax Generation 2) as the design vessel. Final channel dimensions and navigation requirements were developed using the Corps' state-of-the-art Ship Simulator along with input from the Savannah Harbor Pilots Association. These data supersede guidance from Corps of Engineers', Design Standards and Procedures outlined in EM-1110-2-1613. The ship simulation confirmed that the new channel could safely accommodate transit of this vessel. The longer design vessel would result in the need for bend wideners in multiple locations. The new channel would allow the design vessel to meet a Panamax vessel at all locations along the channel. Two meeting lanes are included in the inner harbor to provide places where two design vessels could meet when transiting the harbor.

Page 2-13

760-JK-400-EN13

Comment: *One-Way Traffic: The channel is not satisfactory for two-way traffic of any appreciably sized ships, per Anny Corps standards. Navigational simulation studies only simulated ships up to 140 feet wide, less than post-panamax and problems presented in these simulations. There were no simulations of a full sized post-panamax ship reported.*

Response: The preliminary channel design was determined using the Corps of Engineers' design standards and procedures outlined in EM-1110-2-1613, Hydraulic Design of Deep Draft Navigation Projects. In accordance with ER-1110-2-1403, the Corps developed final channel dimensions and navigation requirements using the Corps' state-of-the-art Ship Simulator, with input from the Savannah Harbor Pilots Association (SHPA). The use of ship simulators to establish final design parameters for deep-draft navigation channels is the standard practice worldwide and ensures that channels are safe and economical, and minimizes environmental impact and long term maintenance requirements. The use of ship simulators also provides the harbor pilots who will actually use the channel with the opportunity to provide input into the design and ensure the navigability and safety of the channel. The existing channel dimensions can accommodate meeting between the deepening design vessel (post-panamax Generation 2; 140' beam) and a smaller vessel. Ship simulation verified that the channel could be deepened and widened at 2 bends in the inner harbor to maintain two-way traffic capability for the design vessel and a smaller vessel. Two meeting areas are also included to provide for meeting of two design vessels at the Long Island and Oglethorpe Ranges.

Documentation for both the ship simulation and meeting area studies can be found in Engineering Appendix Supplemental Materials.

760-JK-400-EN14

Comment: *Passing Lanes: One passing lane was found to be inadequate, leaving one viable passing lane throughout the length of the project.*

Response: As stated in the Engineering Appendix Section 6.3.3, the two meeting areas included in the project are designed to allow the meeting of 2 SHEP design vessels (*Susan Maersk)*. Meeting areas provide areas for the design vessels to be able to meet in transit to avoid delays that would otherwise be incurred if a vessel had to either wait in the entrance channel or at dock until a design vessel had exited the channel. For Savannah Harbor, all "passing" lanes are defined as meeting areas. "Passing" is typically defined as ships overtaking each other. "Passing" in this sense is not practiced in Savannah Harbor; therefore any subsequent reference to "passing" shall be understood as "meeting". The two meeting areas are located at Long Island Range and Oglethorpe Range. Through model runs and pilot input, ERDC determined that a 100-foot wide and 8,000 foot long meeting area would be required for vessels to meet safely in the Long Island Range with 1,000 foot transitions back to the navigation channel width. The final location (center of range) was determined by consultation with pilots. The location was determined to be from Station 14+000 to Station 22+000 for the full 100-foot meeting area (Station 13+000 to 23+000 including transitions). For the Oglethorpe Range, a width of 100 feet from Station 54+800 to Station 58+800 (Station 54+800 – Station 60+700 with transitions) was used in simulation runs and determined to be adequate. Track plots showed that pilots required the full length, so no further restriction in length was tested. Details of ship simulation for these two meeting areas can be found in the Engineering Appendix Supplemental Materials.

760-JK-400-EN15

Comment: *Offshore Channel Bend: This critical point was found to be navigationally sound only when ranges are visible, limiting use to days when the visibility is good.*

Response: Although infrequent, if visibility becomes restricted to the point that safe transit of the channel is threatened, ship traffic is prohibited. Given the potential for closure exists under current conditions, it is reasonable to assume this would be the case for the deepened channel as well.

760-JK-400-EC04

Comment: *Traffic Load: The project cannot accommodate the number of ships projected to be calling on the port with only one-way traffic. No traffic density study was reported verifying the number of ships the port might handle daily.*

Response: Section 3 of the Economics Appendix describes the GPA's present operations, capital improvement plans and other transportation infrastructure improvements and storage area expansions, all which play a part in the Corps' determination of a maximum capacity. A follow-up letter prepared by Moffatt & Nichol verified the reasonableness of the estimated capacity. It is reasonable for GPA to be able to accommodate the number of ships estimated to call over the study period.

760-JK-400-EN17

Comment: *Maintenance Dredging: The GRR suggests maintenance dredging will not increase in cost or volume over present levels, though four other ACOE studies indicate the contrary. Maintenance at present levels is lacking, as the existing channel is less than project depth across seven ranges of the channel. Basing future maintenance on inadequate present maintenance of a shallower project is likely to prove inaccurate.*

Response: The commenter did not provide sufficient information on the "other ACOE studies" for the District to comment on their potential applicability to this project and situation. The Corps agrees that at times the existing channel contains sediment above the authorized depth. That occurrence is standard practice throughout the country. The advance maintenance that the District has implemented in various reaches of the existing project is one means of minimizing the extent of that situation before maintenance dredging is performed. The GRR-Engineering Appendix, Supplemental Materials contains the evaluation that the Corps performed of sedimentation in the harbor. That analysis identified the changes in shoaling amounts and locations that should be expected with harbor deepening.

760-JK-400-EN18

Comment: *Dredge Spoil Disposal: Even with artificially low estimates of dredge spoil volume, the project relies on the availability of the site considered for a Jasper County terminal for 60 years. The actual amount of dredge spoil disposal volumes is likely to be much higher than estimated in the report, creating further reliance on the Jasper site for decades.*

Response: There may be some obvious impediments to its implementation, but given sufficient motivation a container terminal in Jasper County could become a viable port operation. Nonetheless, as noted in the EIS, the SHEP would use CDFs 14A/14B [the latest proposed Jasper Terminal site] to deposit excavated material since it is the least-cost, environmentally acceptable alternative. However, this decision does not necessarily preclude these areas from being used to construct a terminal within the SHEP's 50-year economic life. The Georgia Department of Transportation has requested the District release its sediment disposal rights in the subject sites. The District is providing technical information to

Joint Project Office (JPO) for a Jasper Terminal to identify a means to replace disposal capacity that would be lost, as well as mitigation features [marsh restoration] within the footprint of the proposed JOT. The Corps has informed the JPO that it will release those easements if the Federal Government's costs are not increased (the Government is "made whole") and all environmental requirements are met and development of the property is imminent, i.e. the developer obtains a Section 404 permit for an alternate use of the site. It should be noted that a consultant working for the JPO has stated that the proposed placement of new work sediments [from SHEP construction] on CDFs 14A and 14B would save the JOT development project over $400 million by raising its elevation to a workable height. Therefore, if SHEP is constructed, it would benefit the development of a Jasper Terminal by significantly reducing initial construction costs.

760-JK-400-EC05

Comment: *Economic Benefit: The economic analysis did not account for limitations on draft, width, speed, and two-way traffic, but rather assumed the project could actually handle post-panamax ships at unlimited density. Actual ship activity is unlikely to meet economic benefit estimates.*

Response: The Economics Appendix did in fact consider limitations on vessel draft, beam and speed. The Transportation Cost Savings Model reveals that a large distribution of vessel classes is used in the calculations. The HarborSym modeling evaluated how the vessel fleets (with and without project) could call at the Port. As a result, that analysis did include consideration of the density of vessels expected to call at Savannah.

760-JK-400-EC06

Comment: *The DGRR states that the Garden City Container will handle up to 6.5 million twenty foot containers (TEU) being on or off loaded at this facility annually. Using several methods to analyze potential capacity with their proposed capital improvements, a more realistic capacity for the facility would be about 3.5 million TEUs annually.*

Response: Section 3 of the Economics Appendix describes the GPA's present operations, capital improvement plans and other transportation infrastructure improvements and storage area expansions, all which play a part in the Corps' determination of a maximum capacity. A follow-up letter prepared by Moffatt & Nichol verified the reasonableness of the estimated capacity. It is reasonable for GPA to be able to accommodate the number of ships estimated to call over the study period.

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760-JK-400-EC07

Comment: *The Savannah Maritime Association recommends a 2 ft minimum water clearance under vessels transiting the Port of Savannah. The GRR uses clearances of over 4 ft for certain classes of vessels in the analysis. There should be general agreement between operational practices at the port and assumptions used in the report.*

Response: The underkeel clearances stated in the Appendix also account for the dynamic condition, and include squat, trim, and freshwater sinkage. Once these factors are netted out, the underkeel clearance requirements are representative of the standard practice.

760-JK-400-EC08

Comment: *Given forecasts for the year 2030 in the report, it is assumed there will be 3,500 container ships calling at Savannah Harbor, along with about 3,000 general cargo ships and 167 LNG tankers. This equates to over 13,000 commercial vessel transits in or out of Savannah Harbor annually. Given:*
- *Multi-mile wide safety zone required for LNG transits,*
- *Recreational boating at the cross point of the channel and the ICWW,*
- *Large size of vessels expected to call Savannah, and*
- *Complexity of navigation within the Savannah River complex.*

The report offers no details on how Savannah Harbor can accommodate so many vessel calls.

Response: The HarborSym modeling evaluated how the vessel fleets (with and without project) could call at the Port. That analysis included consideration of factors such as the number of vessels, their size, the LNG exclusion zone, the duration of a transit, etc.

760-JK-400-EC09

Comment: *Most of the anticipated traffic increase forecasted for Savannah Harbor in the future is imports with a large increase forecasted for imports from the Far East. The report does not effectively address the impact of a significant increase in import cargo versus U.S. exports. By 2030, given the forecasts in the report, there will be over 1.5 million TEUs of empty containers going out of Savannah harbor, due to the imbalance between import volumes and export volumes. This forecasted imbalance in trade flows has an effect on outbound vessel loading and draft requirements that do not seem to change over time. For some trade routes, the depth of outbound vessels is the main source of benefits.*

Response: While it may appear that there is an imbalanced loading for exports and imports, there are unique cargo distribution patterns in the Southeast. It is quite likely that a particular container may enter Savannah from overseas, be taken to a distribution center in central Georgia, then reloaded and exported at Jacksonville. Also, just because you have more empty containers doesn't mean the draft requirements will change significantly, since weight, stowage factors, port rotations and a host of other factors influence the amount carried on a vessel at a given time. The value of an empty container is not as great as a loaded one, and there could be a large level of container "leakage" from the region.

760-JK-400-EC10

Comment: *There is only minimal analysis of the effect deepening Savannah Harbor may have on other Southeast US and Gulf ports. It is acknowledged in the report that there are plans for potential port capacity expansion of 12 million TEUs at Southeastern US ports. Market service areas of ports can often overlap. Rather than looking at each port as a singular entity, they need to be evaluated in a regional as well as national scope, to optimize potential public investment in this industry.*

Response: The study team was well aware of the need to perform a multiport analysis given that there were several competing ports in proximity to Savannah. In 2006, GEC performed a multiport analysis on various hinterland origins and destinations for several South Atlantic and Gulf ports, including Savannah, Charleston and Jacksonville. The savings per TEU for the ocean voyage costs range from about $10 to $60 depending on the trade route distance, percentage of Savannah cargo and other factors. This is derived by dividing the "benefiting tonnes" on each trade route, by the ocean voyage transportation costs for the respective routes. At these levels of savings, and with landside trucking costs within the local area of Savannah are estimated to range from $100 to $150 each round trip, and movements outside of the local area are estimated to average $1.50 to $2.00 per round trip mile, there is not a sufficient differential to attract large amounts of cargo diverted from or to other ports. It is further

believed that there are numerous other factors involved in port developments that would have a greater effect on cargo diversions such as new container yard developments, location of distribution centers, and landside transportation improvements. The findings suggest that deepening Savannah Harbor would not result in substantial changes in the origins and destinations of imports and exports to key US markets served by the Port. Given this study's findings, the economic analysis includes the position that there would be no substantial changes in hinterland service area and therefore no change in overall cargo volume without and with channel improvements at Savannah Harbor.

In the draft report, it was assumed that PPX 2 vessels would call only if the channel were deepened to at least 44 feet. However, since that time PPX 2 vessels have called at Savannah. Recent developments and carrier announcements indicate that even in the without project condition, PPX 2 vessels will continue to call at the Port.

760-JK-400-EC11

Comment: *One argument for the expansion project is the need of greater depth within the river or tonnage will move elsewhere, but the GDRR claims lower shipping costs all the way from China. Benefits would be much lower if the transportation benefits were measured from a likely alternative U.S. port.*

Response: See prior Response to Comment 760-JK-400-EC10, which describes the multi-port analysis and assumed same volume of cargo. Also, per the Principles & Guidelines for Water Resource Projects, all economic benefits are based on willingness to pay which is the basis on which value is determined in any standard benefit-cost analysis. In the case of navigation improvement projects, the proxy for willingness to pay is "transportation savings." All economic benefits from navigation improvements ultimately accrue to individuals, and no attempt is made to distribute the benefits in accord their location or the extent of their participation in the economic cycle that includes production, transportation, distribution, wholesale and retail selling and consumption. The study team included only portions of the voyage costs for Savannah's leg.

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760-JK-400-EC12

Comment: *The NED channel depth to Garden City seems to be about 44 ft. Reducing under-keel clearance alone reduces the optimal channel depth by one to two feet. As depth increases, fewer and fewer vessels draft deep enough to save money.*

Response: The Principles & Guidelines defines the Federal objective as "contributing to National Economic Development (NED) consistent with protecting the environment". The NED Plan represents the plan that reasonably maximizes the NED benefits to the nation over the economic costs.

In the case of Savannah Harbor, the underkeel clearances also account for the dynamic condition, and include squat, trim, and freshwater sinkage. Once these factors are netted out, the underkeel clearance requirements are representative of the standard practice. The District reviewed the underkeel clearance that the pilots have typically used to move containerships through the harbor and the economic analysis is based on those numbers.

Savannah District consulted with the Savannah Harbor Pilots Association about underkeel clearance. The pilots indicated that there is no additional information (real-time information on weather, tides, etc) that would allow them to change their underkeel clearance policies.

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760-JK-400-EV48

Comment: *Section 1502.10 of the CEQ NEPA regulations (40 CFR Part 1500) and 32 CFR Part 651, Environmental Analysis of Army Actions; Final Rule prescribe the format of an EIS. The Savannah Harbor EIS does not follow this format and should be revised accordingly. Specifically, Section 2.00 should be entitled Purpose of and Need for the Action; Section 3.00 needs to be titled Alternatives including Proposed Action; a List of Preparers section should be added (presently the list of preparers appears in Appendix V) and should include persons who were primarily responsible for "significant background papers" per 1502.17; the List of Preparers section should be followed by a section entitled Distribution List, which would be the list of agencies, organizations and persons to whom copies of the statement are sent (this list is currently in Section 7.00); and an Index (there is no index in the EIS).*

Response: The EIS follows the format of and sections [in prescribed order] required by 32 CFR 65.43. The Distribution List is the only exception, which is located in Section 7, Public Involvement, Review and Coordination. Appendix W contains the Index.

760-JK-400-EV49

Comment: *CEQ NEPA Regulations (1502.13) require that the Purpose of and need for action section of an EIS "specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action." Section 2.00 includes statements that describe existing conditions and presumed benefits of the proposed action, but it is not clear if these individually or collectively comprise the underlying purpose and need. The purpose and need needs to be clearly and concisely presented.*

Response: Section 2 of the EIS has been revised to clarify the navigation problems, and it clearly states the project purpose and need.

760-JK-400-EV50

Comment: *CEQ NEPA regulations (1502.14(a)) require that agencies "Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." Paragraph 4 on page 3-2 in Section 3.00 states that "The Corps considered three locations in Jasper County, SC that were considered by others for a 'Jasper Terminal'." Paragraph 5 states that the " ... analyses ... resulted in several conceptual alternatives being eliminated from further consideration." 11 references Formulation of Alternatives, May 2005, found in Appendix O" as the document describing that work. However, Appendix O contains no evaluation of the three locations in Jasper County that were considered for a "Jasper Terminal." A Plan Formulation Appendix that discussed the Jasper Terminal locations is included in the General Reevaluation Report, but there is no reference to this in Section 3.00. Additionally, Section 3.00 of the EIS does not identity the alternatives which were eliminated from detailed study, nor does it discuss the reasons for elimination of those alternatives. This deficiency in the document needs to be corrected for the EIS to comply with CEQ NEPA regulation Section 1502.14(a).*

Response: The SHEP NEPA alternatives analysis and Clean Water Act practicable alternatives analysis fully considered a proposed Jasper County Marine Terminal. Among other things, the Regional Port Analysis specifically evaluated current and projected port capacity, demand, and growth, and environmental impacts and constraints for other South Atlantic ports (Norfolk, VA; Wilmington, NC; Charleston, SC; Savannah, GA; and Jacksonville, FL) and a proposed Jasper County Marine Terminal

(GRR, Appendix A, Attachment 6, Final Report). In addition, the information regarding analysis of the Jasper County Marine Terminal was analyzed in a study of the potential costs and environmental impacts of locating the project at one of eight different sites along the Savannah River (four on the South Carolina side, four on the Georgia side). EIS Section 3.0 and Appendix O. Among the conclusions reached as a result of the Regional Port Analysis, the Multiport Analysis, and the analysis of eight alternative sites for the project along the Savannah River were the following: a Jasper County Marine Terminal would not be cost effective when compared to improving Savannah Harbor based on the high cost involved (now estimated at $4 billion including the cost of constructing the new transportation infrastructure that would have to be built), and the timing (a Jasper Terminal does not exist at present and cannot be constructed in time to meet the growth in demand occurring through Savannah Harbor).

Appendix O [2005] makes no reference to the "Jasper Terminal" because the document was completed before the term "Jasper" was used in its description. The following locations for a new terminal were evaluated in Appendix O:

Georgia - Garden City Terminal, East Coast Terminal, Ocean Terminal, Elba Island, Brunswick;

South Carolina- Disposal Area 12A, Disposal Areas 14A/B (this is the site of what is now currently proposed for a Jasper Terminal), Tybee Island National Wildlife Refuge (NWR), and other locations.

It should also be noted that the SHEP and a Jasper Terminal are not viewed by the Joint Project Office as opposing alternatives. Rather, the JPO believes both ports are needed. A March 11, 2011 "Update" from the Jasper Ocean Terminal Joint Project Office, contains numerous statements that SHEP is necessary and beneficial for a Jasper Terminal project ("The development of the Jasper site is predicated on the success of ports in Savannah and Charleston. A completed SHEP and the planned expansion of Charleston are the first steps . . . ."). The Update states that the Jasper Terminal will handle container volumes in excess of what an improved (deepened) Savannah Harbor or Charleston Harbor could handle. The Update also confirms that the Jasper Ocean Terminal will cost $4 billion (a more recent estimate by the SCSPA is $5 billion).

See also other responses regarding alternatives issues including 760-JK-400-EV02, 765-DC-149-EV28, and 765-DC-149-EV46.

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760-JK-400-EV51

Comment: *Section 1502.14 of the CEQ NEPA regulations states that the Alternatives section of an EIS "... should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public." Section 3.03, however, does not present a comparison of the impacts of alternatives as recommended in the NEPA regulations.*

Response: GRR-Section 11 contains a system of accounts analysis. This was used to identify/compare the impacts of all alternatives [including the no-action plan]. A reference to this system of accounts analysis has been added to the beginning of FEIS-Section 3.00. Additionally, DEIS-Section 3.03 [Tables 3-7 and 3-8] "Comparative Impacts of the Alternatives" provides a comparison of hydrodynamic-related impacts [with and without mitigation] to important estuarine resources for each of the alternative depths considered in detail. EIS-Section 5 addresses the environmental consequences of the proposed action and contains numerous tables that show the individual environmental impacts of the considered

alternatives. These tables clearly demonstrate the potential impacts of the proposed project with and without mitigation.

760-JK-400-EV52

Comment: *CEQ NEPA regulations IS02.14(t) requires the alternatives section of an EIS to "include appropriate mitigation measures nO[already included in the proposed action or alternatives." A review of Section 3.00 indicates that the alternatives section does not discuss mitigation of identified adverse impacts listed in the abstract and in other sections of the EIS, including adverse impacts on the endangered shortnose sturgeon and striped bass habitat, tidal freshwater wetlands, fringe brackish wetlands, and water quality (lowered dissolved oxygen in the inner harbor). For example, the acquisition of lands to mitigate for freshwater wetland impacts is discussed in Appendix C but is not included in the Alternatives section. A mitigation subsection should be added to the Alternatives section which clearly describes mitigation measures not already included in the proposed action or alternatives.*

Response: The EIS's alternative section includes [by reference] a discussion of mitigation. EIS-Section 3.02 specifically notes: "A more detailed impact analysis for these five alternatives is described in Section 5-Environmental Consequences of the Proposed Action and the Mitigation Plan in Appendix C of the DEIS." EIS-Section 5 is the more appropriate location for a full discussion of project impacts [all options] and their individual mitigation requirements.

760-JK-400-EV53

Comment: *CEQ NEPA regulations (IS02.1S) require that the affected environment section of an EIS "concentrate effort and attention on important issues." It is unclear if Project Economics, for example, which is identified in Table 1-1, is an important issue. If so, it should be discussed in the Affected Environment section.*

Response: Table 1-1 lists "Issues Identified for the Savannah Harbor Expansion Project" and includes project economics. Project "issues" are not necessarily part of the affected environment; therefore, Table 1-1 does not directly correlate with those resources discussed in the Affected Environment Section of the EIS. Project economics, although very important to the implementation of the project, are not considered part of the affected environment. A detailed discussion of the project economics is included in the GRR-Economics Appendix. Socioeconomic resources (not included in Table 1-1) are considered part of the affected environment and are discussed in EIS-Section 4.13.

760-JK-400-EV54

Comment: *CEQ NEPA regulations (IS02.24) requires that agencies "shall identify any methodologies used ... " in analyses in environmental impact statements. In many instances, the Environmental Consequences Section S.OO of the EIS clearly states the methodologies that were used to complete the analysis of impacts (e.g., wetlands), but in other instances, such as Environmental Justice, the methodology used to conduct the analysis is not clear and needs to be described.*

Response: EIS-Section 5 includes information on income levels, school locations, hospitals, and child care facilities, proposed road improvement, as well as GPA programs that avoid, minimize and mitigate air quality, traffic, noise, and lighting impacts on the surrounding communities. The District expanded the demographic information about the communities adjacent to the port [to include transportation corridors]. Compliance with EO 12898 and EO 13045 is based on review/analysis of all the information mentioned above. FEIS-Section 5.19 and 5.20 haves been revised to include a list of the types of information collected/analyzed in addressing EO 12898 and EO 13045.

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760-JK-400-EV55, 760-JK-400-EV56

Comment: *In reviewing the DEIS it becomes apparent that the actual purpose of the proposed action is to implement a channel deepening program to mainly support the expansion objectives of the Georgia Ports Authority's (GPA) Garden City Terminal (GCT). In the Introduction to the 2010 General Reevaluation Report (GRR) it states that "... the Panama Canal Expansion Project will be fully operational by 2014, which will allow passage for vessels with up to 50 feet of draft. The Georgia Ports Authority has planned and funded improvements at Garden City Terminal to coincide with the Panama Canal Expansion Project." This would indicate that the GPA has already made and will continue to plan/make modifications to the GCT facilities in clear anticipation that the deepening of the Savannah Harbor to enable larger vessels to reach the GCT will be approved and implemented. Would the GPA be making this major investment in GCT modifications (about $130 million according to the 2005 version of the GRR) if it were concerned about the risk of some other option being chosen? Would the improvements to the GCT be carried out if another alternative, perhaps involving a different terminal site, was selected in the FEIS as a preferred action?*

Response: See response to comment 760-JK-400-EV04. Savannah District expects GPA to expand the GCT to 6.5 million TEUs/annually by 2030 regardless of whether the Savannah Harbor navigation channel is deepened [without project condition]. This capacity [6.5 million TEU] is the maximum number of containers that could reasonably be processed based on factors such as the size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the container cranes, the number of jockey trucks that move the containers within the terminal, how the containers are stacked within the terminal, and the number of railroads that service the terminal and the frequency of their trains. It is anticipated that without deepening, more vessels would be required to transport the cargo expected to transit the port. With deepening, the total number of vessels would decrease (compared to without project scenario), as vessels would be able to load/unload without the current constraints of draft.

Page 5-1

760-JK-400-EV57

Comment: *CEQ NEPA regulations (1502.14(a)) require that agencies "Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." Paragraph 4 on page 3-2 in Section 3.00 states that "The Corps considered three locations in Jasper County, SC that were considered by others for a 'Jasper Terminal'." Paragraph 5 states that the "...analyses ... resulted in several conceptual alternatives being eliminated from further consideration." It references "Formulation of Alternatives, May 2005, found in Appendix O" as the document describing that work. However, Appendix O contains no evaluation of the three locations in Jasper County that were considered for a "Jasper Terminal." A Plan formulation Appendix that discussed the Jasper Terminal locations is included in the General Reevaluation Report, but there is no reference to this in Section 3.00. Additionally, Section 3.00 of the DEIS does not identify the alternatives which were eliminated from detailed study, nor does it discuss the reasons for elimination of those alternatives. This deficiency in the document needs to be corrected for the DEIS 10 comply with CEQ NEPA regulation Section 1502.14(a).*

Response: See responses to other comments including 760-JK-400-EV02, 760-JK-400-EV50, 765-DC-149-EV28, and 765-DC-149-EV46.

760-JK-400-EV58

Comment: *Paragraph 5, line 5 on page 3-2 of Section 3.00 discusses "Four alternate terminal locations ..." The section continues by stating that "Those four sites were then compared on their economics ...", implying that economics was a reason for eliminating alternatives from detailed study. However, if economics was a reason for eliminating alternatives from detailed study, it is not clearly stated. Moreover, if there were other reasons for eliminating alternatives from detailed study, the DEIS does not state so. Additionally, the DEIS should identify the criteria that were used to compare the feasibility of alternatives for further consideration in the DEIS.*

Response: Several factors, including economics, were evaluated during the screening of alternatives. These factors and the criteria used to compare the alternatives are detailed in Appendix O [referenced in DEIS-Section 3.00]. See also responses to other comments including 760-JK-400-EV02, 760-JK-400-EV 50, 765-DC-149-EV28, and 765-DC-149-EV46.

760-JK-400-EV59

Comment: *Section 3.03, Comparative Impacts of Alternatives. Section \502.14 of the CEQ NEPA regulations states that the Alternatives section of an EIS.....should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public." Section 3.03, however, does not present a comparison of the impacts of alternatives as recommended in the NEPA regulations.*

Response: See response to comment 760-JK-400-EV03. GRR-Section 11 contains a system of accounts analysis. This was used to identify/compare the impacts of all alternatives [including the No-Action plan]. A reference to this system of accounts analysis has been added to the beginning of FEIS-Section 3.00.

760-JK-400-EV60, 760-JK-400-EV61

Comment: *Section 3.04, Rationale for Plan Selection. Paragraph 1, line 2 of this section references two pages of the DEIS following the Section 3.04 text that "... summarize the results of the impact analyses." However, the two pages (Table 3-6 and Table 3- 7) only summarize the hydrodynamic- related impacts of the five depth alternatives and do not summarize the impacts of the No Action Alternative, nor deepening only the Garden City Terminal site, which Section 3.00 states in Paragraph 5 on page 3-2 "... was considered in the detailed evaluations. Section 3.04 of the DEIS, therefore, should be revised to present the environmental impacts of the No Action and Garden City Terminal site alternatives with the five depth alternatives in comparative form 10 provide a clear basis for choice among options. Moreover, the comparison of alternatives should include all environmental impacts that arc discussed in Section 5, Environmental Consequences. In addition to those impacts currently included in Tables 3-6 and 3-7, the summary of impacts should include the following: sediment quality, air quality, marine and estuarine resources, terrestrial resources, floodplains, threatened and endangered species, cultural resources, essential fish habitat, cumulative effects, aesthetics and recreational, recreational and commercial fishing, socioeconomic resources, environmental justice, and other items and factors.*

Response: See response to comment 760-JK-400-EV03. GRR-Section 11 contains a system of accounts analysis. This was used to identify/compare the impacts of all alternatives [including the No-Action plan]. A reference to this system of accounts analysis has been added to the beginning of FEIS-Section 3.00. EIS-Section 5 addresses the environmental consequences of the proposed action and contains numerous tables that show the individual environmental impacts of the considered alternatives. These tables clearly demonstrate the potential impacts of the proposed project with and without mitigation. A

sentence will be added in FEIS-Section 3.04 to clarify this point. The sentence that references deepening only the GCT has been revised to state: "Therefore, deepening only to the Garden City Terminal site was considered in the detailed evaluations."

Page 5-2

760-JK-400-EV62

Comment: *Section 3.07, Alternative Methods or Beneficial Use of Dredged Sediments. Paragraph 1on page 3-23 of this Section identifies that "... Savannah Harbor ODMDS is the least cost disposal alternative for long term maintenance of the proposed harbor deepening project." It is not clear whether or not maintenance dredging is part of the proposed action. If it is part of the proposed action and alternatives, the DEIS must present the environmental consequences of the disposal alternatives and should present these in a comparative form so that the decision maker and the public are presented with a comprehensive evaluation of the short-term and long-term impacts of each alternative.*

Response: The requirements for maintenance dredging the deepened harbor are addressed throughout the in EIS including Section 3, Appendix B, Appendix H, Appendix I, the GRR, and the DMMP. The Georgia DOT (non-Federal sponsor) has provided seven confined upland disposal facilities (CDFs) which would be used to maintain the inner harbor channel. Maintenance material from the entrance channel would normally be placed in either the Savannah Harbor ODMDS or an existing CDF. Impacts associated with the CDFs and the ODMDS have been addressed in previous NEPA documents.

As authorized in the LTMS, maintenance material from the completed project may be put onto Tybee Beach or into nearshore areas off Tybee Island and adjacent to the entrance channel (See Figure 3-3). The environmental impacts of placing maintenance material from the first portion of the inner harbor or the entrance channel into these areas was addressed in the EIS for the LTMS. Prior to the initial placement of material in these sites, the Corps would conduct hard bottom surveys and cultural resource surveys. The Corps would also coordinate with the GADNR-CRD prior to using these sites.

760-JK-400-EV63, 760-JK-400-EV64

Comment: *Paragraph I on page 3-24 of Section 3,07 discusses a "sediment placement plan" that was developed by the Savannah District for the new dredging work associated with the proposed action and alternatives. The text in paragraph I. line 2 on page 3-24 indicates that "The plan was reviewed from an environmental perspective ... ". However, the text does not present the results of that review nor indicate if a complete analysis of impacts of the plan was completed. Since placement of sediment is part of the proposed action, an evaluation of the environmental impact of that component of the proposed action needs to be included in the DEIS. Additionally, Paragraph 3 of Section 3.07 indicates that the ". . . currently proposed plan is based ... ", in part, on " ... general environmental acceptability issues." These issues need to be explained and presented for the proposed plan and any reasonable alternatives to allow a comparison of the impacts of alternatives.*

Response: EIS-Figure 3-2 shows the locations of the sediment placement areas that were initially proposed for new work material. The impacts which would accrue from use of these disposal areas are addressed throughout the EIS. However, as a result of comments provided by GA DNR-CRD and the City of Tybee Island, the sediment placement plan was significantly changed. The FEIS states that all new work sediments excavated from the entrance channel would be placed in either the Savannah Harbor ODMDS or an existing CDF.

As authorized in the LTMS, maintenance material from the completed project may be put onto Tybee Beach or into nearshore areas off Tybee Island and adjacent to the entrance channel (See Figure 3-3). The environmental impacts of placing maintenance material from the first portion of the inner harbor or the entrance channel into these areas was addressed in the EIS for the LTMS. If these sites are used, the Corps would conduct hard bottom surveys and cultural resource surveys prior to any use of these sites. The Corps would also coordinate with the GADNR-CRD prior to using these sites.

EIS-Appendix O, as well as other portions of the EIS (see other responses regarding alternative issues) describes the Corps' consideration of a "range of alternatives", which included non-structural and structural measures to address the identified navigation problems.

760-JK-400-EC13

Comment: *As stated in the 2005 GRR, the preferred terminal was the GCT and it was selected on the basis of construction costs only (page 34). The comparison of these construction costs is skewed to the GCT. Table 6 compares the construction costs of the various potential terminal alternatives. For the GCT there 0$ cost shown in the column for facilities costs. Yet in the succeeding discussion there are $130 million in cost's to modify the GCT to achieve a 1.5 m TEUs. This $130 m is considered in the ORR as part of the without Project Condition and not part of the cost of the SHEP. How can that be when the modifications are to accommodate the larger ships from the Panama Canal Expansion? Facility costs for all the other terminals which range from $250m to $370 m and as they are included in the cost comparison, all of the other alternatives are more costly than the GCT. For example the total facility, dredging and mitigation costs are $326 m for the GCT compared to the Jasper County 14A/14B terminal site of $484 m. However, if the $130 m in facility costs are included for the GCT, its total would be $426 m making the actual cost comparisons among the terminal alternatives more equitable. This analysis was repeated in the 2010 GRR with slightly altered numbers in Table 6-3 but again without including any facility costs for the GCT and thus again the conclusion is that the GCT is the best terminal alternative.*

Response: GPA plans to upgrade the Garden City Terminal in the future with or without a harbor deepening. Since those costs would be incurred independent of the proposed project, they should not be included in the SHEP economic analysis as a cost of the deepening.

Page 5-3

760-JK-400-EC14

Comment: *On pages 105-106 of the 2010 GRR the stated goal for the GCT build-out will be 65 m TEUs. The costs to achieve this to the GCT would be expected to be substantial yet they are never included in the cost comparison of the terminal alternatives.*

Response: The costs to expand the Garden City Terminal to its 6.5 m TEU capacity would occur with or without a harbor deepening project. These costs are already being incurred and are not associated with the project.

760-JK-400-EN19

Comment: *In addition, the cost comparisons of the terminal alternatives do not include operations and maintenance costs. From the dredging maintenance required these costs would be expected to be much higher for the GCT than the other alternatives since the GCT is much further upstream.*

Response: A container terminal in Jasper County was not shown to be a lower-cost alternative. The investigations described previously (e.g., EIS-Appendix O) included a conceptual-level cost analysis to that effect. Although channel maintenance costs were not specifically included, it is only the incremental costs that would need to be assessed. Some increase in O&M costs would be incurred by any of the Savannah port deepening locations, as the entrance channel would need to be extended no matter where the upstream terminus of the deeper inner harbor channel. Further, regardless of the location of any new terminals along the Savannah River, the Corps would still maintain the entire length of the currently authorized project, which extends to Station 112+500. Similarly, the costs to operate a new terminal were not included in the conceptual-level cost analysis. Those operating costs would only lessen the cost effectiveness of a new terminal in those conceptual alternatives. Sensitivity analyses performed by the Corps indicate that, if a Jasper Terminal were operational, it would still be economically justified to deepen the navigation channel to Garden City Terminal.

760-JK-400-EC15

Comment: *All of this would indicate that a more thorough and comprehensive cost analysis is warranted. Furthermore, a construction cost comparison alone is not the complete picture. There has been no benefit/cost financial analysis performed for any of the terminal alternatives and it is recommended that one be carried out to provide a more equitable comparison.*

Response: At the conceptual-level analysis at which the alternate terminal locations were examined, it is reasonable to assume that terminal operating costs would be the same for a given size terminal no matter where that terminal is located. As a result, terminal operating costs would be the same with all sites considered and would not affect a cost comparison between sites.

760-JK-400-EV65

Comment: *The comparison of potential adverse environmental impacts among the terminal alternatives is further evidence of the bias favoring the GCT. Table 5 in the 2005 GRR and discussions in the 2010 ORR clearly demonstrate that the adverse impacts associated with deepening all the way to the GCT are much more significant than those for any other terminal alternative. Yet the economic "efficiency" of the GCT is considered the controlling variable in selecting it as the preferred alternative. The large discrepancy in the degree of adverse impacts attributable to the deepening to service the GCT as compared to the oilier terminal alternatives and the subsequent elimination of all the other terminal options from further consideration in the DEIS implies an inadequacy of the DEIS to provide a truly rigorous assessment of reasonable terminal alternatives.*

Response: The adverse impacts of channel deepening to GCT are not more significant than those for other terminal alternatives. Appendix O includes an analysis/comparison of costs [avoidance/mitigation] and impacts for each terminal site. The analysis considered expense of terminal development/improvement, landside transportation, and dredging in comparison with the resultant impacts of each. Other potential issues assessed included wetlands, DO, chlorides, salinity intrusion, Shortnose sturgeon, and Striped bass, debris removal, aids to navigation, etc. The GCT option received the highest composite score. [Appendix O contains more detailed information].

Additionally, the District evaluated the sensitivity of the plan formulation conclusions to wetland mitigation costs by raising wetland mitigation from $20,000 to $100,000/acre. The results of this increase can be seen in Appendix O-Table 31. The increase did not alter the rankings of the top sites, but it did narrow their cost differential. However, the cost disparity remained 23% [mitigation costs

included] and it was unlikely that detailed studies would have changed the ranking. Therefore, the team again concluded only the GCT alternative would be evaluated in detail.

Lastly, all three MEDIUM rated alternative terminal sites (Tybee NWR, DA 12A, and DA 14A/14B) are active CDFs. In fact, the Tybee NWR contains a CDF currently used for disposal of material from Savannah Harbor. This being the case, its lost storage capacity must be replaced elsewhere along the river. Ideal replacement would be in the lower reaches of the river and proximate to its lost counterpart to keep pumping costs comparable. Expansion of the existing CDFs to the north into saltmarsh habitat would be relatively easy to accomplish, but the resultant primary/secondary wetland impacts would be cost prohibitive to mitigate. To avoid these extensive impacts, the US Fish and Wildlife Service suggested the option of taking the O&M sediments to the ODMDS. Two previous studies in Savannah Harbor compared the cost of normal dredging and deposition operations to that of ocean disposal for the same reach and sediment volume. Based on that historical information coupled with the most recent costs for O&M dredging, a cost estimate was developed. Admittedly, they are planning-level estimates, but nevertheless are useful for sensitivity analyses and scenario screening. The cost of taking the subject dredged material to the ODMDS is more than double that of disposal in the CDFs.

See also other responses regarding alternatives issues.

760-JK-400-EV66

Comment: *What is left in the DEIS is not a range of reasonable alternatives but a range of alternatives to deepen the approach to the GCT. The comparative effects of possible terminal alternatives have been effectively removed from consideration m the DEIS. They have been segmented out of the alternatives analysis and segmentation of this nature can be a basis for inadequacy of the DEIS. The analysis presented only addresses comparative impacts of the deepening alternatives, not of the combined total potential impacts of both terminals (new or modified) and deepening options. Some alternatives to consider...*

Response: The EIS addresses the full range of alternatives considered for the Savannah Harbor deepening project. NEPA requires all reasonable alternatives be evaluated with the exception of those eliminated early in the planning process. As described in detail in Appendix O and summarized below, the EIS for the Savannah Harbor project considered numerous potential methods [structural/non-structural] of solving its navigation problems. Management measures with the potential to address navigation inefficiencies were evaluated based on technical, economic, and environmental considerations. The evaluations were conducted in accordance with criteria established by the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (U.S. Water Resources Council, 1983) and the policies and procedures established by ER 1105-2-100, Planning Guidance Notebook, April 2000.

Alternative terminal locations were discussed and evaluated. Those included sites in Georgia and South Carolina in the Savannah Harbor environs, as well as more remote locations (Brunswick, GA and Port Royal, SC). The District considered three locations in Jasper County, SC, i.e., the "Jasper Terminal" sites. Modifications to the existing harbor [meeting areas, bend wideners, aids to navigation, etc.] were also reviewed.

The analyses conducted in these early stages of the project resulted in several conceptual alternatives being eliminated from further consideration. Appendix O describes this work and the conclusions. The documentation was circulated to state/federal agencies along with the public for review and comment.

Four terminal locations were judged as having either a MEDIUM or HIGH potential. These four sites were then compared on their economics (including mitigation costs). When the landside development costs are included, deepening to the Garden City Terminal proved to be the most cost effective. The next site option was 45 percent more expensive. Therefore, the Garden City Terminal was the only option [along with no-action] considered in the detailed evaluations.

Additionally, the District evaluated the sensitivity of the plan formulation conclusions to wetland mitigation costs by raising wetland mitigation from $20,000 to $100,000/acre. The results of this increase can be seen in Appendix O-Table 31. The increase did not alter the rankings of the top sites, but it did narrow their cost differential. However, the cost disparity remained 23% [mitigation costs included] and it was unlikely that detailed studies would have changed the ranking. Therefore, the team again concluded only the GCT alternative [and no-action] would be evaluated in detail.

See other responses regarding alternatives issues.

Page 5-4

60-JK-400-EV67
Comment: *Clearly a thorough analysis of comparative impacts of at least some of the terminal options in concert with the deepening options should be included other than only the GCT. It would appear that the alternatives for a Jasper County terminal would merit inclusion since it appears that many of the most serious environmental adverse impacts would be eliminated or minimized with those options. The possibility of a Jasper County terminal is discussed in the GRR, but it requires a more rigorous comparison of impacts with the GCT and other alternatives. This position is supported in Appendix L: Cumulative Impacts where there a number brief mentions of the minimal adverse impacts (to salinity intrusion, oxygen depletion, shortnose sturgeon) associated with a Jasper County terminal location in comparison with the deepening to the GCT.*

Response: Appendix L does mention "minimal adverse impacts" to certain resources, but clearly states that no detailed studies have been conducted. In this absence, it should be obvious that the potential impacts associated with these notional terminal locations are only known at a conceptual level. See other responses regarding alternatives issues, including a Jasper County terminal location.

760-JK-400-EV68
Comment: *In fact, the degree of adverse impacts associated with deepening to the GCT and the respective major investments required for mitigation calls into question whether the GCT is located optimally. Some of these impacts, specifically related to the endangered shortnose sturgeon, cannot be well mitigated. Perhaps an alternative that removes the GCT from the SHEP or maintains it as a companion facility to a more optimally located terminal with substantially less adverse environmental effects could be evaluated.*

Response: See previous responses regarding alternatives issues, Appendix B (Biological Assessment of Threatened and Endangered Species), and NMFS' Biological Opinion in Appendix Z.

760-JK-400-EV69
Comment: *With regard to the deepening alternatives that are presented within the DEIS a question arises as to the need for evaluations at one foot intervals since the overdraft is estimated at two feet Why not evaluate alternatives that are two or more feet between them? Further, why is there no*

deepening alternative of 50 feet? Or even 52 or 55 feet? It would seem reasonable to include alternatives of 50 feet or more since that is the deepest depth of draft for the ships that will traversing the Panama Canal in 2014? As stated in the GRR, economic benefits increase with deeper alternatives. This may also possibly necessitate other terminal options than only the GCT.

Response: The study authority had no mandate to consider depths greater than -48 feet. As stated in Section 2.04 of the report, this study was conducted pursuant to the Water Resources Development Act of 1999 (Public Law 106-53, Section 102(b)(9)). The wording of the authorization is as follows:

(A) IN GENERAL- Subject to subparagraph (B), the project for navigation, Savannah Harbor expansion, Georgia, including implementation of the mitigation plan, with such modifications as the Secretary considers appropriate, at a total cost of $230,174,000 (of which amount a portion is authorized for implementation of the mitigation plan), with an estimated Federal cost of $145,160,000 and an estimated non-Federal cost of $85,014,000.

(B) CONDITIONS- The project authorized by subparagraph (A) may be carried out only after— (i) the Secretary, in consultation with affected Federal, State of Georgia, State of South Carolina, regional, and local entities, reviews and approves an environmental impact statement for the project that includes— (I) an analysis of the impacts of project depth alternatives ranging from 42 feet through 48 feet; and (II) a selected plan for navigation and an associated mitigation plan as required under section 906(a) of the Water Resources Development Act of 1986 (33 U.S.C. 2283(a)); and
(ii) the Secretary of the Interior, the Secretary of Commerce, the Administrator of the Environmental Protection Agency, and the Secretary approve the selected plan and determine that the associated mitigation plan adequately addresses the potential environmental impacts of the project.

(C) MITIGATION REQUIREMENTS- The mitigation plan shall be implemented before or concurrently with construction of the project.

760-JK-400-EV70

Comment: *3.0 Alternatives - Pg 3-3, 2nd para - "The studies found that (1) the expected growth of container cargo over the next 20 years would exceed the capability of any single existing or future (Greenfield) deepwater container terminal along the East Coast, (2) expansion of any existing container terminal or creation of a new terminal would cause environmental impacts, and (3) improving Savannah Harbor would not cause cargoes to shift from other ports to Savannah. Dismissing as an alternative the creation of a new terminal because it would cause environmental impacts is shortsighted and premature. Only after investigating the potential impacts of a new terminal to a level that would allow them to be directly compared against potential impacts of other alternatives such as incremental deepening, would it be possible to determine if the new terminal alternative were the least environmentally damaging practicable alternative.*

Response: See other responses regarding alternatives issues, including a Jasper County terminal location. The formulation of alternatives was conducted in accordance with criteria established in the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (US Water Resources Council, 1983) and the policies and procedures established by ER 1105-2-100, Planning Guidance Notebook, [April 22, 2000]. Appendix O demonstrates that numerous terminal locations were rigorously considered and evaluated.

Page 5-5

760-JK-400-EV71

Comment: *3.0 Alternatives - Pg 3-4, 3rd para - "For all dredging alternatives, the proposed dredging depths would include an additional 2 feet of allowable overdepth to ensure the contractor obtains the required dredging template. The dredging depths also include advanced maintenance that help the project remain at the authorized project depth between maintenance events. The existing amounts of advanced maintenance are shown in Table 3-2". The project alternatives that are being considered in detail within this DEIS are channel deepening activities ranging from authorized depths of -44 feet to -48 feet. Based on the above reference to allowable overdepth and advanced maintenance (shown in Table 3-2), the final channel depths for each deepening alternative could actually range from -52 feet (i.e., -44 feet of authorized depth plus 2 additional feet of depth for allowable overdepth, plus up to 6 additional feet of depth for advanced maintenance) to -56 feet (-48 feet of authorized depth plus 2 additional feet of depth for allowable overdepth, plus up to 6 additional feet of depth for advanced maintenance). This needs to be more clearly identified in the text describing each alternative and in a table that compares the final depths of each alternative.*

Response: The text in FEIS-Section 3.01 has been revised to better explain the overdepth and advance maintenance considerations associated with each depth alternative.

760-JK-400-EV72

Comment: *3.01.1 No Action Alternative - Pg 3-4, 5th para - "Previous investigations indicate that demand for goods moving through Savannah Harbor, particularly as containerized cargoes, will increase in the future". What is/are the references for this statement?*

Response: A reference to the "previous investigations" mentioned on page 3-4 has been added to the FEIS.

760-JK-400-EN20

Comment: *d. Annual Maintenance Dredging - Pg 3-8, 2nd para ~ "Approximately 7 million cubic yards of sediments are removed each year from Savannah Harbor Navigation Project by the Corps". What is the calculated increase/decrease in maintenance dredging due to the SHEP? Does the calculation include the effects of a navigation channel that could be as deep as -56 feet?*

Response: Approximately 6.2 million cubic yards of sediment are [naturally] deposited in the harbor annually. This volume is forecast to remain constant after deepening. The prediction [of the degree of shoaling for the deepened channel] was based on an inspection of long-term records for the harbor as well as the results of hydrodynamic modeling. Through numerous widening and deepening projects, the shoaling rate has not increased over the past 40 years. This trend was verified by early hydraulic studies of the harbor and a review of dredging records. However, during operation of the Tidegate, a substantial portion of material settled out in the Sediment Basin (as designed). This phenomenon resulted in lower shoaling rates in the river channel and lower dredging costs since this material could be subsequently placed in the disposal areas adjacent to the sediment basin. When the Sediment Basin was taken out of operation, more material moved into the channel with a concomitant increase in dredging costs. With the proposed deepening and construction of its associated mitigation features, a sill will be placed at the mouth of the Sediment Basin which will allow it to become partially filled. When the Sediment Basin is no longer capturing sediments, the excess will be deposited into the channel. There will be increased cost for removing this material since it more distant from the dredged material

containment areas. Regardless, the increased funding required for this maintenance has been identified is included in the SHEP's O&M costs and project economic analysis.

The only part of the harbor that would be at -56 feet depth is the Kings Island Turning Basin [which has an approved advanced maintenance of 8 feet]. Because of its size, the basin functions as a sediment trap for much of the sediment shoaling in the upper harbor. Therefore, this level of advance maintenance is necessary to keep the basin functional [without the need for costly, repeated dredging]. This advance maintenance component was factored into the overall economic/engineering evaluation.

760-JK-400-EV73

Comment: *h. Unconfined Placement Sites - Pg 3- 14, 2nd para - "Moreover, the results of this survey indicated that no cultural resources would be adversely impacted by the proposed placement of dredged sediment within these areas". Was there SHPO concurrence with this finding?*

Response: The sediment placement plan has significantly changed since publication of the DEIS based on input from GA DNR-CRD and the City of Tybee Island. The FEIS has been modified to reflect these changes. At this time, with the exception of the ODMDS, there are no plans to use any of the nearshore sites for new work material (shown in Figure 3-2). Please see previous response (760-JK-400-EV63 and EV64) concerning future maintenance dredging.

760-JK-400-EC16

Comment: *3.04 Rationale for Plan Selection - Pg 3-19, 4th para - "Environmental impacts associated with a shallower depth would be less than those associated with the NED plan, but the lesser impacts of the 44-foot depth, 45-foot depth and 46-foot depth alternatives are not considered sufficient to justify recommendation of these alternatives instead of the NED plan". There is no explanation as to why the Corps considers the lesser impacts of the 44, 45 and 46 foot channels to be sufficient to justify their recommendation instead of the NED plan. This rationale needs to be discussed in detail.*

Response: The Principles & Guidelines defines the Federal objective as "contributing to National Economic Development (NED) consistent with protecting the environment". The NED Plan represents the plan that reasonably maximizes the NED benefits to the nation over the economic costs. The NEPA process is a separate, but concurrent process that is intended to address the environmental concerns of the project.

The section must have been unclear because the Corps was not and is not recommending construction of all depth alternatives, as intimated by the comment. The Corps' assessment of an alternative includes its accompanying mitigation measures. If an acceptable mitigation plan can be developed for a given alternative, then that alternative is judged to be very similar in net environmental impacts to other plans that also have acceptable mitigation plans.

Page 5-6

760-JK-400-EV74

Comment: *3.04 Rationale for Plan Selection - Pg 3-20, Table 3-6 - Regarding Fisheries, and the impacts of each Depth Alternative, what does It-Loss of Acceptable Habitat" mean?*

Response: Suitable habitat was defined by the Fisheries ICT. Loss of acceptable habitat is defined as grid cells in the model outputs that do not meet the suitability criteria. Acceptable habitat was determined using suitability criteria for each species. The suitability criteria (acceptable habitat) for all species were developed via interagency collaboration and Appendix P has been revised to include the suitability criteria for each species and a definition of acceptable habitat.

760-JK-400-EV75

Comment: *3.05 Tentatively Recommended Plan - Pg 3-22, 5th para - "Two feel of allowable overdepth and up to 6 feet of advanced maintenance in selected areas (see Table 3-2, above) would also be included for the proposed action". This apparently means that the actual depth of the navigation channel in much of the Savannah River would be either 55 feet deep (for a 47-foot project) or 56 feet deep (for a 48-foot project). This being the case, the water quality and hydrodynamic model results for the 47-foot and 48-foot alternatives don't correctly predict the impacts on dissolved oxygen and salinity. In turn, the discussion of impacts on the river's resources is inaccurate for the 47-foot and 48-foot alternatives. Since the mitigation plan was developed to address the impacts predicted by the models, it too would need to be revised to address impacts of the actual channel depths.*

Response: Over-depth and advance maintenance were considered in the water quality and hydrodynamic model development, as outlined in the GRR-Appendix C. In addition, the Supplemental Study to the EN Appendix (see "Development of the Hydrodynamic and Water Quality Models", January 2006) includes detailed information [Section 4.2-page 21] on the model's grid bathymetry. Specifically, for each channel depth alternative the model grid was lowered by the appropriate amount. Namely, the 48' project depth required adjusting the model grid bathymetry by 6', the 47' project depth required adjusting the model grid bathymetry by 5', etc. The original model grid was based on actual annual surveys, which include the advance maintenance/over depth component. These data were directly included in the model design to capture/evaluate the depths involved.

760-JK-400-EV76

Comment: *3.12 Relationship of Proposed Action to Other Federal Projects - Pg 3-29, 5th para - «As indicated in Section 3.01 of this Draft EIS, the proposed action assumes that the project feathures associated with the LTMS (USACE 1996), Bank Protection for CDFs 13A and 138, and the realignment of the Federal Navigation Channel (USACE 2006) have been completed". Given the historic uncertainty in the federal funding stream, what would be the environmental and economic impacts if the above mentioned project features have not been completed when the proposed SHEP project is ready to be constructed? Would the Corps proceed with constructing SHEP?*

Response: The features (CDF 14A) addressed in the LTMS have already been constructed and the channel realignment is finished. Bank protection for CDFs 13A and 13B are funded under the Operations and Maintenance Program for the harbor and have no direct bearing on the SHEP's construction.

Page 6-1

760-JK-400-EV77

Comment: *The sections of the report discussing impacts to wetlands and floodplains are generally without consistent references to the numerous support documents, making the discussion difficult to follow. The document has numerous figures without legends, scales and north arrows; this combined with the actual size of the figures makes them difficult to interpret.*

Response: Improvements to the figures, legends, scales, etc, were incorporated as needed to understand the graphic.

760-JK-400-EV78

Comment: *The USACE proposes to allow the wetland restoration site (Disposal Area 1S) to revegetate naturally. Slow vegetative establishment within the restoration site allows for the establishment of invasive species and would allow more temporal loss in wetland functions and values than is necessary. Planting the site with appropriate wetland vegetation would minimize the potential for invasives to colonize the area.*

Response: The criteria which would be used to determine if wetland restoration/growth rates at Disposal Site 1S meet projections are located in Appendix C, Mitigation Planning, and Appendix D Monitoring and Adaptive Management Plan. The plan has been expanded to include monitoring for invasive species [especially common reed and Chinese tallow tree], together with measures to control such species should they prove problematic.

760-JK-400-EV79

Comment: *The USACE is depending on the models to estimate proposed impacts and potential mitigation alternatives. Despite these models being independently verified, the US ACE is putting too much reliance on their results.*

Response: The models were used as a predictive tool to assess future impacts expected to occur with the various depth alternatives. Their use employed state-of-the-art techniques that were independently reviewed and verified. This work was part of a comprehensive study approach that was refined over a 13-year period to ensure all impacts were adequately assessed. All of the analyses performed and their derived data were coordinated with the interagency teams, the non-federal sponsor, and stakeholders for review/comment. The end result is a product which more than adequately evaluates the impacts of the various project alternatives.

760-JK-400-EV80

Comment: *A comprehensive investigation is needed to quantify the impacts of the project and the amount of mitigation proposed to ensure no net loss of wetland functions and values.*

Response: The District conducted a comprehensive investigation that quantifies the project-related impacts on wetland function and values. This analysis also evaluated mitigation options within the Lower Savannah Watershed. Additional information may also be found in Appendix C – Mitigation Planning, Section VII Consideration of 2008 Mitigation Rule.

760-JK-400-EV81

Comment: *Section 4.08, page 4-62. The first sentence under the wetlands sub heading references a 1992 Planning Aid Report for the Savannah Comprehensive Study but does not provide an author. Later in the section, references are made to "that USFWS report" or "the UFWS report." Are these the same report? If so what is the correct date? The reference section contains a 1982 and a 1983 report of the same title by USFWS.*

Response: A reference has been added to explain that the USFWS prepared the 1992 Planning Aid Report for the Savannah Harbor Comprehensive Study.

760-JK-400-EV82

Comment: *The imagery used in the report discussed above was taken in 1979 (31 years ago) and is too old to accurately reflect existing conditions.*

Response: The information on EIS-Pages 4-62 to 4-65 was included to provide the reader with a general characterization of wetland communities in the Savannah Harbor estuary. This information is still valid. The EIS also contains recent, specific information on the types and amounts of wetland communities in the study area [I-95 Bridge to the mouth of Back River].

760-JK-400-EV83

Comment: *Section 4.08, page 4-63, item 14 "Scrub-shrub." The community description only lists one shrub and 4 tree species. Should this more appropriately be classified as a forested community?*

Response: To reiterate, the 1992 Planning Aid Report had the following caveat, *"the data reflect a wetland system that was likely still in a state of transition. However, the findings still provide value in their general characterization of wetland communities in the Savannah estuary."* At that point, the observed scrub-shrub communities were dominated by species such as the *Cephalanthus occidentalis. Nonetheless,* it is valid to include tree species like *Taxodium* spp., *Nyssa* spp., *Acer rubrum,* and *Salix* spp. that often inhabit these transitional, scrub-shrub environments. Table 4-12 illustrates that areas identified as scrub-shrub wetlands comprise 25.7 percent of the forested wetlands occurring in the Savannah Harbor area.

760-JK-400-EV84

Comment: *Section 4.08, page 4-63. Are there no pine dominated wetlands along the transition between marsh and forested communities?*

Response: The information in the EIS regarding wetland community types is based primarily on the USFWS 1992 Planning Aid Report and *as emphasized* in Section 4.08, the wetland system remains successional in nature. More recent studies have not been conducted of those areas. There may be some transitional [between marsh and forested communities] pine-dominated wetlands, but this has not been documented. However, the EIS discussion focuses primarily on the emergent wetland areas within the project effect's area.

Page 6-2

760-JK-400-EV85
Comment: *Section 4.08, page 4-65 cites "Tidal Wetland Studies, USFWS, 2003". This reference cannot be found in Section 9.0 References.*

Response: A reference for the USFWS, 2003 Tidal Wetland Studies has been added to FEIS-Section 9.00, References.

760-JK-400-EV86,760-JK-400-EV87
Comment: *Section 4.08, page 4-64 states: "It is likely that the percentages of those various wetland community types have changed over time. However, the Corps is not aware of similar information that is more recent.*

No project specific wetlands data is provided in this Section. Has a wetland delineation using the Corps 1987 Manual and regional supplement been done for the Project Area? The exact location of wetlands should be shown and each wetland should be characterized based size and dominant flora. If not, an "on-the-ground" delineation is needed. Alternatively, appropriate remote sensing techniques may be used.

Response: Detailed wetland field studies were performed by the USGS Florida Fish and Wildlife Cooperative Research Unit (2003) and ATM, Inc (2003) to characterize emergent wetlands in the potential impact area. These data, coupled with the modeling results, were used to quantify indirect impacts to freshwater and saltmarsh. These areas will again be studied for one year as part of the pre-construction phase of the project. Monitoring of marsh vegetation would occur during the period of construction and after construction. The marsh sites would be evaluated with respect to vegetation composition for more than ten years. Tidal monitoring stations installed at these marsh sites would also record water surface elevation, specific conductance of surface waters that flood the marsh and its root zone, and water depth. The recorded data would be downloaded monthly. The District expects to fund the USGS Florida Fish and Wildlife Cooperative Research Unit to perform this work. The District used an inclusive, elevation-based GIS analysis and site reconnaissance to determine the initial 15.68 acres of wetlands that will be excavated as a result of the SHEP. Prior to the start of construction, the District will verify the reported impact acreage via a wetland delineation. Even if there is a minor adjustment in the impact acreage, the "sum of r" factors reported in the SOP calculation (See Appendix A of Appendix C- Mitigation Planning) would remain the same. However, the acreage of required saltmarsh restoration would have to be recalculated. The available acreage for saltmarsh restoration at DA 1S (40+ acres) would be more than sufficient to compensate for any slight adjustment that might occur.

760-JK-400-EV88
Comment: *Based on Table 5-1 page 5-2, wetland impacts appear to be based solely on elevation. An explanation is appropriate. Have these impact's been field verified? If so, this needs to be stated.*

Response: The District used an inclusive, elevation-based GIS analysis and site reconnaissance to determine the initial 15.68 acres of wetlands that will be excavated as a result of the SHEP. Prior to the start of construction, the District will verify the reported impact acreage via a wetland delineation. Even if there is a minor adjustment in the impact acreage, the "sum of r" factors reported in the SOP calculation (See Appendix A of Appendix C- Mitigation Planning) would remain the same. However, the acreage of required saltmarsh restoration would have to be recalculated. The available acreage for

saltmarsh restoration at DA 1S (40+ acres) would be more than sufficient to compensate for any slight adjustment that might occur.

760-JK-400-EV89

Comment: *Table 5-1, page 5-2. The use of a single elevation in evaluating wetland impacts throughout the project area is in appropriate. The lower and upper limits within a single wetland community (i.e. Spartina alterniflorCl) will change moving further upstream or downstream. These changes may be small but given the length of this project, the acreage could be significant.*

Response: The District used an inclusive, elevation-based GIS analysis and site reconnaissance to determine the initial 15.68 acres of wetlands that will be excavated as a result of the SHEP. Prior to the start of construction, the District will verify the reported impact acreage via a wetlands' delineation. Even if there is a minor adjustment in the impact acreage, the "sum of r" factors reported in the SOP calculation (See Appendix A of Appendix C- Mitigation Planning) would remain the same. However, the acreage of required saltmarsh restoration would have to be recalculated. The available acreage for saltmarsh restoration at DA 1S (40+ acres) would be more than sufficient to compensate for any slight adjustment that might occur.

760-JK-400-EV90

Comment: *Section 5.1.1.2 Mitigation, identifies Spartina alfemiflora as occurring at +7.6 to +7.8 MLLW but Table 5-1 is based on MLW. A single vertical datum and tidal stage should be used to reference all elevations or the relationship between each one used needs to be defined within the document.*

Response: The FEIS will not be updated and normalized to reflect a single vertical datum and/or tidal scale. However, it does contain the following table to help readers convert referenced datum, if desired.

Relationship between Mean High Water and other vertical datum in the Savannah region.*

Vertical datum	*Difference to MHW*
NGVD29	-0.660
NAVD88a	-0.939
MSL	-1.009
MLW	-2.108
MLLW	-2.174

* Datum relationships determined by tidal station #8670870 at Fort Pulaski, Savannah, Georgia.

Information obtained from NOAA Technical Memorandum NESDIS NGDC-6, DIGITAL ELEVATION MODEL OF SAVANNAH, GEORGIA: PROCEDURES, DATA SOURCES AND ANALYSIS, National Geophysical Data Center Marine Geology and Geophysics Division, Boulder, Colorado January 2008

760-JK-400-EV91

Comment: *Figure 5-1, page 5-3. No scale or north arrow provided. Text on background image is illegible. No aerial image. Scale of drawing prevents an evaluation of the two excavation areas planned at the Kings Island Turning Basin.*

Response: Figure 5-1 has been revised to improve viewing.

760-JK-400-EV92

Comment: *Figure 5-2, page 5-4. Level of detail and scale of the Figure prevents evaluation of planned wetland impacts.*

Response: Figure 5-2 has been revised to improve viewing.

760-JK-400-EV93

Comment: *Figure 5-3, page 5-5 No scale bar, north arrow or legend. The lack of a legend prevents reviewers from determining what exactly is happening at this location.*

Response: Figure 5-3 has been revised to improve viewing.

760-JK-400-EV94

Comment: *The fourth sentence on page 5-6 states; "CDF I S is located adjacent to the confluence of Front River and Middle River, and it is located within the boundaries of the Savannah National Wildlife Refuge (see Figure 5-52)." However; Figure 5-52 on page 5-134 is a photograph of Old Fort Jackson (Upstream Bank Protection).*

Response: The text has been revised to reference Figure 5-4 instead of Figure 5-52.

Page 6-3

760-JK-400-EV95

Comment: *This project will result in a net loss of wetlands within South Carolina and the Charleston District, based on the fourth sentence on page 5-5 describing the location of the proposed mitigation site*

Response: The 2008 Final Mitigation Rule encourages a watershed approach when evaluating impacts to aquatic resources as well as the selection of appropriate mitigation. The District has conducted a functional assessment of the impact areas and proposed mitigation sites. A watershed assessment was also conducted which confirmed that the proposed mitigation was appropriate [see earlier responses that detail information concerning the functional and watershed assessments]. SHEP would require the excavation of 0.85 acres of saltmarsh in South Carolina waters. However, restoration of saltmarsh at Disposal Area 1S would provide "in-kind/in-basin" replacement for noted marsh excavation. For the type and magnitude of impact, the DA 1S restoration site represents the most practical option for mitigation. Although the mitigation site would be located in Georgia waters, the wetland functions attributed to the site would service all of the Lower Savannah Watershed [both Georgia and South Carolina waters]. See also numerous other responses to comments on this issue.

760-JK-400-EV96

Comment: *The last sentence of the first paragraph on page 5-6 states "excess mitigation would be credited to the Savannah Harbor Navigation Project." How will this "excess" mitigation be credited and debited to ensure no additional loss of wetland acreage? Establishment of a wetland mitigation bank with the Corps as the sponsor and overseen by the remaining agencies that make up the Wetlands Interagency Coordination Team may be a plausible approach.*

Response: The District used the SOP to determine the total number of credits that would be generated at Disposal Area 1S. Present calculations determined 28.75 acres would compensate for the 15.68 acres of saltmarsh lost [details in Appendix C-Mitigation Planning]. Release of any excess credits [only for use on the Savannah Harbor Navigation Project] would occur after the long-term health/productivity of the restoration site is verified by the Federal Cooperating Agencies.

760-JK-400-EV97

Comment: *In Section 5.1. 1.2, page 5-6, the USACE proposes to allow the wetland restoration site (Disposal Area IS) to revegetate naturally, provided that the minimum percent vegetative cover shown in Table 5-2 is met in each of the first 5 years shown.*

Based on the text below Table 5-2, it is uncertain when the USACE would plant, at the end of any year or at the end of the 5 year period? By allowing natural revegetation the Corps is ensuring that the plants that establish within the site are genetically appropriate for the region. However the slow vegetative establishment within the restoration allows for the colonization of invasive species and would allow more temporal loss in wetland functions and values than is necessary. Planting would be more appropriate.

Response: After preparation, the restoration site would be allowed to vegetate naturally. It is unlikely that invasive species [*Phragmites australis]* would significantly colonize the 40+-acre restoration site given the density of *Spartina alterniflora* and associated seed stock in the immediate vicinity. Likewise, the site's salinity/tidal range are conducive to supporting a robust growth of *Spartina alterniflora*. The Adaptive Management Plan includes sprigging *Spartina alterniflora* if the site does not colonize at the rate indicated in FEIS-Table 5-2, as well as adjustment of the ground elevation by either excavation or filling. The plan also includes measures for removal of invasive species. Annual monitoring reports would be generated over a period of seven years and provided to the Wetland Interagency Coordination Team (ICT). If the restored marsh does not meet the success criteria illustrated in Table 5-2, then the ICT would identify corrective actions for the Corps to implement to achieve the compliance objectives. The need for corrective action(s) would be determined annually with agency involvement/concurrence. At the end of seven years, if the site's plant density is not within 10% of the reference site, the ICT would be consulted for a determination on how to proceed (see updated Appendix C-Mitigation Planning).

760-JK-400-EV98

Comment: *Figure 5-4, page 5-7 No scale bar or legend presented. Level of detail and scale of the Figure prevents evaluation of restoration site.*

Response: Figure 5-4 will be enlarged so that it can be seen more clearly; a scale bar and legend have also been added.

760-JK-400-EV99

Comment: *"Section 5.1.2.2, page 5-1 1, Applied Technology and Management (March 2003) was cited; however this reference does not appear in Section 9 References."*

Response: A reference for Applied Technology and Management, March 2003 (referenced in Section 5.1.2.2) has been added to Section 9.00, References.

760-JK-400-EV100
Comment: *Section 5.1.2.2, page 5-1 1, USFWS (Welch and Kitchens 2006) was cited; however this reference does not appear in Section 9 References.*

Response: Welch and Kitchens 2006 (cited in Section 5.1.2.2) was added to Section 9.00, References.

760-JK-400-EV101
Comment: *Table 5-2, page 5-7. Table title does not match with what IS provided 10 Table of Contents.*

Response: In the List of Tables the title of Table 5-2, has been changed from "Marsh Revegetation Rate" to "Revegetation Rate for Created Marsh" to lessen confusion.

760-JK-400-EV102
Comment: *Section 5.1.2.1, page 5-8. The accuracy of the models will not be known until years after all of the work is complete. This fact is supported by the internal Corps documents found in Appendix N on page 44.*

Response: It is unclear what the comment is referencing on DEIS-p. 5-8. Model accuracy is dependent on calibration with existing conditions, not future completion of the project. The "work" referred to in Appendix N-p. 44 is the effort necessary to complete the modeling analyses rather than SHEP construction.

760-JK-400-EV103
Comment: *Table 5-3, page 5-1 1 Table title does not match with what is provided in the Table of Contents.*

Response: The title of this table (now Table 5-5), has been changed from "Marsh Distribution" to "Marsh Distribution From EFDC Model" to lessen confusion.

760-JK-400-EV104
Comment: *Table 5-4, page 5-13 Table title does not match with what is provided in the Table of Contents.*

Response: In the List of Tables, the title of this table (now Table 5-6) has been changed from "Summary of Hydrodynamic-Related Fishery Impacts Without Mitigation" to "Summary of Project-Related Impacts Without Mitigation".

Page 6-4

760-JK-400-EV105
Comment: *In Section 5.1.2.3 page 5-13, The Corps introduces a component of the mitigation package, "Flow Routing". What are the direct and secondary impacts from Flow Routing?*

Response: The SHEP's flow routing elements provide a means to avoid and minimize indirect wetland impacts to the maximum extent practicable. Direct impacts associated with flow routing structures include construction of the diversion structure at McCoys Cut,and the submerged berm in Back River. All of these fill-related activities would result in placement of material on unconsolidated water bottoms. Mitigation would not be required for fill which is not intrusive with the water surface since there is essentially no functional change, i.e., the water depth is just less. The plug in Rifle Cut would

result in the creation of a mudflat and marsh habitat. This would constitute a net gain in aquatic function and the values associated with essential fish habitat. The flow routing structures are an indirect means to avoid and minimize wetland impacts (see Appendix C). Without these structures, approximately 1,177, acres of freshwater marsh would convert to brackish marsh with the 47-feet alternative. With flow-routing measure 6A, there would only be 223 acres of freshwater marsh at risk. Thus, flow routing measure 6A satisfies both avoidance and minimization elements by maintaining 954 acres of freshwater marsh that would otherwise experience some degree of species shift.

760-JK-400-EV106

Comment: *Table 5-7, page 5- \6. Table title does not match with what is provided in the Table of Contents.*

Response: The title of that table (now Table 5-9) has been changed to match the title shown in the Table of Contents.

760-JK-400-EV107

Comment: *Figure 5-5, page 5-15. Table title does not match with what is provided in the Table of Contents.*

Response: The title of that table has been revised to match the title in the Table of Contents.

760-JK-400-EV108

Comment: *The following figures have no scale bars or north arrows (not inclusive):*

- *Figure 5-6, page 5-15*
- *Figure 5-7, page 5-19*
- *Figure 5-8, page 5-20*
- *Figure 5-9, page 5-21*
- *Figure 5-10, page 5-22*
- *Figure 5-11, page 5-23*
- *Figure 5-12, page 5-24*
- *Figure 5-13, page 5-25*
- *Figure 5-14, page 5-26*

Response: The FEIS includes revisions to figures that allow the reader to more clearly present the information the Corps intends to convey.

760-JK-400-EV109

Comment: *Table 5-16, Page 535. Channel Depth Alternatives 46, 47 and 45-Foot have freshwater wetland impacts too large to go without at least a 1: 1 restoration component within the same river basin or at a larger ratio in another river basin.*

Response: The District conducted a watershed assessment in the Lower Savannah River Harbor to evaluate specific mitigation measures which could compensate for the potential conversion of freshwater wetlands [223 acres] to its brackish marsh counterpart. This functional assessment concluded the only element of wetland function that would be affected by this conversion is the fish and wildlife habitat component. To rectify these losses, the District reviewed approved mitigation banks in the Lower Savannah River Watershed, and determined there were none with the appropriate tidal, freshwater wetland characteristics. The District determined that the "In-Lieu Fee" program is also functionally unable to provide the requisite compensation. The District considered the creation of

freshwater, tidal wetlands. However, it was ultimately concluded by the study group that this was not a long-term solution given the unacceptable potential for failure.

The District consulted the Wetland Interagency Coordination Team (ICT) [technical experts from USACE and federal/state natural resource agencies assembled to provide guidance on SHEP wetland impacts and mitigation]. The USFWS stated that mitigation actions must be performed within the basin for impacts to wetlands located within the SNWR. The Service suggested preservation of lands as a possible solution and recommended sites that are part of its long-term lands acquisition strategy to compliment the SNWR. The District then consulted with the Stakeholder Evaluation Group, including its non-governmental organizations members, to see if they had identified any suitable mitigation options. Over the 10-year study period, no agency/organization could identify another feasible alternative as mitigation for impacts that would occur as a result of the wetland species shifts. Therefore, the District proceeded with the identification of preservation sites.

The Corps' Agency Technical Review (ATR) assessed the use of Savannah District's SOP to develop a mitigation plan for SHEP. The ATR was lead by the Corps' National Deep-Draft Navigation Planning Center of Expertise; technical work was performed by Corps experts at the Engineering Research and Development Center in Vicksburg, MS. The ATR evaluated the SOP to determine if it was an appropriate method of ascertaining the preservation acreage needed to compensate for SHEP impacts. The ATR also commented on the underlying assumptions used in the application of the SOP for the SHEP. It should be emphasized that the SOP was only used to determine the amount of preservation acreage necessary to offset the remaining impacts after development of avoidance, minimization, and restoration features. The ATR concurred with use of the SOP to determine the amount of preservation acreage needed and considered Savannah District's application of the SOP to be reasonable in quantifying impacts and the required mitigation.

The USFWS provided a Fish and Wildlife Coordination Act Report, dated August 2010. In that report, the USFWS concurred with use of the SOP, which calculated a need to preserve 2,245 acres of land adjacent to the SNWR for the 47-foot alternative . The Service provided updates to the SOP calculations in Appendix A of the report. The District concurred with use of the updated SOP worksheets and adopted their results for use in the DEIS. In its Adaptive Management Program, the District also proposed acquisition of additional wetlands if monitoring demonstrates wetland impacts are under-predicted.

In summary, the most appropriate and practicable means of mitigating the resultant species shift is the preservation of 2,245 acres of bottomland hardwoods and upland buffer. USFWS and the Savannah National Wildlife Refuge (SNWR) have already prepared a prioritized acquisition list of ecologically-valuable properties within the estuary which can further Refuge's goals and enhance the basin's fish and wildlife resources.

760-JK-400-EV110

Comment: *There is no discussion on potential impacts associated with elements of this project including a new boat ramp and new water intakes. Are there wetland (or other resource) impacts associated with these components of the project?*

Response: The boat ramp would be constructed within the property boundaries of the existing Tidegate [See Appendix C – Mitigation Planning]. Construction of the boat ramp would not require the filling of jurisdictional wetlands, however some fill material (concrete, rock) would be discharged into unconsolidated river bottom in Back River.

Based on additional studies, a supplemental raw water storage impoundment would be constructed to provide the City of Savannah with a dependable source of water during high chloride spikes. The initial site plans for this impoundment provide for it to be located in an existing industrial park. As such, the District does not expect construction of this impoundment to impact any non-tidal jurisdictional wetlands. However, the site would be surveyed prior to construction. If jurisdictional wetlands are present and impacts to wetlands are unavoidable, additional mitigation would be provided.

760-JK-400-EV111, 760-JK-400-EV112

Comment: *The Essential Fish Habitat portion of the DEIS was difficult to follow. Tables and figures were mislabeled, lacked legends, or were of poor quality. In addition, the DEIS contained a paucity of information about impacts to essential fish habitat or how the project will impact essential fish habitat from a fish accessibility perspective. Instead the DEIS focused on the mitigation of essential fish habitat in the majority of the discussion. The lack of information about the impacts or consideration of realistic options that would avoid the impacts suggests the requirements of NEPA may not have been satisfied. Extensive areas of essential fish habitat will be lost because of the project. The mitigation of essential fish habitat through the restoration of inaccessible marsh habitats or the purchase of woodland does not provide adequate replacement for the essential fish habitats that will be lost due to this project. The inaccessibility of mitigation areas renders the essential fish habitats, non-fish habitats and, therefore, non-essential and nonexistent from a fisheries perspective.*

Response: EFH is discussed in DEIS-Sections 4.05 and 5.14, as well as in Appendix S.

Page 6-5

760-JK-400-EV113

Comment: *Table 4-8 highlights potential impacts to essential fish habitats due to the project. The table does not include potential impacts due to the increased wave activity caused by the larger ships for which the project is being constructed. The absence of this information is likely to underestimate the loss of essential fish habitats.*

Response: The Fisheries Interagency Coordination Team did not incorporate wave activity into the criteria for evaluating potential impacts to essential fish habitat. However, the District did examine how wave activity would affect the shoreline within the project effects' area [GRR, Appendix C, Section 9.0]. The habitat suitability criteria used to evaluate impacts to essential fish habitat, critical species, and life stages were defined and agreed upon [after a great deal of deliberation] by the Cooperating Agencies and the Fisheries Interagency Coordination Team. The District believes that the criteria and data used, as well as the modeling conducted are sufficient to evaluate impacts posed by each of the different project alternatives.

760-JK-400-EV114

Comment: *Table 4-8 also highlights a potential loss of live/hard bottoms. Actual loss could be determined by a study of the proposed channel extension or sediment deposit areas. It is difficult to assess the impacts of a project if the proper studies have not been completed to determine the likely impacts of the project.*

Response: The potential live/hard bottom impacts shown in Table 4-8 are related to placement of sediment in the nearshore. However, based on input from GA DNR-CRD and the City of Tybee Island, the sediment placement plan has changed since publication of the DEIS. With the exception of the ODMDS, there are no plans to use any of the nearshore sites (shown in Figure 3-2) for the placement of

new work material resulting from construction of the project. In response to the specific comment regarding impacts to live/hard bottoms, it is unlikely that any hard-bottom communities occur within the nearshore sediment placement sites or in the channel extension area. However, a side scan sonar and/or magnetometer investigation would be performed prior to dredging the channel extension to verify this belief. Please see previous response to maintence dredging and placement of material into the nearshore sites off Tybee Island (760-JK-400-EV63 and EV64).

760-JK-400-EV115
Comment: *Table 4-10 does not, but should include the Atlantic Sturgeon as a candidate species.*

Response: Table 4-10 (now Table 4-14) is not intended to identify candidate species.

760-JK-400-EV116
Comment: *Section 5.3.2.A.Shortnose sturgeon - Pg 5-91, 3rd para - The Corps conducted a preliminary review of the 2001 fishway design and confirmed that conditions had not changed that would reduce its effectiveness or implementability". Does the Corps have documentation that Shortnose sturgeons have used fishways in the Savannah River, or any other river of similar characteristics?*

Response: The Shortnose sturgeon has not been documented using constructed rapids fishways because there are none within its population range. In the upper mid-west US, Lake sturgeon have been observed passing both constructed and natural rapids. Some of these observations were at lesser water depths than are proposed (3.5 to 5.5 feet) for the fish passage at the New Savannah Bluff Lock and Dam (Aadland 2010). The Lake sturgeon is a larger species than the Shortnose so physical passage of the latter should not pose a problem. Adaptive management, attraction flow measures, cost estimates/commitments, and monitoring are described in detail in Appendix D. Post-project, the District would monitor the passage of Shortnose sturgeon across the structure to ensure it performs successfully (Appendix D).

760-JK-400-EV117
Comment: *GRR Section 4.8.4 Marine and Estuarine Resources - Pg 61, 4th para - "The recreational fishery for striped bass was recently reopened in the harbor, as a response to restored population levels." ... "the Savannah River was the location of Georgia's most important striped bass fishery." This is a critical statement. Where is the citation for this?*

Response: In the EIS in Section 4.04 Marine and Estuarine Resources the following is noted: *More recent studies on striped bass (Will and Jennings 2001) indicate that historically the Savannah River was Georgia's most important striped bass fishery.*

760-JK-400-EV118
Comment: *DEIS Section 4-12, P. 4-79, 5th para. -Shrimp fishing common at the mouth of the River. May be more in the spring when females are moving toward the ocean to release their eggs. As queried above, shrimp fishing is a significant commercial venture but there appears to be no recent survey data to characterize population or health of this resource.*

Response: Section 4.12 [Recreational and Commercial Fishing] states: Commercial shrimp trawling is common in the immediate vicinity of the dredged entrance channel, since this is a natural corridor for emigrating shrimp. The Georgia DNR Coastal Resources Division (Personal Communication, 26 February 2007, Mr. Spud Woodard, Assistant Director for Marine Fisheries) indicates that Georgia's territorial waters south of the channel are open to food shrimp trawling during the established season, which is

typically mid-June through December. Trawling occurs off the beach at Tybee Island, but is limited because of water depth.

760-JK-400-EV119
Comment: *The report contained extensive amounts of information on a wide variety of issues. The DEIS would be more understandable if proper citations were made. As currently organized, significant issues are difficult to follow.*

Response: Additional references have been included

760-JK-400-EV120
Comment: *Overall, there was a lack of discussion and a lack of recent evaluation of the project's impacts on commercial and non-commercial pelagic and benthic invertebrates. In that this trophic level serves as the base of the food chain more information should be provided on the impacts to these assemblages.*

Response: The EIS-Sections 4, 5 and Appendices D, P, and S adequately characterize/evaluate the project's impacts on commercial and non-commercial fish [fin/shell] and benthic invertebrates.

Page 6-6

760-JK-400-EN21
Comment: *Section 3.07 - Page 3-23, Para. 4-"Savannah District followed an iterative process to develop a plan for the new work entrance channel sediments. The work started with an engineering determination of sediment quantities to be removed at various channel depths and the composition (i.e., percent fines and percent sands) of those sediments. A review of previous information was conducted, including: the Draft 2003 ERDC Report on Nearshore Placement at Tybee Island; ... ". What is the citation for this document? It is not listed in the References.*

Response: The subject document is included in Supplemental Materials (Attachment 3 of Appendix C of the GRR), "Savannah Harbor Entrance Channel Near Shore Placement of Dredged Material Study", July 2003.

760-JK-400-EV121
Comment: *Section 4.04 Marine and Estuarine Resources - Pg 4-20, 1st para - "Shad spawn in the main river, further upriver than do striped bass". Where do American shad spawn in the main river with respect to the limits of the SHEP?*

Response: The sentence in the FEIS-Section 4.04 has been changed: "American shad spawn in the freshwater portion of the main river [further upstream than do striped bass] well outside the impact limits of SHEP."

760-JK-400-EV122
Comment: *Section 4.04 Marine and Estuarine Resources - Pg 4-20, 3rd para - "However population levels have been much lower in the last 20 years and a higher proportion of the spawning now appears to be occurring in the Savannah River a few miles upstream of the harbor (over 21 miles upstream from the mouth of the Savannah River)." Over what type of bottom does striped bass spawning in the Savannah River occur?*

Response: The referenced paragraph indicates "the eggs must be suspended in the water, as they float with the river currents before they hatch 36-72 hours after being laid." Since the eggs float in the river currents, the type of bottom is not critical to egg survival. However, after spawning a greater percentage of eggs will rise in the water column in those reaches of active currents [often associated with a sandy bottom].

760-JK-400-EV123

Comment: *Section 4.04, Page 4-2 1, Para. 3- Invertebrates s of commercial import- cited from 1974 report (Johnson et a1.) «e.g., crabs, oysters, and shrimp). Cites data back to 1955. Provided an unreferenced, undated Shellfish Harvest Area Map from Mr. Dominic Guadagnoli, Shellfish Program Leader with the Georgia Department of Natural Resources - Coastal Resources Division. Is there more recent data available on the state of invertebrates of commercial importance?*

Response: As noted, Mr. Guadagnoli, the Shellfish Program Leader with the Georgia Department of Natural Resources [Coastal Resources Division], provided the source information for Figure 4-3-Shellfish areas. Given his position, Mr. Guadagnoli is not considered an "unreferenced" source, but the FEIS will provide additional details regarding the source/dates of the information in the subject figure. [see response to Comment 760-JK-400-EV09]

760-JK-400-EV124

Comment: *Page.4-38 . Para. 1. Information was taken from Collins et al. (2001). Also, discusses plankton in two studies from 200 I and 1988. Not sure of the geographic extent of these studies and they are very qualitative. Simply references species caught in tows. This may indicated that a better understanding of the resource is needed.*

Response: DEIS-Section 9 references the geographic extent of Collins et al (2001). The title indicates the research area, viz., "Distribution of Shortnose sturgeon in the lower Savannah River". A perusal of the document will verify the resource is well understood.

760-JK-400-EV125

Comment: *5.7 Marine and Estuarine Resources, Page 5-111, Section 5.7. 1.1, C - Example of unreferenced critical statement, "Marc recent dam indicate that present-day dredging operations are conducted in ways that do not increase suspended sediment concentrations to such a degree." No reference. Is this real data specific to Savannah River or an industry-wide generalization?*

Response: A reference has been added to Section 5.07.1 for the statement regarding the relationship [impacts] of dredging on suspended sediment concentrations.

760-JK-400-EV126

Comment: *5.7 Marine and Estuarine Resources, Page 5- 11 3, Section 5.7. 1. 1, C - Example of unreferenced critical statement, "Moreover, the Savannah River already has a very high sediment load and turbidity caused during the new work dredging would not adversely impact shellfish areas." There is no reference or a discussion in the DEIS that supports this. Has it been quantified?*

Response: Section 5.07.1 has been revised for clarity.

Page 6-7

760-JK-400-EV127

Comment: *Section 5.7 Marine and Estuarine Resources, Page 5-114, Section 5.7.2, A - "The sediments to be deposited in the nearshore area consist primarily of sands. The sand content of the sediments generally exceed 70 percent and in most reaches exceed 80 percent." Where is the support for these data? It should be cited.*

Response: The data to support the statement are located in EIS Section 4.00 and in the GRR Engineering Appendix (Appendix C, Attachment 3).

760-JK-400-EV128

Comment: *Also, the DEIS states "Eggs and larval fish are not as mobile as adults, so there is a higher potential for those early life stages to be impacted being physically damaged by sediment or materials in the dredge plume. However, the near shore areas off Tybee Island have a very high sediment load since the Savannah River discharges at the north end of the island. Also the wind and wave climate in the near shore area tends to have a naturally high sediment content and high turbidity. The placement activities would be much localized and therefore not impact a large area."-These are very broad, uncited, unquantified statements that, if inaccurate, could have very significant impacts on these life forms in the vicinity of these proposed.*

Response: As discussed in previous responses, no new work sediment would be placed in the nearshore area at Tybee Island. Placement of all sediments excavated from the entrance channel would now be deposited in previously-approved areas, i.e., the Offshore Dredged Material Disposal Site or an upland confined disposal site. The FEIS details the revised sediment placement plan. Please see previous response concerning maintenance dredging (760-JK-400-EV63 and EV64).

760-JK-400-EV129

Comment: *5.7.2 Sediment Placement Impacts, B. Turbidity, p.5-115. Para 5 - "The turbidity in effluent from diked sediment placement is controlled by adjustable spillways. The SC standard for turbidity is that discharges not to exceed 25 NTUs provided the existing uses of the water body are maintained. Savannah District imposes a 500 mg/l limit on suspended solids in the CDF discharges. This limit is believed to be sufficient to reduce turbidity impacts in the receiving waters to acceptable levels."- What is this based on?*

Response: Both Georgia and South Carolina require a Section 401 Water Quality Certification (WQC) for the discharge of effluent from the upland confined disposal areas into state waters. These Section 401 WQCs contain conditions or restrictions with which the District has to comply. These stipulations are discussed in EIS-Section 5.07. The 1996 EIS for operation and maintenance of the Savannah Harbor Navigation Project examined turbidity levels in CDF discharges and found that a 500 mg/l limit on suspended solids in the CDF discharges is sufficient to minimize impacts to the aquatic environment.

760-JK-400-EV130

Comment: *The three paragraphs within this section fail to sufficiently discuss the floodplains within or immediately adjacent to the project area. Information was lacking on floodplains within or immediately adjacent to the project area and the quantity, functions and values of the floodplains.*

Response: Reference is unclear. There is a discussion of floodplains in Chapter 4- Affected Environment (Sections 4.08) and in Chapter 5-Environmental Consequences of the Proposed Action (Section 5.10) in the EIS. Since there would be no incremental development within the 100-year flood plain and hurricane surge heights would not be measurably affected, the project's direct impact on same is nil. Moreover, after the noted revisions, dredged material would no longer even be placed within the nearshore areas. Hence, any direct effects on storm surge are also nil.

According to the NEPA regulations: Sec. 1502.2 Implementation states the following:

To achieve the purposes set forth in Sec. 1502.1 agencies shall prepare environmental impact statements in the following manner:

(a) Environmental impact statements shall be analytic rather than encyclopedic.

(b) Impacts shall be discussed in proportion to their significance. There shall be only brief discussion of other than significant issues

Floodplain impacts are not significant. The same rationale applies to the proportionality of discussion regarding certain other insignificant or non-existent impacts addressed in the EIS.

760-JK-400-EV131, 760-JK-400-EV132

Comment: *The final sentence in this sections states that "large-scale filling of wetlands within the floodplain are not expected in the future". Large is a relative term. If floodplains are going to be impacted, this impact needs to be accurately quantified. Also, why does the SHEP mitigation plan propose to preserve existing wetlands that are "protected" and under no threat of filling as compensation for the loss of 337 acres of tidal freshwater wetlands?*

Response: If the proposed action was going to adversely impact the adjacent floodplain, this impact should be accurately quantified. However, the referenced sentence in Section 4.08 states:

With the legal protections that have been provided to wetlands, large-scale filling of wetlands within the floodplain are[is] not expected in the future.

This sentence should be sufficient to clarify the subject comment; hence, no revision to the FEIS is necessary. The District has repeatedly emphasized that the proposed action would not adversely impact the present floodplain boundaries.

The District conducted a watershed assessment in the Lower Savannah River Harbor to evaluate specific mitigation measures which could compensate for the potential conversion of freshwater wetlands [223 acres] to its brackish marsh counterpart. This functional assessment concluded the only element of wetland function that would be affected by this species shifting was the fish and wildlife habitat component. To rectify these changes [losses], the District reviewed approved mitigation banks in the Lower Savannah River Watershed and determined there were none with the appropriate tidal, freshwater wetland characteristics. The District determined that the "In-Lieu Fee" program is also functionally unable to provide requisite compensation. The District considered the creation of tidal

freshwater wetlands. However, it was ultimately concluded by the study group that this was not a long-term solution given the high risk of failure.

A Wetland Interagency Coordination Team [consisting of technical experts from USACE and federal/state natural resource agencies] was used to identify acceptable mitigation for the proposed project. USFWS emphasized that mitigation actions must be performed within the basin for wetlands impacts within the SNWR. After deliberation, the Service recommended preservation of a number of sites which were already part of its long-term land acquisition strategy to compliment the SNWR. The District also consulted with the Stakeholder Evaluation Group, including its non-governmental organizations members, to identify other suitable mitigation alternatives. Over the ten year study period, no agency or organization could identify another feasible alternative as mitigation for impacts that would occur as a result of wetland conversion. Therefore, the Team agreed that the most practicable means of mitigating the shift in species composition [freshwater to brackish marsh] resulting from harbor deepening would be the preservation of bottomland hardwoods and upland buffer. The District and the Savannah National Wildlife Refuge have already prepared a list of ecologically valuable properties within the estuary which can further the Refuge's goals and enhance area fish and wildlife resources.

760-JK-400-EV133

Comment: *Section 5.10 Floodplains on page 5-122 states "hurricane modeling indicates that change in the water surface elevations due to the proposed harbor deepening is not significant. What statistical analysis was used to determine if a significant difference exist?*

Response: The District made its floodplain determination after consultation with the Chatham County Emergency Management Agency. As stated in EIS-Section 5.10 and detailed in the GRR-Engineering Appendix, the County indicated that since any elevation increase [attributable to the SHEP] would fall within the 1-foot contour interval, they would not be able to identify any specific location[s] which would be adversely affected by increased surge height.

760-JK-400-EV134

Comment: *Section 5.10 Floodplains on page 5- 122 did not quantify any specific impact to floodplains including shift in community composition or land use.*

Response: See response to previous comment on this issue.

Page 6-8

760-JK-400-EV135

Comment: *Section 5.10 Floodplains on page 5-122 did not provide any information on the secondary impacts to floodplains caused by this project?*

Response: Since the proposed deepening of the harbor does not directly impact floodplains, this section need not be revised.

760-JK-400-EV136

Comment: *In Section 5. 10 Floodplains on page 5- 122, modeling discussed involved storm surge from hurricanes. Was any modeling done to identify the effects of the project to floodplains in normal conditions?*

Response: Hurricane surges would be the conditions for which an effect is most likely to be seen. Since no effect was identified for those maximum case conditions, evaluations of lesser conditions are not warranted.

760-JK-400-137

Comment: *Section 5.10 Floodplains on page 5-122. Was the potential impact to floodplains/riparian wetlands caused by increased ship traffic or ships traveling at increased speeds evaluated?*

Response: The Coastal and Hydraulics Laboratory at the US Army Engineer Research and Development Center studied the potential shoreline impacts resulting from the proposed deepening. This information is found in GRR-Engineering Appendix C [Section 9.0 Shoreline Effects].

760-JK-400-EN22

Comment: *Some of the conclusions made in the documents were sound; however, many were based on unsubstantiated claims. In some cases conclusions were based on existing conditions without determining the impacts of the proposed conditions. Comparisons were made between alternatives which were not the proposed alternative, while ignoring differences in impacts between the existing condition and the proposed alternative. Data which could be used to allow peer review of some of the models was missing or omitted. Some conclusions were based on incomplete models and impacts to some resources were not determined because they were not under the scope of the current study. It remains unclear whether impacts to these resources were determined. Finally, none of the studies examined the impacts resulting from the use of Generation 2 post-panamax vessels within the deepened channel.*

Response: An independent external peer review team [comprised of subject matter experts] provided an in-depth review of the project documents and did not reach the conclusions cited in your comment. Detailed data and analyses are included in the Supplemental Studies Attachment (Attachment 3) to the Engineering Appendix (Appendix C) of the GRR.

The design vessel, Susan Maersk [Generation 2 Post-Panamax vessel] was used in ship simulator and bank erosion studies.

760-JK-400-EN23

Comment: *The documentation does not clearly quantify the impacts to the Confined Sediment Placement/Disposal Facilities, City Front, Ft. Pulaski, and Tybee Island. The conclusions drawn from these studies have not been substantiated and continuation of the NEPA process without knowledge of the potential impacts to these resources would be in error.*

Response: The published bank erosion study [2006] and 2010 update were included in GRR-Engineering Appendix, Supplemental Materials. Those documents describe in detail the potential for erosion impacts at each of the referenced locations. The District has concluded that SHEP would not significantly increase the present erosion rates at those locations.

Page 6-9

760-JK-400-EN24

Comment: *4.07. Terrestrial Resources, p. 4-61, Last paragraph: The section titled Existing Shorelines Adjacent to the Federal Navigation Channel is Section 5.9 in the Tier 2 EIS.*

Response: The FEIS has been revised to correct that error.

760-JK-400-EN25

Comment: *5.9. Existing Shorelines Adjacent to the Federal Navigation Channel, p. 5- 120: This section fails to discuss the analysis, or lack thereof, of the effects of the project on the shoreline along the Confined Sediment Placement/Disposal Facilities as reported in Ship Forces on the Shoreline of the Savannah Harbor Project. Table 20 of the report lists the observed drawdown of seven inbound vessels and eight outbound vessels not the predicted values resulting from the proposed project.*

Response: Protective riprap is has been placed around the margins of confined disposal facilities 13A, 14A, and 14B and is currently being placed around the margins of Jones/Oysterbed Island. This construction is scheduled for completion prior to the proposed deepening. Paragraph 5.09 of the EIS has been revised to reflect the current/completed construction time table. Harbor deepening is not expected to increase erosion of these shorelines. Detailed information is found in the GRR, Appendix C, Attachment 3.

760-JK-400-EN26

Comment: *5.9. Existing Shorelines Adjacent to the Federal Navigation Channel, p. 5-120, 6th paragraph: The Savannah Harbor Expansion Savannah Harbor Expansion Bank Erosion Study was updated in June 20 I 0; the paragraph should indicate this fact.*

Response: The FEIS has been revised to indicate the update to the bank erosion study.

760-JK-400-EN27

Comment: *5.9. Existing Shorelines Adjacent to the Federal Navigation Channel, p. 5-120, Last paragraph: The Savannah Harbor Expansion Savannah Harbor Expansion Bank. Erosion Study-Update indicates that Areas 13A, 13B, and 14 B of the Bight Area were to be protected prior to completion of the proposed project and therefore not studied in the Savannah Harbor Expansion Savannah Harbor Expansion Bank Erosion Study-Update. Has the shoreline protection projects within these three areas been completed? Has the shoreline along the remaining portions of the Confined Sediment Placement/Disposal Facilities (Such as the Jones Island Disposal Area) been completely protected and stabilized? I f unprotected areas remain, the Savannah Harbor Expansion Bank Erosion Study should be updated again to include an analysis of potential impacts to the unprotected areas of the shoreline along the Confined Sediment Placement/Disposal Facilities.*

Response: See previous response 760-JK-400-EN25.

760-JK-400-EN28

Comment: *Did the analysis consider potential sea level rise and its impacts on existing shorelines? Will the areas which are currently protected by hardened shorelines (i.e. jetties and bulkheads), and excluded from this analysis, continue to be protected if sea level rise becomes a reality? The analysis should be updated to include the effects of sea level rise on existing shorelines and quantify the impacts that longer and deeper draft vessels will have at higher, base water levels.*

Response: Sea level rise would be the same in both the future with and without project conditions. It is not considered a function of channel deepening with respect to bank erosion. Erosion due to sea level rise is not addressed by this study.

760-JK-400-EN29

Comment: *5.9. Existing Shorelines Adjacent to the Federal Navigation Channel, p. 5-121, 3rd paragraph: Paragraph states that from 2003 to 2050 there is 3.1 feet of shoreline erosion along Flo Pulaski per year due to ship traffic and in the same sentence it states that only 0.1 foot (1.2 inches) of the erosion is due to ship traffic. Both values cannot be correct.*

Response: The 3.1 feet is total erosion along this part of the unprotected shoreline due to all causes, (not due to ship traffic). The EIS has been updated to agree with study documents.

760-JK-400-EN30

Comment: *5.9. Existing Shorelines Adjacent to the Federal Navigation Channel, p. 5-1 21, 3rd paragraph: Paragraph states that from 2003 to 2050 there is only 0.1 foot (1.2 inches) of erosion along the Ft. Pulaski shoreline due to ship traffic. However, in the last sentence the document reads that up to 2.23 inches of annual erosion could occur by year 2050. Both values cannot be correct.*

Response: The EIS has been updated to agree with the most recent Savannah Harbor Expansion Bank Erosion Study.

Page 6-10

760-JK-400-EN31

Comment: *5.9. Existing Shorelines Adjacent to the Federal Navigation Channel, p. 5-121 , 4th paragraph: The paragraph states that the circulation and wave modeling results indicate that very small changes are anticipated with the proposed deepening on the beaches of Tybee Island. However, the paragraph fails to mention the sedimentation modeling results, or lack thereof, detailed in the report titled Impacts of Savannah Harbor Expansion Project contained in the Engineering Appendix of the GRR. This report indicates that "A complete sediment budget was not produced due to lack of broad coverage for bathymetry, lack of multiple surveys pre-project to establish the baseline, and uncertainty in rates of some key pathways (p. 2-15)." This report was completed in 2006, four years earlier then the submittal of the Tier 2 EIS. A complete sediment budget should be formulated to determine the impacts that the project would have on Tybee Island.*

Response: The report, "Impacts of Savannah Harbor Expansion Project", concluded that the current navigation channel appears to function as a sink for sediments moving from north to south along the Tybee Island shelf. Since channel deepening would have negligible effect on the shelf, an updated sediment budget would not provide any pertinent information. Conceptual sediment budgets are included in Figures 2-31 and 2-32 of the report. These budgets are substantiated by historic maps and surveys, as well as coastal modeling studies.

760-JK-400-EN32

Comment: *5.9. Existing Shorelines Adjacent to the Federal Navigation Channel, p. 5-121, 4th paragraph: The paragraph fails to mention that the shoreline and volume change analysis reported in Impacts of Savannah Harbor Expansion Project did not include the barrier islands along the coastline. The report states that the islands were not studied because they were not part of the "scope of work." If the potential for negative impacts to barrier islands exist then the scope should have been expanded or a separate study should have been conducted to determine potential impacts. If there is potential for negative impacts to barrier islands, the shoreline and volume change analysis should be updated.*

Response: Previous studies concluded that up to 78 percent of erosion of the Tybee Island shelf is attributable to the existing navigation channel. As noted previously, the report, "Impacts of Savannah Harbor Expansion Project", found that the existing channel intercepts nearly all sediment moving from north to south along the shelf. The report "Impacts of Savannah Harbor Expansion Project", 2006 (GRR-Engineering Appendix, Supplemental Materials) determined that the Tybee Island shore and shelf would not be significantly impacted by a harbor deepening. The Tybee shelf is located immediately adjacent to (and down-current from) the navigation channel, it would experience greater impacts than other locations that are more removed from the channel. Since the coastal erosion studies indicated that Tybee shelf would not be significantly impacted by a harbor deepening, it is reasonable to assume to sites located further down-current from the channel would also not be significantly impacted.

760-JK-400-EN33

Comment: *5.9.Existing Shorelines Adjacent to the Federal Navigation Channel, p. 5-121, 4th paragraph: The paragraph fails to mention that the shoreline and volume change analysis reported in Impacts of Savannah Harbor Expansion Project could not adequately determine the impacts to Tybee Island as stated as follows: "Data are lacking to fully quantify the impact of the project on Tybee Island (primarily multiple full coverage surveys prior to the project to establish historic rate and recent surveys to establish present rates) (p. 2-17)." The report indicates that the Tybee Island Shelf is currently deflating at a rate of 220,000 m3/yr and although the full impacts of the project cannot be "full quantified" with the data available, the Report indicates that the major impacts to the Shelf and Barrett Shoals are from "dredging and deepening." The Shoreline and Volume Change Analysis should be completed with the missing data to determine the potential impacts of yet another dredging and deepening project on the Tybee Island Shelf and Barrett Shoals.*

Response: The analyses described in the 2006 report titled "Impacts of Savannah Harbor Expansion Project" (GRR-Engineering Appendix, Supplemental Materials) were sufficient to identify the incremental impacts of the proposed harbor deepening.

760-JK-400-EN34

Comment: *5.9. Existing Shorelines Adjacent to the Federal Navigation Channel, p. 5-121, 2nd and 3rd paragraphs: The conclusions drawn from the results detailed in Ship Forces on the Shoreline of the Savannah Harbor Project, (which is contained as an attachment in the Engineering Appendix) should be reconsidered.*

Response: The findings of the referenced report have been verified and the EIS has been updated to correctly reflect the most recent studies.

Page 6-11

760-JK-400-EN35

Comment: *Ship Forces on the Shoreline of the Savannah Harbor Project. p. 2, 1st paragraph: Page 2 is very optimistic about the "blockage ratio". in areas where the channel takes up much of the river, such as the U.S. Route 17 crossing, the blocking ratio is much greater than predicted. A vessel with a 160 ft beam (Such as a Generation 2 post-panamax vessel which is predicted to use the channel by 2015, Savannah Harbor Expansion Bank Erosion Study-Update, Appendix B) and a 42.3 ft draft (Allowing for a 10 percent under keel clearance, or 6,768 sq ft), in a channel that's 470 ft wide, 47 ft deep, and has sloped sides at 3:1 (22,560 sq ft) the blockage ratio is 30 percent not the 9.5 percent stated as the maximum in the report. The blockage ratios should be revised to include areas where the river is narrow in width and should be updated based on the predicted use of Generation 2 post-panamax vessels (See below).*

Response: The design vessel for this project, the *Susan Maersk*, a Gen 2 post-panamax vessel, was used for the analysis. The ship forces at the shoreline were reanalyzed in the report *2011 Reanalysis of Ship Forces at the Shoreline in Savannah Harbor* (July 2011) which is included in the Engineering Investigations Supplemental Materials. All responses are based on that reanalysis and not the 2007 report. Additional analysis was added to the report to address the blockage ratio in constricted areas. Three cross-sections near the Highway 17 crossing were plotted. The average area at mean tide level is 30630 sq ft and the width at the -20 contour is 662 feet. If the 500 foot navigation channel is deepened to 48-feet, the area will be 33130 sq ft at mean tide. Measured drawdown data and measured speed along with drawdown calculations show that ships typically slow down in this area such that the drawdown from the ship is not greater than 0.6-0.7 feet. Based on the average Gen 2 beam of 142.9 ft and draft of 46.6 ft, blockage will be 0.20. Based on the Schijf equation for drawdown using water level at mean tide, the ship will have to travel at 5.0 knots speed through water to keep the drawdown below 0.7 feet. The pilots have stated they can and have maintained safe navigation at low speeds in this range due to concerns about bank erosion. They plan to continue this practice in the future. During the 2005 field study, one ship was measured at 2.4 knots and several ships were measured at 5.2-5.4 knots. Using the channel area from measured cross sections at Route 17, the blockage ratio in the deepened channel for the design ship (142.9 X 46.6) or the ship referenced by the comment (160 X 42.3) is 0.20 which is the value stated in the 2011 Reanalysis of Ship Forces at the Shoreline in Savannah Harbor (July 2011).

760-JK-400-EN36

Comment: *Also, the assumption that ship forces are essentially dependent on a two dimensional slice of the ship in the channel is also flawed. It is a problem of added mass, which is the mass of water a ship needs to displace to move into a new location within the fluid. Two ships of the same beam but different hull forms have different added mass factors. A very full ship such as a tanker moves more water than a finer bull like a container ship, which moves more water than a naval ship.*

Response: While hull form does have some effect, the Corps bases its analysis on comparing the same ship hull form in both the existing and deepened channel. If hull forms become more efficient in the future, the District's analysis (using the same hull form in existing and future channels) would tend to over-predict ship effects from a deepened channel. The ship forces study focused on container ships rather than tankers, because containerships dominate the fleet in Savannah, tankers calling at Savannah

generally do not use the full project depth, tankers travel slower and short period waves are much less of an issue. The field data used to calibrate the analysis technique was based primarily on container ships, with the same ship forms used for both the existing and deepened channel conditions.

760-JK-400-EN37

Comment: *Ship Forces on the Shoreline of the Savannah Harbor Project, p. 13, 2nd paragraph: The writer bases the drawdown, wave height, and wave power calculations on the facts that panamax vessels will have an increased speed in the deepened channel and that postpanamax vessels will have a decreased speed. The assumption that post-panamax vessels will maintain the same power level and travel at a lower speed seems poor (The lower speed resulting from a deeper draft). The post-panamax vessels would travel at a speed which provides safe maneuverability when traveling the channel. To assume that this speed will always be lower than the current speed and that that the captain or pilot will maintain the same power setting, which may result in a speed which provides low maneuverability, is a poor assumption. The analysis should be based on the actual predicted speeds not the predicted power level.*

Response: The ship forces at the shoreline were reanalyzed in the report *2011 Reanalysis of Ship Forces at the Shoreline in Savannah Harbor* (July 2011) which is included in the Engineering Investigations Supplemental Materials. All responses are based on that reanalysis and not the 2007 report. The revised ship speed model, that did not differ significantly from the 2007 ship speed model, was developed to ensure this and any other comments about ship speed were correctly addressed. Determining ship speed requires knowledge of what power setting will be used, what power settings are available on a ship, and the particulars of restricted speed areas in the channel (such as at Coast Guard and LNG A Gen 1 ship that drafts about 41.2 feet in the existing channel and is loaded to draft 45.6 feet in the deepened channel (10% increase in ship area) in a channel whose cross section area only increases by about 5% will go slightly slower (about 3%) at the same power level but still maintain control at the 11-12 knot speeds used in the evaluation. Ship power is used in the analysis to predict ship speed. Ship power is important because typical ships only have four maneuvering settings or "bells" they can use at Savannah Harbor. At Savannah Harbor and other ports studied by ERDC, pilots almost always used the highest maneuvering setting of "full bell" if. One reason the full bell usage is critical in speed prediction is because there is no higher setting used while in the channel. Additional discussions have taken place between ERDC and the pilots. Along the channel, the ships must control their wakes when passing the Coast Guard Station, LNG facility, and from Old Fort Jackson into the City. In addition, the Right Whale speed restriction (on the entrance channel) that was placed into effect after the 2007 ship forces study affects ship speed 6 months of the year near Tybee and Fort Pulaski. In addition to fixed locations of wake reduction, pilots must control their wake when recreational or other boats are along the shoreline or at the jetties. The effects of all of these wake reduction areas extend well upstream and well downstream because of the required channel distance for a ship to slow down and then speed back up. Discussions with Savannah Harbor pilots have led to the understanding that operational constraints such as wake reduction are the major factor in defining ship speed at most areas along the channel. The two exceptions to operational constraints being the dominant factor are at Tybee Island for 6 months of the year and between the Coast Guard Station and the LNG facility. In these areas, the ships frequently reach their maximum speed for full bell and the deepened channel must be evaluated for speed changes from those occurring with the existing channel. The net result is that many areas of the channel would not see any significant change in speed in a deepened channel. Based on reviewer comments, the ship speed model has been updated to ensure accurate speed prediction when a ship has its draft increased and the channel is deepened. In some cases, deepening the channel is more significant than the draft increase and the ship speed would increase. In other cases, deepening the channel is less significant

than the draft increase and the ship speed would decrease. The Corps' analysis calculated vessel speed based on power setting and vessel characteristics, including draft. The harbor pilots participated in these analyses, and neither the simulations nor the calculations indicated problems with maneuverability with the proposed project. Further discussion of the ship speed model is included in the Final GRR-Engineering Appendix.

760-JK-400-EN38

Comment: *Ship Forces on the Shoreline of the Savannah Harbor Project, p. 20, 2nd paragraph: Wave power, is expected to increase by up tol9 percent along Ft. Pulaski. This is not insignificant. Wave power has to increase substantially as the percentages of larger vessels running with deeper drafts are projected to increase in a channel whose cross sectional area is only increasing by 4 percent. It is assumed that the 19 percent increase was forecasted for a post-panamax vessel, as a full summary of the results of the wave power analysis are not provided in this document. The details of the wave power study need to be made public to allow for peer review of these conclusions.*

Response: Details of the wave study are published in the 2011 Reanalysis of Ship Forces on the Shoreline of the Savannah Harbor Project documents. Based on the updated ship speed and wave models, summing secondary wave power for all ships shows decreased wave power in the deepened channel from both wave equations (see Table 27 in the reanalysis). This is particularly true at Fort Pulaski where the Right Whale restriction on speed has greatly reduced ship speeds 6 months of the year. Fort Pulaski speeds are also affected by the wake reduction requirements at the Coast Guard Station. Based on the 2011 Reanalysis, wave power at Fort Pulaski decreases in the deepened channel. Further discussion of the wave power calculation is included in the Final Report.

Page 6-12

760-JK-400-EN39

Comment: *The document states that the project's effects along the Confined Sediment Placement/Disposal Facilities (p. 24, 1 Sl paragraph) will be the same as along Ft Pulaski, therefore the ship forces along this long section of the river were not modeled. Barring any differences in river width which may exists between the two sections of the river (Wave impacts will be greater in a narrower river as the waves will have less time to decay before reaching the shoreline) the conclusion that wave power will also increase by up to 19 percent along the Confined Sediment Placement/Disposal Facilities is fair. This is a significant increase.*

Response: The 2011 updated analysis examined ship waves, drawdown, and return velocity at the CDFs. The results demonstrated wave power at the CDFs does not increase in the deepened channel.

760-JK-400-EN40

Comment: *The document states that the only effect which needs to be modeled for the shoreline along the City Front is the long period drawdown. However, the document only provides observed drawdown results (Table 21) and not predicted impacts of the project. The predicted drawdown results, as wells as wave power results, should be published for review.*

Response: Observed drawdown was less than 0.6 feet. Drawdown is related to the speed of a vessel, which pilots adjust to prevent damage to moored vessels at City Front. This is the current practice and it is expected to continue with a deepened channel. There was no need to model predicted drawdown

results at City Front, as ships must slow down to prevent adverse wake effects and drawdown. In many cases, they go slower than the speed required to prevent wake effects and drawdown. Tables are included in the final report showing ship speeds to limit drawdown at City Front and ship speeds (by vessel class) required to prevent wake effects at City Front, the CDFs, and Tybee Island. Wave power (by vessel class) predictions are also included for Tybee Island, Fort Pulaski, Coast Guard Station to LNG, and CDF to Old Fort Jackson. Table 18 of the Reanalysis report shows the predicted wave height at City Front for all ships in both the existing and deepened channels. Wave height is small for all ships.

760-JK-400-EN41

Comment: *The study also fails to analyze the predicted drawdown, wave height and wave power increases along the City Front, the Confined Sediment Placement/Disposal Facilities, and Tybee Island resulting from the passage of a Generation 1I post-panamax vessel along the River. As mentioned previously, according to the updated fleet forecasts detailed in Appendix B of the Savannah Harbor Expansion Bank Erosion Study-Update Generation II post-panamax vessels (Which can have beams up to 160 ft) are expected to call by the year 2015. These vessels will displace an even greater amount of water and it doesn't appear that the effects that they will have has been calculated, or at least reported in Ship Forces on the Shoreline of the Savannah Harbor Project or in the Tier 2 EIS. For example, a Generation 2 post-panamax vessel (160ft beam) with 10 percent underkeel clearance will take up 30 percent of the cross section ofthe new 47 ft channel. Current panamax vessels in the current channel only take up 18 percent of the cross section of the channel. Thus, Generation 2 vessels will displace 67 percent more water relative to channel cross section. This cannot amount to a negligible erosion rate, and the conclusion that wave power will be substantially greater is accurate. The effects that the use of Generation 2 post-panamax vessels will have on drawdown, wave height and wave power along the City Front, the Confined Sediment Placement/Disposal Facilities, and Tybee Island should be determined.*

Response: Calculations for the 140 foot beam Gen 2 ships have been included in the Final Report. The study has been updated to address the most recent fleet forecast and the fleet mix predicted to call upon the port with the deepened channel. The predicted impacts from the alternatives have been updated based on this new information.

760-JK-400-EN42

Comment: *Ship Forces on the Shoreline of the Savannah Harbor Project, p. 22, 3rd paragraph: The document indicates that the impact analysis conducted for the Tybee Island shoreline compared the typical (80 percent of design draft) and design draft conditions. The document then states that "in all cases, the design draft ship in the deepened channel had slightly less drawdown then the existing channel." The difference between those two conditions is much less important than the difference in drawdown between the current condition (Vessels traveling at 80 percent draft in the existing channel) and the future condition (Vessels traveling at design draft in tbe deepened channel). Table 15 indicates that post-panamax vessels traveling at typical and high speed will have drawdown increases of 12.9 percent and 5.73 percent, respectively. These are much less then the differences calculated for panamax and sub-panamax vessels. The increase in drawdown for panamax vessels traveling at typical speed is 31.5 percent and the increase for those traveling at high speed is 22.3 percent between existing and future conditions. The increase for sub-panamax vessels traveling at typical speed is 27.2 percent and the increase for those traveling at high speed is 34.4 percent. These increases are not insignificant.*

Response: The statement "The difference between those two conditions is much less important than the difference in drawdown between the current condition (Vessels traveling at 80 percent draft in the

existing channel) and the future condition (Vessels traveling at design draft in the deepened channel)." is not a valid comparison. It proposes to compare a frequently occurring ship in the existing channel to an infrequently occurring ship in the deepened channel. Sailing draft distributions are a valid way of comparing existing and deepened channels. In the 2011 reanalysis, frequently occurring ships in the existing channel were compared to frequently occurring ships in the deepened channel. A comparison was also made of infrequent ships in both channels.

Transverse stern wave height is generally 10-20% greater than the drawdown. The reanalysis shows the same result whether all typical draft ships were used or all large draft ships were used. The sum of the transverse stern wave height squared, which was used herein as a relative indicator of wave power, was less in the deepened channel. This finding was true even if only Gen 1 and Gen 2 ships were summed and compared. Drawdown only increases for Gen1 and Gen2 in the reach between the Confined Disposal Facility and Old Fort Jackson. Even then, less than 6.2% for all cases. The sum for all vessel classes combined would be less drawdown in the deepened channel for this reach as well.
Page 6-13

760-400-JK-EN43
Comment: *Ship Forces on the Shoreline of the Savannah Harbor Project, Tables 16-1 9: The tables should provide the differences between the existing conditions (Vessels traveling at 80 percent draft in the existing channel) and the future conditions (Vessels traveling at design draft in the deepened channel) for the years of 2030 and 2050. The differences in drawdown between the other scenarios matter much less. The updated table should be updated to make these comparisons.*

Response: The comparison has been revised and updated based on the most recent sailing draft distribution. The report also has been revised to compare existing future with-project at median and 95% draft. The Corps believes that the comparison requested in the comment would not provide uniquely important information beyond what is already in the report.

760-JK-400-EN44
Comment: *Ship Forces on the Shoreline of the Savannah Harbor Project. p. 36, Table 9: The ship effects should be recalculated using the actual predicted speeds for post-panamax vessels (not an estimate of the power level), and should show the predicted drawdown, return velocity, and wave height for Generation 2 post-panamax vessels. The same type of table should be developed to show the results of these forces on the shorelines of the Confined Sediment Placement/Disposal Facilities and the City Front. Appropriate cross sectional areas should be used for each of these sections of the River.*

Response: Additional documentation on ship speeds in the channel has been obtained from the Savannah Harbor Pilots Association. The Savannah Harbor pilots provided input on power settings that would be used, power settings available on a ship, and the particulars of restricted speed areas in the channel (such as at the Coast Guard Station and LNG facility) which are critical to determining ship speed. A Gen 1 ship that drafts about 41.2 feet in the existing channel and is loaded to draft 45.6 feet in the deepened channel (10% increase in ship area) in a channel whose cross section area only increases by about 5% will go slightly slower (about 3%) at the same power level but still maintain control at the 11-12 knot speeds used in the evaluation. Ship power is used in the analysis to predict ship speed. Ship power is important because typical ships only have four maneuvering settings or "bells" they can use at Savannah Harbor. Based on documented experience at Savannah Harbor and other ports, pilots almost always used the highest maneuvering setting of "full bell" if possible. One reason the full bell usage is critical in speed prediction is because there is no higher setting used while in the channel. As a result of

reviewer comments, additional discussions have taken place between ERDC and the pilots. Along the channel, the ships must control their wakes at the Coast Guard Station, the LNG facility, and from Old Fort Jackson into the City. In addition, the Right Whale speed restriction on the entrance channel placed into effect after the 2007 ship forces study also affects ship speed 6 months of the year near Tybee and Fort Pulaski. In addition to fixed areas of wake reduction, pilots must control their wake when recreational or other boats are along the shoreline or at the jetties. The effects of all of these wake reduction areas extend well upstream and well downstream because of the required channel distance for a ship to slow down and then speed back up. These discussions with the pilots have led to the understanding that the operational constraints such as wake reduction are the major factor in defining ship speed at most areas along the channel. The two exceptions to operational constraints being the dominant factor are at Tybee Island for 6 months of the year and between the Coast Guard Station and the LNG facility. In these areas, the ships frequently reach their maximum speed for full bell and the deepened channel must be evaluated for ship speed changes from speeds in the existing channel. The net result of all of this discussion is that many areas of the channel would not see any significant change in speed in the deepened channel. The ship speed model has been updated to ensure accurate speed prediction when a ship has its draft increased and the channel is deepened. In some cases, deepening the channel would be more significant than the draft increase and the ship speed would increase. In other cases, deepening the channel would be less significant than the draft increase and the ship speed would decrease. The Final Report includes further discussion of the ship speed model to address reviewer comments. Verification of calculations with 140 foot beam Gen 2 ships is also in the final report.

760-JK-400-EN45

Comment: *Ship Forces on the Shoreline of the Savannah Harbor Project. p. 36, Table 9: As the table appears in the report, the predicted return velocity increase for typical speed panama vessels with the change from 80 percent draft to design draft is 24 percent. The drawdown increase for typical speed panamax vessels is 26 percent. The return velocity increase and drawdown increase for high speed panamax vessels are 30 percent and 35 percent, respectively. The short period bow and stem wave heights for typical and high speed panamax vessels going from 80 percent draft to design draft are 28 percent and 30 percent, respectively. These area substantial increases and should not be hidden within the composite tables which average in the results from the smaller vessels shown in Tables 5 and 9. As mentioned previously, the analysis should be conducted again using predicted speeds and should include an analysis of the impacts of Generation 2 post-panamax vessels using the channel. The results should be updated to clearly indicate that return velocities, drawdowns, and wave heights could increase with the project as shown in the example above.*

Response: The primary factor in increasing wave power is an increase in vessel speed. When the percentage increase in draft exceeds the percentage increase in channel area due to channel deepening, vessel speed typically decreases, with correspondingly less wave power.

The 2011 Reanalysis of Ship Forces on the Shoreline of the Savannah Harbor Project includes updated sailing draft distributions to allow comparison of ships in the existing and deepened channels. The drafts have been updated and the calculations for the 140-foot beam Gen 2 ship have been verified in the final report. Comparisons are based on equal frequency of passage in the existing and deepened channels. Median or 50% exceedance drafts are compared in the existing channel to median or 50% exceedance drafts in the deepened channel to represent a frequently occurring ship. The 95% exceedance drafts are compared in the existing and deepened channel to represent a large ship that occurs less frequently.

760-JK-400-EN46

Comment: *Ship Forces on the Shoreline of the Savannah Harbor Project, p. 43, Table 15: The table heading indicates that it contains return velocity information, however, this data is absent from the table. Table 15 should be updated to include this missing information for public review purposes."*

Response: The table reference to return velocity was a typo and has been corrected in the Final Report. Return velocity at Tybee is not a concern due to the distance from the channel to the shoreline in that location.

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760-JK-400-EN47

Comment: *5.9. Existing Shorelines Adjacent to the Federal Navigation Channel, p. 5-121, 2nd and 3rd paragraphs: The conclusions drawn from the results detailed in Savannah Harbor Expansion Bank Erosion Study-Update, (which is contained as an attachment in the Engineering Appendix) should be reconsidered to address the following concerns with this document.*

Response: The Bank Erosion Study and Ship Forces on Shoreline Study have been updated with additional data that has become available, including the latest Fleet Forecast.

760-JK-400-EN48

Comment: *Savannah Harbor Expansion Bank Erosion Study Update, p. I, 7th paragraph: For 2008, 3,055 calls would have been reduced to only 3,049 calls if the channel is deepened to 48 ft. This is a statistical draw, not a "notable reduction".*

Response: The calculated reduction is small, but worthy of being identified.

760-JK-400-EN49

Comment: *Savannah Harbor Expansion Bank Erosion Study - Update, p. 2, 2nd paragraph and p. 7, 3rd paragraph: "The updated forecast changes in ship length, beam, and speed were evaluated." And "Changes with regard to ship length, width, speed were negligible." It appears that changes in draft were not considered and Generation 2 post-panamax vessels were not included as part of this Study. The Study should be amended to address these significant deficiencies.*

Response: Changes in draft were evaluated using sailing draft distributions. Median or 50% exceedance drafts are compared in the existing channel to median or 50% exceedance drafts in the deepened channel to represent a frequently-occurring ship. The 95% exceedance drafts are compared in the existing and deepened channel to represent a large ship that occurs less frequently. The channel design is based on the Susan Maersk, a Generation 2 post-panamax vessel. The updated evaluation uses the more recent Fleet Forecast developed by the project economists.

760-JK-400-EN50

Comment: *Savannah Harbor Expansion Bank Erosion Study - Update, p. 5, 4th paragraph: The paragraph mentions the increase in wave power at Ft. Pulaski but doesn't mention which vessels and which speeds were used to develop these numbers and how these results are " Included" or utilized within the bank erosion analysis.*

Response: Erosion at Fort Pulaski isn't necessarily the result of ship traffic. Most is the result of tides, flow velocities, nor'easters (wind), drainage, etc. The vessel fleet predicted from economic studies was used in the bank erosion studies. The Pilots state that vessels would run about the same speed in a deepened channel as in the existing channel. The 2011 updated analysis provides details of the Fort Pulaski wave heights and shows that wave power does not increase at Fort Pulaski in the deepened channel.

760-JK-400-EN51

Comment: *Savannah Harbor Expansion Bank Erosion Study Update, p. 6, 1st paragraph: The report lists the average length of98.9 percent of all ships calling from the ERDC report to be 574 ft. It is assumed that these callings are the same as those listed in Table 4 of this report. The average length of the 1,245 callings listed in Table 4 is 869.5 ft, a 51.4 percent increase. This is easily noticeable when 70 percent of the calls were panama vessels with an average length of 951 ft (Table 4). Using the average length of 869.5 ft divided by the average ship speed (19.6 fps) returns a passing time of 44.4 seconds. This number is 126 percent greater than the estimated time of generated wave activity upon the shoreline. The observed wave incident data from the study needs to be made public to allow for peer review of these conclusions.*

Response: The average speed and vessel sizes used in the bank erosion studies were obtained from the fleet forecast. The observation of a difference in passing time is not significant. The time of wave generation per ship multiplied by the number of ships yields an extremely small fraction of time with respect to all events within the defined time frame. The observed incident wave data are included in the Engineering Appendix Supplemental Materials report entitled "Ship Forces on the Shoreline of the Savannah Harbor Project".

760-JK-400-EN52

Comment: *Savannah Harbor Expansion Bank Erosion Study - Update, p. 7, 3rd paragraph: The percentage of passing time was revised upwards with the measured forces from the ERDC study and other factors and used to estimate the percentage of annual erosion that could be attributed to vessel traffic. This method appears to be using poor science. There is no evidence presented that indicates that the actual percentage of annual erosion couldn't be higher, or lower, for that matter. A different method should be used to estimate the amount of bank erosion attributable to vessel traffic.*

Response: The methods used to estimate bank erosion are based on calculations from observations, existing bank information available, the ERDC wave study, available aerial photography, site visits, fleet forecasts, and economic studies, all collectively considered. Minor variations from the erosion predicted at any specific location are possible. Updates to the fleet forecast have been included in the final Bank Erosion Study.

Page 6-15

760-JK-400-EN53

Comment: *Savannah Harbor Expansion Bank Erosion Study - Update, p. 7, 3rd paragraph: The method used to estimate the impact from vessel traffic in 2030 and 2050 uses equally poor science. Multiplying the year 2003 erosion amount by the change in vessel numbers between 2003 and 2030 and again for 2050 completely ignores changes in vessel length and vessel draft. The Revised Fleet Forecast in Appendix B of the Savannah Harbor Expansion Bank Erosion Study - Update details the increasing use of Generation I post-panamax vessels and the use of Generation 2 post-panamax vessels beginning in 2015. At this point, the effect that vessels have on the Savannah River shoreline is unknown. Also unknown are*

the impacts that longer and deeper draft vessels will have on the shoreline. As mentioned previously, a different method should be used to estimate the amount of bank erosion attributable to vessel traffic.

Response: The methods used to estimate bank erosion are based on calculations from observations, existing bank information available, the ERDC wave study, available aerial photography, site visits, fleet forecasts, and economic studies, all collectively considered. Minor variations from the erosion predicted at any specific location are possible. Updates to the fleet forecast have been included in the final Bank Erosion Study.

760-JK-400-EN54
Comment: *Savannah Harbor Expansion Bank Erosion Study - Update, Appendix B: Consistent use of year 2050 forecast numbers occurs within the document, yet the table in Appendix B only contains forecasts out [0 year 2032. The Appendix should be updated to included forecasts out to year 2050.*

Response: The fleet is forecast to change through 2032. No change is predicted for the fleet between years 2032 and 2065. The table has been updated to show no change.

760-JK-400-EN55
Comment: *Savannah Harbor Expansion Bank Erosion Study - Update. p. 8, 2nd paragraph: The document states that "There appears to be a net reduction of bank erosion due to the proposed deepening effort." As mentioned previously, the science in the study does not support this claim.*

Response: The fleet is forecast to change through 2032. No change is predicted for the fleet between years 2032 and 2065. The table has been updated to show no change.

760-JK-400-EN56
Comment: *Savannah Harbor Expansion Bank Erosion Study Update, p. 8, 4th paragraph: This document states results detailed in the report titled Ship Forces on the Shoreline of the Savannah Harbor Project, and as indicated in a previous comment, the drawdown comparisons should be made between the current condition (Vessels traveling at 80 percent draft in the existing channel) and the future condition (Vessels traveling at design draft in the deepened channel). Comparison s between other scenarios is almost meaningless. The claim that "the Savannah Harbor Deeping will have no significant effect on North Tybee" has yet to be substantiated.*

Response: Sailing draft distributions have been updated that compare ships in the existing and deepened channels. Comparisons are based on equal frequency of passage in the existing and deepened channels. Median or 50% exceedance drafts are compared in the existing channel to median or 50% exceedance drafts in the deepened channel to represent a frequently occurring ship. The 95% exceedance drafts are compared in the existing and deepened channel to represent a large ship that occurs less frequently. The updated report shows that composite drawdown in the channel, return velocity in the channel, and wave height at the Tybee Island shoreline were less than or equal with the deepened channel when compared to the existing channel.

760-JK-400-EN57
Comment: *Savannah Harbor Expansion Bank Erosion Study - Update, p. 9, 2nd paragraph: Table 21 of the report titled Ship Forces on the Shoreline of the Savannah Harbor Project lists the observed drawdown of 15 inbound and 22 outbound vessels as they passed the City Front area. The report says nothing of predicted drawdown expect that it was assumed to "remain unchanged" due to low vessel speeds in the area. Even if speeds remain the same, the percentages of longer vessels with deeper drafts*

are to increase according to the table in Appendix B of the document titled Savannah Harbor Expansion Bank Erosion Study - Update. Therefore, it cannot be assumed that conditions in the area are to remain the same (as obviously they are not with larger vessels passing the area) and the potential effects of the project cannot remain unknown. The effects of the project in the City Front area need to be determined.

Response: The 2011 updated analysis examined ship waves, drawdown, and return velocity along the navigation channel, including the City Front [see GRR, Engineering Appendix, Supplemental Materials]. Specific studies involving ship hull configurations, lengths, speeds, drafts, etc. are not necessary and would not yield significantly different results. In addition, shorelines at the City Front properties are protected by concrete piling supporting walks, parking decks, and Plazas above, behind which the slopes are protected with ballast stone, concrete, and other slope protection, laid directly on grade. The channel in this area would not be widened beyond the existing side slope.

Page 6-16

760-JK-400-EN58
Comment: *2. General, p. 1, 7th paragraph: For 2008, 3,055 calls would have been reduced to only 3,049 calls if the channel is deepened to 48 ft. This is a statistical draw, not a "notable reduction".*

Response: The calculated reduction is small, but worthy of being identified.

760-JK-400-EN59
Comment: *2. General, p. 2, 2nd paragraph and p. 7, 3rd paragraph: 'The updated forecast changes in ship length, beam, and speed were evaluated." And "Changes with regard to ship length, width, speed were negligible." It appears that changes in draft were not considered and Generation 2 post-panamax vessels were not included as part of this Study. The Study should be amended to address these significant deficiencies.*

Response: The channel design is based on the Susan Maersk, a Generation 2 post-panamax vessel. The future fleet was developed by project economists and was used in the 2011 updated reanalysis, which included changes in vessel draft.

760-JK-400-EN60
Comment: *5.Fort Pulaski, p. 5, 4th paragraph: The paragraph mentions the increase in wave power at Ft. Pulaski but doesn't mention which vessels and which speeds were used to develop these numbers and how these results are "included" or utilized within the bank erosion analysis.*

Response: Most wave energies and erosion forces at Fort Pulaski are the result of tides, flow velocities, nor'easters, drainage, exposure to open water of the Atlantic, etc. Changes in the vessel fleet predicted from economic studies, as well as the total erosion measured from all causes, were used for bank erosion studies.

Revised wave power calculations at Fort Pulaski are included in the final report for the wave power associated with each vessel class for both existing and deepened channels. The 2011 reanalysis of ship forces shows that wave power is not increased at Fort Pulaski in the deepened channel.

760-JK-400-EN61

Comment: *5. Fort Pulaski, p. 6, l SI paragraph: The report lists the average length of 98.9 percent of all ships calling from the ERDC report to be 574 ft. II is assumed that these callings are the same as those listed in Table 4 of this report. The average length of the 1,245 callings listed in Table 4 is 869.5 ft, a 51.4 percent increase. This is easily noticeable when 70 percent of the calls were panamax vessels with an average length of 951 ft (Table 4). Using the average length of 869.5 ft divided by the average ship speed (19.6 fps) returns a passing time of 44.4 seconds. This number is 126 percent greater than the estimated time of generated wave activity upon the shoreline. The observed wave incident data from the study needs to be made public to allow for peer review of these conclusions.*

Response: Table 4 has been updated based on the updated fleet forecast. The 574-foot length came from all ships observed in the 1-week field study. The observed incident wave data are included in the Engineering Appendix Supplemental Materials report entitled "Ship Forces on the Shoreline of the Savannah Harbor Project".

Average speed and vessels from the fleet forecast were used for the bank erosion studies. The observation of a difference in time range is not significant. The time of wave generation per ship multiplied by the number of ships yields an extremely small fraction of time with respect to all events within the defined time frame.

760-JK-400-EN62

Comment: *5. Fort Pulaski, p. 7, 3rd paragraph: The percentage of passing time was revised upwards with the measured forces from the ERDC study and other factors and used to estimate the percentage of annual erosion that could be attributed to vessel traffic. This method appears to be using poor science. There is no evidence presented that indicates that the actual percentage of annual erosion couldn't be higher, or lower, for that matter. A different method should be used to estimate the amount of bank erosion attributable to vessel traffic.*

Response: The methods used to estimate bank erosion are based on calculations from observations, existing bank information available, the ERDC wave study, available aerial photography, site visits, fleet forecasts, and economic studies, all collectively considered. Updates to fleet forecast have been considered in the final Bank Erosion Study.

760-JK-400-EN63, 760-JK-400-EN64

Comment: *5. Fort Pulaski, p. 7, 3rd paragraph: The method used to estimate the impact from vessel traffic in 2030 and 2050 uses equally poor science. Multiplying the year 2003 erosion amount by the change in vessel numbers between 2003 and 2030 and again for 2050 completely ignores changes in vessel length and vessel draft. The Revised Fleet Forecast in Appendix B of the Savannah Harbor Expansion Bank Erosion Study Update details the increasing use of Generation 1 post-panamax vessels and the use of Generation 2 post-panamax vessels beginning in 2015. At this point, the effect that vessels have on the Savannah River shoreline is unknown. Also unknown are the impacts that longer and deeper draft vessels will have on the shoreline. As mentioned previously, a different method should be used to estimate the amount of bank erosion attributable to vessel traffic.*

Response: The methods used to estimate bank erosion are based on calculations from observations, existing bank information available, the ERDC wave study, available aerial photography, site visits, fleet forecasts, and economic studies, all collectively considered. Updates to fleet forecast have been considered in the final Bank Erosion Study.

Page 6-17

760-JK-400-EN65

Comment: *5. Fort Pulaski, p. 8, 2nd paragraph: The document states that "There appears to be a net reduction of bank erosion due to the proposed deepening effort." As mentioned previously, the science in the study does not support this claim.*

Response: The methods used to estimate bank erosion are based on calculations from observations, existing bank information available, the ERDC wave study, available aerial photography, site visits, fleet forecasts, and economic studies, all collectively considered. Updates to fleet forecast have been considered in the final Bank Erosion Study.

760-JK-400-EN66

Comment: *6. North Tybee, p. 8, 4th paragraph: This document states results detailed in the report titled Ship Forces on the Shoreline of the Savannah Harbor Project and as indicated in a previous comment, the drawdown comparisons should be made between the current condition (Vessels traveling at 80 percent draft in the existing channel) and the future condition (Vessels traveling at design draft in the deepened channel). Comparisons between other scenarios is almost meaningless. The claim that "the Savannah Harbor Deeping will have no significant effect on North Tybee" has yet to be substantiated.*

Response: Sailing draft distributions have been updated that compare ships in the existing and deepened channels. Comparisons are based on equal frequency of passage in the existing and deepened channels. Median or 50% exceedance drafts are compared in the existing channel to median or 50% exceedance drafts in the deepened channel to represent a frequently occurring ship. The 95% exceedance drafts are compared in the existing and deepened channel to represent a large ship that occurs less frequently. The updated report shows that composite drawdown in the channel, return velocity in the channel, and wave height at the Tybee Island shoreline were less than or equal to the deepened channel when compared to the existing channel.

760-JK-400-EN67

Comment: *7. City Front, p. 9, 2nd paragraph: Table 21 of the report titled Ship Forces on the Shoreline of the Savannah Harbor Project lists the observed drawdown of 15 inbound and 22 outbound vessels as they passed the City Front area. The report says nothing of predicted drawdown expect that it was assumed to "remain unchanged" due to low vessel speeds in the area. Even if speeds remain the same, the percentages of longer vessels with deeper drafts are to increase according to the table in Appendix B of the document titled Savannah Harbor Expansion Bank Erosion Study - Update. Therefore, it cannot be assumed that conditions in the area are to remain the same (as obviously they are not with larger vessels passing the area) and the potential effects of the project cannot remain unknown. The effects of the project in the City Front area need to be determined.*

Response: The Harbor Pilots have given no indication that they expect to alter the manner in which they move vessels past City Front in the future, either with or without project. Since most of the shoreline in that area is protected and the channel would not be widened beyond its existing side slope during harbor deepening, the Corps continues to believe that a detailed assessment of project effects on the shorelines in that location is not needed.

This position is supported by the Corps' expectation that fewer total vessels would be required (compared to the without project condition) with a deepened channel to carry the cargo for a given year.

760-JK-400-EN68

Comment: *Savannah Harbor Expansion Bank Erosion Study - Update, Appendix B: Consistent use of year 2050 forecast numbers occurs within the document, yet the table in Appendix B only contains forecasts out to year 2032. The Appendix should be updated to included forecasts out to year 2050.*

Response: The container fleet is forecast to reach its maximum size [numerically] in 2032. To date, the fleet is predicted to remain constant between 2032 and 2050.

760-JK-400-EN69

Comment: *I. Savannah Harbor Characteristics, p. 2, I S\ paragraph: Page 2 is very optimistic about the "blockage ratio". 10 areas where the channel takes up much of the river, such as the U.S. Route 17 crossing, the blocking ratio is much greater than predicted. A vessel with a 160 ft beam (Such as a Generation 2 post-panamax vessel which is predicted to use the channel by 2015, Savannah Harbor Expansion Bank Erosion Study-Update, Appendix B) and a 42.3 ft draft (Allowing for a 10 percent under keel clearance, or 6,768 sq ft), in a channel that 's 470 ft wide, 47 ft deep, and bas sloped sides at 3: I (22,560 sq ft) the blockage ratio is 30 percent not the 9.5 percent stated as the maximum in the report. The blockage ratios should be revised to include areas where the river is narrow in width and should be updated based on the predicted use of Generation 2 post-panamax vessels (See below).*

Response: The ship forces at the shoreline were reanalyzed in the report *2011 Reanalysis of Ship Forces at the Shoreline in Savannah Harbor* (July 2011) which is included in the Engineering Investigations Supplemental Materials. Additional analysis was added to the report to address the blockage ratio in constricted areas. The design vessel for this project, the *Susan Maersk*, a Gen 2 post-panamax vessel, was used for the analysis. Three cross-sections near the Highway 17 crossing were plotted. The average area at mean tide level is 30630 sq ft and the width at the -20 contour is 662 feet. If the 500 foot navigation channel is deepened to 48-feet, the area will be 33130 sq ft at mean tide. Measured drawdown data and measured speed along with drawdown calculations show that ships typically slow down in this area such that the drawdown from the ship is not greater than 0.6-0.7 feet. Based on the average Gen 2 beam of 142.9 ft and draft of 46.6 ft, blockage will be 0.20. Based on the Schijf equation for drawdown using water level at mean tide, the ship will have to travel at 5.0 knots speed through water to keep the drawdown below 0.7 feet. The pilots have stated they can and have maintained safe navigation at low speeds in this range due to concerns about bank erosion. They plan to continue this practice in the future. During the 2005 field study, one ship was measured at 2.4 knots and several ships were measured at 5.2-5.4 knots.

Page 6-18

760-JK-400-EN70

Comment: *Also, the assumption that ship forces are essentially dependent on a two dimensional slice of the ship in the channel is also flawed. It is a problem of added mass, which is the mass of water a ship needs to displace to move into a new location within the fluid. Two ships of the same beam but different hull forms have different added mass factors. A very full ship such as a tanker moves more water than a finer bull like a container ship, which moves more water than a naval ship.*

Response: While hull form does have some effect, the Corps bases its analysis on the same ship hull form in both the existing and deepened channel conditions. If hull forms become more efficient in the future, the analysis using the same hull form in both the existing and future channels would tend to over-predict ship effects. The ship forces study focused on container ships because containerships

dominate the fleet at Savannah, tankers calling at Savannah do not generally use full project depth, tankers travel slower and short-period waves are much less of an issue. The field data used to calibrate the analysis technique was based primarily on container ships, with the same ship forms being used in both the existing and deepened channel scenarios.

760-JK-400-EN71

Comment: *5. Ship Speed Analysis, p. 13, 2nd paragraph: The writer bases the drawdown, wave height, and wave power calculations on the facts that panamax vessels will have an increased speed in the deepened channel and that post-panamax vessels will have a decreased speed. The assumption that post-panamax vessels will maintain the same power level and travel at a lower speed seems poor (The lower speed resulting from a deeper draft). The post-panamax vessels would travel at a speed which provides safe maneuverability when traveling the channel. To assume that this speed will always be lower than the current speed and that that the captain or pilot will maintain the same power setting, which may result in a speed which provides low maneuverability, is a poor assumption. The analysis should be based on the actual predicted speeds not the predicted power level.*

Response: The ship forces at the shoreline were reanalyzed in the report *2011 Reanalysis of Ship Forces at the Shoreline in Savannah Harbor (July 2011)* which is included in the Engineering Investigations Supplemental Materials. The revised ship speed model, that did not differ significantly from the 2007 ship speed model, was developed to insure this and any other comments about ship speed were correctly addressed. Determining ship speed requires knowledge of what power setting will be used, what power settings are available on a ship, and the particulars of restricted speed areas in the channel (such as at Coast Guard and LNG). A Gen 1 ship that drafts about 41.2 feet existing and drafts 45.6 feet (10% increase in ship area) in a channel whose cross sectional area only increases by about 5% would go slightly slower (about 3%), but still maintain control at the 11-12 knot speeds the District is using in the evaluation. Ship power is used in the analysis to predict ship speed. Ship power is important because typical ships only have four maneuvering settings or "bells" they can use at Savannah Harbor. At Savannah Harbor and other ports studied by ERDC, pilots almost always used the highest maneuvering setting of "full bell" if possible and this is true at Savannah Harbor. One reason the full bell usage is critical in speed prediction is because there is no higher setting used while in the channel. Additional discussions have taken place between ERDC and the pilots. Along the channel, the ships must control their wakes when passing the Coast Guard Station, LNG facility, and from old Fort Jackson into the City. In addition, the Right Whale speed restriction (on the entrance channel) that was placed into effect after the 2007 ship forces study affects ship speed 6 months of the year near Tybee and Fort Pulaski. In addition to fixed locations of wake reduction, pilots must control their wake when recreational or other boats are along the shoreline or at the jetties. The effects of all of these wake reduction areas extend well upstream and well downstream because of the required channel distance for a ship to slow down and then speed back up. Discussions with Savannah Harbor pilots have led to the understanding that operational constraints such as wake reduction are the major factor in defining ship speed at most areas along the channel. The two exceptions to operational constraints being the dominant factor are at Tybee Island for 6 months of the year and between the Coast Guard Station and the LNG facility. In these areas, the ships frequently reach their maximum speed for full bell and the deepened channel must be evaluated for speed changes from those occurring with the existing channel. The net result is that many areas of the channel would not see any significant change in speed in a deepened channel. Based on reviewer comments, the ship speed model has been updated to insure accurate speed prediction when a ship has its draft increased and the channel is deepened. In some cases, deepening the channel is more significant than the draft increase and the ship speed would increase. In other

cases, deepening the channel is less significant than the draft increase and the ship speed would decrease. Further discussion of the ship speed model is included in the Final GRR-Engineering Appendix.

760-JK-400-EN72

Comment: *7. Fort Pulaski Ship Forces Analysis, p. 20. 2nd paragraph: Wave power, is expected to increase by up to 19 percent along Ft. Pulaski. This is not insignificant. Wave power has to increase substantially as the percentages of larger vessels running with deeper drafts are projected to increase in a channel whose cross sectional area is only increasing by 4 percent. It is assumed that the 19 percent increase was forecasted for a post-panamax vessel, as a full summary of the results of the wave power analysis are not provided in this document. The details of the wave power study need to be made public to allow for peer review of these conclusions.*

Response: Details of the wave study are published in the 2011 Reanalysis of Ship Forces on the Shoreline of the Savannah Harbor Project documents. Based on a better understanding of how ships operate and updated ship speed and wave models, the wave power would change along the channel. This is particularly true at Fort Pulaski where the Right Whale restriction on speed has greatly reduced ship speeds 6 months of the year. Fort Pulaski speeds are also affected by the wake reduction requirements at the Coast Guard Station. Based on the 2011 report, wave power at Fort Pulaski does not increase in the deepened channel. Further discussion of the wave power calculation is included in the Final Report.

760-JK-400-EN73

Comment: *The document states that the project's effects along the Confined Sediment Placement/Disposal Facilities (p. 24, l SI paragraph) will be the same as along Ft. Pulaski, therefore the ship forces along this long section of the river were not modeled. Barring any differences in river width which may exists between the two sections of the river (Wave impacts will be greater in a narrower river as the waves will have less time to decay before reaching the shoreline) the conclusion that wave power will also increase by up to 19 percent along the Confined Sediment Placement/Disposal Facilities is fair. This is a significant increase.*

Response: The 2011 updated analysis examined ship waves, drawdown, and return velocity at the CDFs. The results demonstrated wave power at the CDFs does not increase in the deepened channel.

Page 6-19

760-JK-400-EN74

Comment: *The document states that the only effect which needs to be modeled for the shoreline along the City Front is the long period drawdown. However, the document only provides observed drawdown results (Table 21) and not predicted impacts of the project. The predicted drawdown results, as wells as wave power results should be published for review.*

Response: The 2011 updated analysis provides observed and computed drawdown and computed wave height at City Front. The observed drawdown in that location was less than 0.6 ft. Drawdown is related to the speed of a vessel, which pilots adjust to prevent damage to moored vessels at City Front. This is the current practice and it is expected to continue with a deepened channel.

At City Front, ships slow down to prevent adverse wake effects. In many cases, they go slower than the speed required to prevent wake effects. A table is included in the final report showing ship speeds for each vessel class that is required to prevent wake effects at City Front.

760-JK-400-EN75, 760-JK-400-EN76

Comment: *The study also fails to analyze the predicted drawdown, wave height and wave power increases along the City Front, the Confined Sediment Placement/Disposal Facilities, and Tybee Island resulting from the passage of a Generation U post-panamax vessel along the River. As mentioned previously, according to the updated fleet fo recasts detailed in Appendix B of the Savannah Harbor Expansion Bank Erosion Study-Update Generation II post-panamax vessels (Which can have beams up to 160 ft) are expected to call by the year 2015. These vessels will displace an even greater amount of water and it doesn't appear that the effects that they will have has been calculated, or at least reported in Ship Forces on the Shoreline of the Savannah Harbor Project or in the Tier 2 EIS. For example, a Generation 2 post-panamax vessel (160ft beam) with 10 percent underkeel clearance will take up 30 percent of the cross section of the new 47 ft channel. Current panamax vessels in the current channel only take up 18 percent of the cross section of the channel. Thus, Generation 2 vessels will displace 67 percent more water relative to channel cross section. This cannot amount to a negligible erosion rate, and the conclusion that wave power will be substantially greater is accurate. The effects that the use of Generation 2 post-panamax vessels will have on drawdown, wave height and wave power along the City Front, the Confmed Sediment Placement/Disposal Facilities, and Tybee Island should be determined.*

Response: Calculations for the 140-foot beam Gen 2 ships have been included in the Final Report at multiple locations, including City Front, the CDFs, and Tybee Island. The study has been updated to address the most recent fleet forecast and the fleet mix predicted to call at the port with the deepened channel.

760-JK-400-EN77

Comment: *8. Tybee Island Ship Forces Analysis, p. 22, 3rd paragraph: The document indicates that the impact analysis conducted for the Tybee Island shoreline compared the typical (80 percent of design draft) and design draft conditions. The document then states that "in all cases, the design draft ship in the deepened channel had slightly less drawdown then the existing channel." The difference between those two conditions is much less important than the difference in drawdown between the current condition (Vessels traveling at 80 percent draft in the existing channel) and the future condition (Vessels traveling at design draft in the deepened channel). Table 15 indicates that post-panamax vessels traveling at typical and high speed will have drawdown increases of 12.9 percent and 5.73 percent, respectively. These are much less then the differences calculated for panamax and subpanamax vessels. The increase in drawdown for panamax vessels traveling at typical speed is 31 _5 percent and the increase for those trave ling at high speed is 22.3 percent between existing and furure conditions. The increase for sub-panamax vessels traveling at typical speed is 27.2 percent and the increase for those traveling at high speed is 34.4 percent. These increases are not insignificant.*

Response: Sailing draft distributions have been updated that compare ships in the existing and deepened channels. Comparisons are based on equal frequency of passage in the existing and deepened channels. Median or 50% exceedance drafts are compared in the existing channel to median or 50% exceedance drafts in the deepened channel to represent a frequently-occurring ship. The 95% exceedance drafts are compared in the existing and deepened channel to represent a large ship that occurs less frequently.

Page 6-20

760-JK-400-EN78

Comment: *Ship Forces on the Shoreline of the Savannah Harbor Project, Tables 16-19: The tables should provide the differences between the existing conditions (Vessels traveling at 80 percent draft in the existing channel) and the future conditions (Vessels traveling at design draft in the deepened channel) for the years of 2030 and 2050. The differences in drawdown between the other scenarios matter much less. The updated table should be updated to make these comparisons.*

Response: The draft comparison has been revised and updated based on the most recent sailing draft distribution. The report also has been revised to compare existing future with-project at median and 95% draft. The comparison requested in the letter would not provide substantial information beyond what is in the final report.

760-JK-400-EN79

Comment: *Ship Forces on the Shoreline of the Savannah Harbor Project, p. 36, Table 9: The ship effects should be recalculated using the actual predicted speeds for post-panamax vessels (not an estimate of the power level), and should show the predicted drawdown, return velocity, and wave height for Generation 2 post-panamax vessels. The same type of table should be developed to show the results of these forces on the shorelines of the Confined Sediment Placement/Disposal Facilities and the City Front. Appropriate cross sectional areas should be used for each of these sections of the River.*

Response: The primary factor in increasing wave power is an increase in speed. An increase in draft typically decreases speed, with correspondingly less wave power.

The study included in the draft report assumed the percentage draft would be the same for the existing and the deepened channel. Since the 2007 ship forces study, sailing draft distributions have become available that allow better comparison of ships in the existing and deepened channels. The drafts have been updated and the calculations for the 140-foot beam Gen 2 ship have been verified in the final report. Comparisons are based on equal frequency of passage in the existing and deepened channels. Median or 50% exceedance drafts are compared in the existing channel to median or 50% exceedance drafts in the deepened channel to represent a frequently occurring ship. The 95% exceedance drafts are compared in the existing and deepened channel to represent a large ship that occurs less frequently.

760-JK-400-EN80

Comment: *Ship Forces on the Shoreline of the Savannah Harbor Project, p. 36, Table 9: As the table appears in the report, the predicted return velocity increase for typical speed panama vessels with the change from 80 percent draft to design draft is 24 percent. The drawdown increase for typical speed panamax vessels is 26 percent. The return velocity increase and drawdown increase for high speed panamax vessels are 30 percent and 35 percent~ respectively. The short period bow and stern wave heights for typical and high speed panamax vessels going from 80 percent draft to design draft are 28 percent and 30 percent, respectively. These area substantial increases and should not be hidden within the composite tables which average in the results from the smaller vessels shown in Tables 5 and 9. As mentioned previously, the analysis should be conducted again using predicted speeds and should include an analysis of the impacts of Generation 2 postpanamax vessels using the channel. The results should be updated to clearly indicate that return velocities, drawdowns, and wave heights could increase with the project as shown in the example above.*

Response: The primary factor in increasing wave power is an increase in vessel speed. When the percentage increase in draft exceeds the percentage increase in channel area due to channel deepening, vessel speed typically decreases, with correspondingly less wave power.

Since the 2007 ship forces study, sailing draft distributions have become available that compare ships in the existing and deepened channels. The drafts have been updated and the calculations for the 140-foot beam Gen 2 ship have been verified in the final report. Comparisons are based on equal frequency of passage in the existing and deepened channels. Median or 50% exceedance drafts are compared in the existing channel to median or 50% exceedance drafts in the deepened channel to represent a frequently occurring ship. The 95% exceedance drafts are compared in the existing and deepened channel to represent a large ship that occurs less frequently.

760-JK-400-EN81

Comment: *Ship Forces on the Shoreline of the Savannah Harbor Project, p. 43, Table 15: The table heading indicates that it contains return velocity information, however, this data is absent from the table. Table 15 should be updated to include this missing information for public review purposes.*

Response: The table reference to return velocity was a typo. Return velocity at Tybee is not an issue due to the distance from the channel to the shoreline in that location.

760-JK-400-EV138

Comment: *The June 2010 forecast of vessel calls appearing in Appendix B of the Savannah Harbor Expansion Bank Erosion Study Update indicates that fewer vessels will call under the proposed conditions (completed project) than the current conditions (maintaining the 42 ft depth). If this proves to be true, then the chances for invasive species to enter the harbor in ballast water are decreased along with the decrease in vessel calls. The analysis of this subject seems appropriate as well as the conclusion that the vessels entering the Port of Savannah will have to adhere to State and Federal laws regarding ballast water regard less of the depth.*

Response: Concur that if fewer vessels call at the port, the risk of the introduction of invasive species decreases.

Page 6-21

760-JK-400-EV139

Comment: *The 2007 report from the Atlantic Sturgeon Status Review Team lists a seasonal restriction on dredging in the Savannah River between March 16th and May 31st. The DEIS does not appear to address this seasonal restriction in the document.*

Response The seasonal dredging restriction referred to in the 2007 report references the dredging restriction for Striped bass, not Atlantic sturgeon. This dredging restriction is discussed in several places in the EIS.

760-JK-400-EV140

Comment: *The DEIS lacked information that is critical to make an assessment on listed and candidate species, did not substantiate its determination of non-significant impacts when adverse impacts were acknowledged, did not appear to pursue studies to collect the necessary information, and relied upon a significant amount of unsubstantiated assumptions and conclusions to make its determinations. If the assumptions and conclusory statements were based on peer-reviewed or project related studies, the DEIS*

should cite that source as a basis upon which the assessment occurred. Furthermore, the assessment should include all potential impacts from the project, including omitted impacts, e.g., increased boat strikes and wave erosion due to larger ships accessing the port; disruption of habitat continuity; disruption of habitat accessibility; and mitigation impacts.

Response: The discussion on threatened and endangered species is in compliance with ESA. This information (and appropriate citations) is contained in FEIS-Sections 4.09 and 5.11 as well as Appendix B and Appendix Z.

760-JK-400-EV141, 760-JK-400-EV142

Comment: *The shortnose and Atlantic sturgeon are examples of the shortcomings of the assessment of impacts to threatened and endangered species. Shortnose sturgeon and Atlantic sturgeon were grouped together for purposes of assessing impacts from the project. The DEIS justifies the grouping due to their "similarities in habitat use, distribution throughout the proposed action area, foraging behavior and prey base, and subsequent risk of take relative to dredging and trawling operations..... No citations or other reference information was provided to substantiate this decision to group the species. However, other information provided in the DEIS provides information that contradicts the claim that the species are similar enough to group together for impact assessment purposes. For example, the DEIS states that Atlantic sturgeon primarily lead a marine existence and are therefore more likely to be impacted by hopper dredges than the more estuarine-based shortnose sturgeon. The DEIS states that shortnose sturgeon spawn 100 miles upstream of the project area, but also states that an Atlantic sturgeon larva was found 6.7 km (4 miles) upstream of the project impact area. This information not only suggests that shortnose and Atlantic sturgeon spawn in different areas, it also highlights the possibility that some larva may drift into the project area and may be affected by the upstream increases in salinity that would occur as a part of this project. Additional information should be collected to verify the actual location of Atlantic sturgeon spawning to ensure the project dredging and upstream movement of salinity and decreases in DO will not deleteriously impact Atlantic Sturgeon as its spawning habitat has not been adequately accounted.*

Response: See response to comments 760-JK-400-EV14, 760-JK-400-EV15, 760-JK-400-EV16.

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760-JK-400-EV143, 760-JK-400-EV144, 760-JK-400-EV145

Comment: *The impact summary to the Essential Fish Habitat in Appendix S, acknowledges that the proposed action would have adverse impacts on shortnose sturgeon, an endangered species. Nonetheless, the DEIS dismisses the adverse impacts as non-significant without providing sufficient detail as to how the non-significant status had been applied. The DEIS does not provide an accurate representation of impact. The DEIS states that "the maximum expected reductions in habitat acreage range [sic] of about 11.0 percent or 439.0 acres [with mitigation], depending on channel depth, life stage, and season." First, there is apparently an error in the DEIS narrative as indicated by the out-of-place 'range.' Second, this estimate fails to accurately sum the decreases in habitat that will still be realized even with mitigation. Table 8-13 of Appendix B states that 439 acres of January habitat will be lost for adult shortnose sturgeon alone. An additional 113 acres of August habitat will be lost for adult shortnose sturgeon and another 28 acres of January habitat will be lost for juvenile shortnose sturgeon. The estimated loss in habitat is a minimum projection because it does not include lost habitat that is used during other seasons. Also, shortnose sturgeon use different habitats based upon life stage and*

season. Thus, estimates of habitat loss by month and life stage may be representative, but are not conc1usory as to the total amount of habitat lost.

Response: This section only provides summary information. The details are provided in Appendices C and S [which was referenced in the summary statement].

First, the sentence indicated with the out of place 'range' will be changed in Appendix B as follows: "For Shortnose sturgeon, the maximum expected reductions in habitat acreage would be approximately 11.0 percent [439.0 acres], but actual losses depend on selected channel depth, life stage, and season.

Second, an examination of Table 5-36 and Appendices B and C reveal that project impacts [with mitigation] on the Shortnose sturgeon are already adequately discussed.

Appendix B includes an adequate assessment of sturgeon habitat which would be impacted by SHEP.

760-JK-400-EV146

Comment: *The DEIS also fails to represent impacts to shortnose sturgeon based upon sediment impacts from the project even though substrate preference information is available and substrates will be affected by the project. For example, the 1998 NMFS Final Shortnose Sturgeon Recovery Plan states that "juveniles in the Savannah River use sand/mud substrate in 10-14 m depths (Hall et al. 1991). Furthermore, the Atlantic sturgeon, for which the DEIS has claimed the shortnose sturgeon is an adequate surrogate for purposes of impact assessment, occupies habitats dominated by gravel and sand substrates (NOAA Fisheries Office of Protected Resources webpage). Presumably, dredging will alter the depth and substrate composition of the river. This impact should be accounted for and quantified in the DEIS.*

Response: In Appendix B Section 8.02.7 [Sturgeon (Atlantic and Shortnose)], the following statement is made: "These migratory ***subadults, as well as adult sturgeon,*** are normally captured in shallow (10-50m) near shore areas dominated by gravel and sand substrate (Stein *et al.*, 2004)" ***(bold italics added for emphasis)***. This quote is from the discussion on Atlantic sturgeon and is dealing with subadults and adults, not juveniles. The Hall et al., 1991 quote indicated in the comment is addressing juveniles.

The Corps followed incremental analysis procedures indicated by the Fisheries Interagency Coordination Team. Those procedures did not include specific factors for impacts based on "sediment impacts", including substrate. Similar sedimentation is expected to occur in the navigation channel for both the with and without project condition. Discussions are included in both Appendix B and NMFS' Biological Opinion included in Appendix Z.

760-JK-400-EV147, 760-JK-400-EV148, 760-JK-400-EV149

Comment: *Moreover, the habitat losses may have been further underrepresented by the habitat suitability modeling in the DEIS due to inaccurate assumptions regarding dissolved oxygen levels necessary for habitat use. For example, a baseline level of 3.0 to 4.0 mg/l of dissolved oxygen was used to determine if habitat was available for juvenile and adult shortnose sturgeon. This is a minimum level at which the agencies determined shortnose sturgeon can survive based on laboratory studies of survival. However, these levels do not necessarily indicate the dissolved oxygen level that is necessary for foraging, resting, and moving. For example, the Collins et al. (2001) study of shortnose sturgeon habitat use, cited in the DEIS, reported minimum mean dissolved oxygen levels of 6.36 and 6.45 in areas where adults and juveniles were found, respectively. In the Appendix N documentation, Prescott Brownell, from NMFS requested that a range of suitable habitat thresholds be used for modeling habitat availability.*

The agency panel then redacted his comments from the record without providing an adequate basis for the redaction. The panel decided the current methods were "acceptable for now." This comment would suggest that additional work would be necessary in the future in order to adequately asses the impacts. The narrative does not provide adequate discussion as to why the pass/fail approach was more adequate than the range approach suggested by Mr. Brownell. Moreover, there is no indication of future actions that would be necessary or that any future action was taken in order to compensation for the inadequacies of the pass/fail analysis.

Response: The observed dissolved oxygen values 6.36 and 6.45 mg/l are just that, observed values, not life requisites. The baseline levels indicated in the EIS remain valid.

The habitat suitability criteria for the Shortnose sturgeon were developed by the Fisheries Interagency Coordination Team, which included Dr. Collins and Mr. Brownell. The criteria were based on professional expertise/experience, a review of pertinent literature, and site-specific data for the Savannah River.

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760-JK-400-EV150, 760-JK-400-EV151

Comment: *The DEIS also mentions mitigation, but does not accurately quantify the acres of impact or the quantity of mitigation area with the exception of newly provided access to 20 miles of river upstream of the New Savannah Bluff Lock and Dam at Augusta, Georgia. The DEIS fails to describe the habitat upstream of the dam, its adequacy for sturgeon habitat, its past use by sturgeon, or the successful use of fish ways by shortnose or Atlantic sturgeon. Spawning habitat for shortnose sturgeon in the Savannah River has been documented by Hall et al. (1991) as areas will gravel/sand/log substrate in curves in the Savannah River. Furthermore, the New Savannah Bluff Lock and Dam are located on or about the fall line. The NOAA Atlantic Sturgeon Fact Sheet states that Atlantic sturgeon spawn between the fall line and salt front, suggesting Atlantic sturgeon would not benefit from the proposed mitigation measures. Thus, the use of the fish passage structure as adequate mitigation has not been shown to be sufficient to mitigate the intensity and extent of impacts to shortnose and Atlantic sturgeon.*

Response: The following habitat information was not available when the DEIS was published. However a discussion has been added to FEIS-Appendices B and C.

In the 20-mile study area [Augusta Shoals/Savannah Rapids upstream of the New Savannah Bluff Lock and Dam] substrate data were collected at 57 sites. Forty percent of the sites had a substrate type[s] considered suitable for sturgeon spawning (NMFS 2007) whereas the combined frequency of marginally suitable sites was 37%. The remaining sites [33%] had unsuitable substrates.

Benthic substrate frequency in Augusta Shoals study area

Class	Benthic substrate	SI[1]	Number of Sites	Frequency (%)
1	Mud, soft clay/fines	0.0	0	0
2	Silt, sand (diameter < 2.0 mm)	0.0	7	12
3	Sand, gravel (diameter > 2.0 mm to < 64 mm)	0.5	0	0
4	Cobble/gravel (diameter > 64 mm to < 250 mm)	1.0	3	5
5	Boulder (diameter 250 mm to 4,000 mm)	0.8	20	35
6	Bedrock w/ fissures w/ gravel/cobble mixtures	0.6	21	37
7	Bedrock smooth w/ few fissures or gravel	0.2	6	11

[1]1.0 indicates highest suitability; 0.0 the lowest.

The following link contains the full report of the investigation of Shortnose sturgeon spawning habitat in the Savannah River [Georgia and South Carolina]: http://www.sas.usace.army.mil/plnew.html

In the upper mid-west US, Lake sturgeon have been observed passing both constructed and natural rapids covering an entire river width. Some of these observations were at lesser water depths than are proposed (3.5 to 5.5 feet) for the fish passage at the New Savannah Bluff Lock and Dam (Aadland 2010). The Lake sturgeon is a larger species than the Shortnose sturgeon, so physical passage of the latter should not pose a problem. Adaptive management, attraction flow measures, cost estimates/commitments, and monitoring are described in detail in Appendix D. Post-project, the District would monitor passage of Shortnose sturgeon across the structure to ensure it performs successfully (Appendix D).

The fall line is not a discrete boundary within the river. Instead, it is a transition zone marking the retreat/advance of sea level/geological shorelines. Unless there is specific evidence to the contrary, appropriate reaches within the entire fall line zone would become available for spawning/foraging after construction of the fish passage.

760-JK-400-EV152

Comment: *4.06.1. Invasive Species, p. 4-43, 2nd paragraph: The document should cite the source of the text used for this paragraph. The text appears to be taken from the EPA's Ballast Water Fact sheet found on the Agency's website.*

Response: A reference has been added to the FEIS-Section 4.06.1 regarding invasive species and their relationship to ballast water.

760-JK-400-EV153
Comment: *4.06.1. Invasive Species, p. 4-44, 2nd paragraph: The document states that the Marine Extension Service was "expected to release an Invasive Species Plan for the State of Georgia later in 2008." This document was finalized in October 2009 and is available from the Marine Extension Service's website. The text should be updated to include this fact and to include information contained in the Plan pertinent to invasive species control in ballast water for this project.*

Response: The text in Section 4.06 has been revised to reflect the October 2009 final report.

760-JK-400-EV154
Comment: *4.06.1. Invasive Species, p. 4-44, 4th paragraph: The document should cite the source of the text used for this paragraph. The text appears to be taken from the USCG's Aquatic Nuisance Species Website.*

Response: Section 4.06 has been revised to reflect the source of this information as the website of the United States Coast Guard [Aquatic Nuisance Species].

760-JK-400-EV155
Comment: *4.06.1. Invasive Species, p. 4-44, 5th paragraph: The document states the mandatory practices which must be applied by "all vessels with ballast tanks on all waters of the US." It should be noted that crude oil tankers engaged in coast wide trade, DOD and Homeland Security vessels, and vessels operating exclusively within one COTP zone are excluded from these regulations.*

Response: Section 4.06 has been revised to note that there are some limited exemptions to the ballast water management requirements.

Page 6-24

760-JK-400-EV156
Comment: *4.06.1. Invasive Species, p. 4-45, 5th paragraph: The words "per cent" should be changed to the word percent.*

Response: The text in Section 4.06 has been revised.

760-JK-400-EV157
Comment: *6.08 Threatened and Endangered Species Act - Pg 6-2, 8th para – "A Biological Assessment evaluating the potential impacts of the proposed action on endangered and threatened species has been prepared (Appendix B)". Impacts to adult Shortnose sturgeon habitat is estimated by the Corps to range from 20 to 220 acres, and for juvenile sturgeon from 86 to 373 acres, depending on the channel depth alternative selected. Under the Endangered Species Act, why would the loss of this habitat not be considered a "take", and thus a violation of the Act? Since Atlantic sturgeon also inhabit the Savannah Harbor, and have recently been proposed for listing by NMFS as endangered, the same question applies to that species.*

Response: "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect an endangered species. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of ESA Section 7(b)(4) and Section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not to be considered prohibited taking provided that such taking is in compliance with the terms and conditions of the

Incidental Take Statement in the BO. The incidental take statements for both Shortnose and Atlantic sturgeon can be reviewed in the BO prepared by the NMFS which is included in Appendix Z.

760-JK-400-EN82

Comment: *Has groundwater use in the Upper Floridan aquifer decreased in Georgia and South Carolina as assumed in the model and analysis?*

Response: According to USGS data (USGS SIR 2009-5251), groundwater withdrawals from the Upper Floridan aquifer in the "Red Zone" counties of Chatham and Effingham in Georgia, and Beaufort and Jasper Counties in South Carolina [2000/2004] were as follows [high/low in mgd]:

Chatham	68.15 / 67.00
Effingham	4.62 / 6.85
Jasper	3.34 / 2.65
Beaufort	21.44 / 19.74

Data from the City of Savannah [city wells only] indicate that withdrawals from 2005 through 2010 have remained fairly constant [from 23.5 to 25.5 mgd].

See also response to comment 760-JK-400-EN03.

760-JK-400-EN83

Comment: *Did groundwater withdrawals from the Upper Floridan aquifer decrease by at least 5 MGD between 2006 and 2008 in Georgia?*

Response: According to USGS data (USGS SIR 2009-5251), groundwater withdrawals from the Upper Floridan aquifer in the "Red Zone" counties of Chatham and Effingham in Georgia, and Beaufort and Jasper Counties in South Carolina [2000/2004] were as follows [high/low in mgd]:

Chatham	68.15 / 67.00
Effingham	4.62 / 6.85
Jasper	3.34 / 2.65
Beaufort	21.44 / 19.74

Data from the City of Savannah [city wells only] indicate that withdrawals from 2005 through 2010 have remained fairly constant [from 23.5 to 25.5 mgd].

See also response to comment 760-JK-400-EN03.

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760-JK-400-EN84

Comment: *Groundwater use trends and restrictions by GAEPD are discussed in various sections of the GRR and supporting appendices. There appears to be a lack of corresponding discussion on groundwater use and restrictions by SDHEC in South Carolina.*

Response: The supplemental studies for the Floridan aquifer indicated that pumping in Savannah was the driving force behind the cone of depression in the coastal area. The states, including SC DHEC, did not identify water use restrictions in South Carolina as a useful tool to ameliorate salt water intrusion issues. According to USGS data (USGS SIR 2009-5251), groundwater withdrawals from the Upper

Floridan aquifer in the "Red Zone" counties of Chatham and Effingham in Georgia, and Beaufort and Jasper Counties in South Carolina [2000/2004] were as follows [high/low in mgd]:

Chatham	68.15 / 67.00
Effingham	4.62 / 6.85
Jasper	3.34 / 2.65
Beaufort	21.44 / 19.74

Data from the City of Savannah [city wells only] indicate that withdrawals from 2005 through 2010 have remained fairly constant [from 23.5 to 25.5 mgd].

See also response to comment 760-JK-400-EN03.

760-JK-400-EN85

Comment: *There has been a great deal of effort in characterizing the pore water for the Miocene confining unit and underlying Floridan aquifer. One key question evaluated in the DEIS is the rate of vertical movement through the clay, in particular the area near the mouth of the harbor where I) the confining unit is thinnest; 2) sunace water salinity is greatest; 3) paleochannels are abundant. Were any efforts made to age date the pore water and underlying groundwater from the Upper Floridan aquifer as a more direct measure of transport time?*

Response: No attempt was made to date confining unit pore water or groundwater from the Floridan aquifer. Such analysis was not identified by the resource agency groundwater experts as being critical information.

760-JK-400-EN86

Comment: *1. The groundwater model was used in place of the step drawdown test. Given that the model is developed from available field data and assumptions on characteristics of the aquifers and confining units, it is not at all clear how the model replaces the field test.*

Response: The groundwater modeling results were not intended to replace those of the field pumping test. Instead, the model simulations were performed to validate the previous results obtained from field pumping tests conducted at the Tybee Island test well cluster. The Tybee Island and model simulation tests found that a full aquitard test would require months to pump the necessary volume of water [millions of gallons] from the aquifer. Since little meaningful data would be acquired, this test was not conducted.

760-JK-400-EN87

Comment: *2. It would seem more reasonable to use the model to design an adequate aquitard test that may or may not include pumping directly from the Floridan aquifer, rather than use the model to try and disprove the need to conduct a " trial step-drawing" test altogether.*

Response: The groundwater modeling was not intended to replace the field pumping test. The model simulated pumping test was performed to check the validity of previous results from pumping tests conducted at the Tybee Island test well cluster. Since the Tybee Island tests and the model simulations indicated a full aquitard test would likely require months to pump millions of gallons of water from the aquifer and would acquire little meaningful data, a full aquitard testing was not warranted.

760-JK-400-EN88

Comment: *While the overall conclusion that the impacts to groundwater are not expected to be significant appear reasonably well substantiated, quantifying the increased flow through the confining unit to 3-4 percent does not appear to be well substantiated given the uncertainty in leakance though this unit.*

Response: The intent of groundwater modeling was to bracket a range of vertical hydraulic conductivities which would produce a *'best fit'* with observed/ simulated groundwater heads [and gradients] on a calibrated USGS groundwater scale. Notably, simulated migration of chlorides through the Miocene confining layer appear to be most sensitive to the vertical hydraulic conductivity assigned to the confining layer. After deliberation, a range for vertical hydraulic conductivity [which *best-fit* actual data] was chosen. As verification, both lower and higher conductivity values produced unrealistic heads and chloride concentrations when compared to actual data. [As discussed in the General Re-Evaluation Report for SHEP, Appendix C: Engineering, Supplemental Studies, Potential Ground-Water Impacts to the Upper Floridan Aquifer, June 2007].

Applying the derived range of vertical hydraulic conductivities to the proposed deepened channel length yielded a potential increase of 3% to 4% in vertical flow through the confining clay unit. Importantly, this increased flow applies **only** to the confining unit below/along the actual width of the deepened channel.

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760-JK-400-EN89

Comment: *These potential mitigation measures, in particular the last two, have significant ramifications on water use in the region by reducing overall water availability. The ability to acquire permitted rights in Georgia and presumably South Carolina, including existing permitted rights without replacing them with an alternate source raise significant questions regarding the viability of these conceptual alternatives.*

Response: The potential mitigation alternatives referred to in the comment were conceptual, as stated in the preceding paragraph of the GRR. As was also noted later in the GRR (Section 9) and EIS (Section 5), neither of the measures of concern was adopted in the proposed mitigation plan.

760-JK-400-EN90

Comment: *There are abundant references to past supporting work but there is a lack of specific references to the relevant documents in the DEIS and GRR. This lack of references makes evaluating the supporting information difficult.*

Response: The report has been revised to include the updated chloride impacts study.

760-JK-400-EN91

Comment: *GRR (10Nov10), Page 93, Section 5.7.2: A general discussion of global sea level rise and its expected effect on salinity is provided. However, it is not clear if or how the effect of global sea level rise was evaluated in conjunction with the channel deepening, in particular as it relates to chloride levels at the Abercorn Creek intake as well as other intakes on the river. Specifically, it is not clear how the channel deepening will affect the timing and magnitude of salinity intrusion associated with sea level rise.*

Response: Our analysis of sea level rise impacts on wetlands showed a negative relationship; that is, the greater the sea level rise, the lesser the relative impact of the project (increased salinity) on wetlands. With regard to impacts at the City's water intake, construction of the raw water storage impoundment would mitigate for expected increases in salinity at the intake, including those associated with sea level rise. The Corps also considered potential project impacts on Beaufort-Jasper Water and Sewer Authority's intake on the Savannah River. Since that intake is located well upstream of the City of Savannah's water intake, the Corps expects no increases in salinity due to impacts of the project. The Corps also evaluated the project effects on the magnitude of sea level rise with hurricanes. The analysis indicated that the increases would be small and within the margin of error of Chatham County's hurricane planning guidelines.

760-JK-400-EN92, 760-JK-400-EN93, 760-JK-400-EN94

Comment: *Chloride Model Analysis:*

1. It is not clear what the chloride results presented from the EFDC model used to evaluate potential chloride impacts represent:

- *Average chloride concentrations over a river reach and/or over time?*
- *Cross-section maximum chloride levels?*
- *Tidal maximum?*
- *Another metric?*

2. It is not clear what pumping rate was used in the assessment:

- *Current rate is described as 30 MGD.*
- *Plant capacity is variously described as 62.5 MGD and 75 MGD.*

3. GRR (10Nov10), Page 166, Section 9.8 states that the rate of surface water withdrawal at the Abercorn Creek intake "has been increasing substantially over recent years as the western part of the County has grown rapidly. In addition, the City has been directed by the Georgia EPD to reduce groundwater withdrawals by 11 MGD requiring more surface water use." It is not clear how the expected increase in use at the intake was considered as part of the chloride impact evaluation.

Response: The final reports include an updated chloride impact analysis. The District uses average daily chloride concentrations calculated by the EFDC model, as well as hourly chloride concentrations. That model was calibrated to daily average chloride numbers provided by the City of Savannah. The EFDC model can provide the chloride numbers for any cell within its model grid, but the primary points of interest are the City's water intake on Abercorn Creek (provided most of the calibration data for the model) and the USGS gage at I-95 (used as part of the model calibration). Chloride levels at the City's water intake are the focus of the chloride impact assessment. No other natural resources would be impacted by those chloride concentrations.

As noted in EIS-Section 5.02 , the City initially indicated to the District that it was regularly treating about 30 MGD at the water treatment plant. Later, the City clarified that the plant capacity was 62.5 MGD. Their water withdrawal permit from GA DNR-EPD is for 50 MGD. The analysis of impacts to the water in Abercorn Creek is not sensitive to the amount withdrawn from the river by the City. Their withdrawal is a minor amount in relation to the volume of water in Abercorn Creek that moves past their intake. GA DNR-CRD has stated that if mitigation is needed for adverse impacts to the intake water, the Corps should mitigate at the plant capacity of 62.5 MGD. The 75 MGD capacity noted in the comment is the design capacity for the raw water pumps and not the plant capacity. The difference between the pump capacity and the plant capacity is the rate used to refill the proposed mitigation storage.

As groundwater withdrawals are curtailed by the State, there would be greater reliance on surface water supplies. However, the current intake rates at the Abercorn Creek facility are only a small fraction of the total flow [even during drought periods]. The withdrawal rates could increase to their permitted levels without resulting in adverse environmental impacts.

Page 6-27

760-JK-400-EN95, 760-JK-400-EN96

Comment: *Available input data relating to chloride/salinity changes over tidal cycles and over cross-sectional areas of critical river reaches appear to be sparse to absent. There is reference to proposed or on-going chloride / salinity monitoring, however these does not appear to be any detail on this monitoring effort. Given the highly stratified nature of the chloride distribution in conjunction with tidal effects, understanding the temporal and spatial distribution throughout the estuary may prove critical to evaluating peak chloride levels at the Abercorn Creek intake. Clarification on the existing data and any proposed monitoring would be useful in evaluating potential future impacts at the intake.*

Response: A report that describes the additional data that was collected is included in the final report (GRR-Engineering Appendix, Supplemental Materials). Field data do not show chloride stratification in the vicinity of Abercorn Creek. Stratification is a factor in the lower harbor and upstream through Houlihan Bridge. However, as the river shallows in the vicinity of I-95, the chloride stratification becomes less of an issue. This lack of stratification led to the non-selection of one of the alternative mitigation proposals – which was to place a submerged sill at the entrance to Abercorn Creek to inhibit the upstream movement of the higher salinity bottom layer of water.

A report that describes the additional data that was collected is included in the final report (GRR-Engineering Appendix, Supplemental Materials). EIS-Appendix D describes the post-construction monitoring that would be performed.

760-JK-400-EN97

Comment: *The DEIS evaluates potential effects of chloride/salinity changes at the Abercorn Creek intake. Have potential impacts at other intake structures been evaluated?*

Response: There are no other fresh water intake structures in the vicinity of the Savannah facility. The Beaufort-Jasper Water Authority intake is located further upstream, i.e., closer to the location of the potential alternate intake site. Weyerhaeuser operates an intake at its plant site adjacent to Houlihan Bridge, but it withdraws brackish water for use as once-through cooling water and for firefighting. Although this water source will incrementally increase in salinity, the system was designed to be used with brackish water.

760-JK-400-EN98

Comment: *As a potential mitigation measure, cost for a supplemental water intake approximately 10-miles upstream from the current intake was presented in a document titled "Review and Costs for Supplemental Water Supply - City of Savannah Intake at Abercorn Creek" dated 17 Sep 2009. It is not clear if environmental impacts from this proposed new intake have been evaluated, including the potential in increase salinity in Abercorn Creek further upstream from the current intake location.*

Response: Even at a rate of 62.5 mgd [maximum permitted capacity], the withdrawal is less than 2% of the river flow [Clyo gage]. It is not expected that the location of the alternate intake would have any

measurable environmental impact beyond its initial construction. Additionally, since this alternative was not selected, any potential additional environmental impacts are a moot point.

760-JK-400-EN99

Comment: *DEIS, Page 5-55, Section 5.2.4 - Side-bank storage reservoir options were considered in the GRR. The preliminary design size of the reservoir was to hold a 1-week supply of raw water. It appears for the purpose of evaluating potential locations for the side-hank reservoir a 210 MO capacity was assumed, corresponding to a 30 MOD demand. However, as stated in this section, the plant 'S capacity is 62.5 MOD. In the GRR Attachment 1.1.7, the plant capacity is stated as 75 MGD, 20-percent more than the 62.5 MOD capacity provided in the DEIS. Also, as stated in Section 5.2.3, page 5-51 of the DEIS as well as in appendices to the GRR, demand has increased significantly due to increased growth in the western part of the County. It is also noted in the GRR appendix 1.1.36 that groundwater use from the Upper Floridan aquifer is being cut back by OAEPD, it is not clear if this reduction in groundwater use corresponds to an increase in surface water demand.*

Response: Larger withdrawals of surface water at the City's I&D plant is expected due to groundwater use reductions. The I&D plant has a capacity that is roughly twice its present level of operation. Its withdrawal permit from the State of Georgia is also substantially higher than its present operation. The 75 MGD capacity referenced from the GRR attachment is pump station plant capacity, not treatment plant capacity – which is 62.5 MGD.

760-JK-400-EN100

Comment: *A side bank reservoir with a 210 MG capacity provides only 3 1/3 days of capacity at a plant capacity demand of 62.5 MGD. This is less than half of the stated goal of I-week supply of raw water.*

Response: The initial designs considered would have provided 7 days of water at the current water use rate of 30 MGD. The revised modeling and storage requirement computations account for the hourly variation in chlorides during each day, a significant difference from average daily chloride concentration. The current water impoundment design is intended to match the 62.5 MGD plant capacity.

760-JK-400-EN101

Comment: *It is not clear what analysis was completed to determine that 1-week duration was adequate to address an increase in chlorides. Section 5.2.4, page 5-55 references a "new moon" receding, was this the extent of the evaluation? Were any historical durations considered?*

Response: Chloride levels at the City's intake vary depending on both river flow and tidal conditions. Higher chloride levels occur with low river flows (drought conditions) and large tidal ranges (spring tides). It is well understood that there is a relationship between tides and salt wedge penetration upstream in the estuary. However the current design is based on historic flow and tide data. Withdrawal from the proposed raw water storage impoundment is projected to occur intermittently for up to two weeks.

760-JK-400-EN102
Comment: *Can they accommodate a 440 MG capacity (1-week at 62.5 MGD)?*

Response: The initial designs considered would have provided 7 days of water at the current water use rate of 30 MGD. The raw water storage impoundment and pumps have been redesigned to draw from storage during high tide during chloride intrusion events and partially refill during low tide when chloride concentrations in the river are acceptable.

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760-JK-400-EN103
Comment: *Has an equivalent of a Phase I ESA been completed to establish past Recognized Environmental Conditions?*

Response: The specific tracts have not yet been identified. The general area has been selected and the District has made initial assessments of potential sites to identify items which could screen out a tract and make it undesirable for use as mitigation for this project. An equivalent of a Phase I Environmental Site Assessment would be performed prior to acquisition of the individual properties.
760-JK-400-EN104
Comment: *Has a screening level evaluation for wetlands, threatened and endangered species, historic resources, and similar issues that significantly impacts availability of properties been completed?*

Response: Yes, screening level evaluations of wetlands and threatened and endangered species have been performed of properties considered for acquisition. No resource was identified that would diminish the expected ecological value of a site or preclude its intended use as mitigation. Additional studies would be performed at the time of acquisition to ensure no issue is present that would preclude a site's use as mitigation.

760-JK-400-EN105
Comment: *What is the proposed process that would implement construction of a side-bank reservoir? How will availability of potential sites be maintained?*

Response: This alternative is not being considered for incorporation into the project due to the high real estate and maintenance costs that would be required.

760-JK-400-EN106
Comment: *DEIS Appendix C - Mitigation Planning; page 9. The accuracy of the chloride model is not sufficient to support the stated increase in chloride levels at the City's intake (e.g.; 0.34 percent during very low flows). It is worth noting that the relatively low accuracy of the model is the stated reason the USACE evaluated various mitigation alternatives that included relocating the pump intake and use of side-bank storage.*

Response: A report that describes the additional data that was collected and analyses that were performed is included in the final report (GRR-Engineering Appendix, Supplemental Materials). The model used to estimate future chloride levels has been revised substantially from that which was included in the draft report. The cited percentage increase in chloride levels is no longer applicable. All engineering models contain some uncertainty. The Corps is aware of those uncertainties when it makes decisions based, in part, on information from such models.

760-JK-400-EN107, 760-JK-400-EN108, 760-JK-400-EN109

Comment: *The water quality-related sections of the DEIS include detailed assessments of the project's impacts on dissolved oxygen and chloride concentrations. The analysis relied on models and field testing of mitigation techniques. Much of this information is useful for identifying the potential water quality impacts and mitigation strategies. However, the DEIS understates that uncertainty and risks associated with both the water quality impacts and the proposed mitigation. The DEIS also does not explicitly consider the manner in which the water quality of the harbor is currently being managed and regulated. For example, the DEIS does not address impact of the project on the 20 I 0 draft TMDL for oxygen-demanding substances, nor the related regulatory framework for achieving full compliance of water quality standards.*

Response: The risks and uncertainties of the proposed dissolved oxygen system for Savannah Harbor are fully discussed in the Risk and Uncertainty Analysis [Appendix Q, pages 9-11]. Specifically, an uncertainty analysis of the water quality model was used to assess its reliability. An oxygen demonstration trial verified the efficacy of the Speece Cones to add oxygen to these estuarine waters. Extensive post-construction monitoring would identify whether initial predictions regarding oxygen levels are correct. Given the depth of analysis of this matter, there is little risk to decision-makers regarding the dissolved oxygen issue. Post-project, the adaptive management plan provides a means to change the oxygen injection system, should that be necessary. This could range from increasing the amount of injected oxygen, modifying the oxygen injection equipment, or adding injection sites.

EIS-Section 4.02.2 discusses Surface Water, including South Carolina and Georgia Water Quality Standards, the City of Savannah Water Intake on Abercorn Creek, and the Georgia and South Carolina Water Quality Certifications for the existing Savannah Harbor Navigation Project. These sections identify areas that do not meet the existing water quality standards and the TMDLs that EPA has prepared for the harbor area (fecal coliform and dissolved oxygen). EIS-Section 5.02 discusses impacts to water quality, including dissolved oxygen and chlorides at the City of Savannah's water intake.

The dissolved oxygen analysis for SHEP consisted of model simulations which compared existing to deepened [post-project] conditions. As anticipated, dissolved oxygen in the water column is projected to decrease after deepening without mitigation. This difference is due to salinity changes and resultant stratification. That is, the deepened channel allows the salt wedge to move farther upstream which expands the area of stratification. This, in turn, results in less oxygen reaching the bottom layers of the water column in those locations. The SHEP model simulates this effect accurately. However, all models have a degree of intrinsic risk. This uncertainty is examined in the report, "Development of the Hydrodynamic and Water Quality Models" dated January 2006. Mitigation for the identified potential reductions in dissolved oxygen focused on injecting oxygen at three harbor locations [Front River near IP's waste discharge, Back River upstream of Tidegate, and near the Georgia-Pacific plant on the Savannah River (upstream of I-95)]. As emphasized previously, the oxygen system would only mitigate the effects of post-project deepening [with some small improvements]. However, it is not sufficiently robust to inject enough oxygen so that the harbor would meet water quality standards.

The TMDL model is very similar to the SHEP model. In fact, EPA used the SHEP model for its TMDL application with some minor modifications. The 2010 Draft TMDL was based on the water quality standard which is basically a deficit of 0.10 mg/L in both Georgia and South Carolina. The deficit is calculated using "natural" conditions coupled with the amount of point and nonpoint source load necessary to deplete the deficit. For the 0.10 mg/L DO deficit, the point source TMDL calculated values were essentially the same for both the existing condition and the 6-foot deepening model runs. Therefore, since the dissolved oxygen mitigation for harbor deepening brings the dissolved oxygen

concentrations back to existing conditions, the point source reductions to meet water quality standards should remain unchanged.

The impacts of the SHEP on the dissolved oxygen regime in the Savannah Harbor estuary are discussed in the EIS and in greater detail in the GRR-Engineering Appendix. Based on the potential impacts to dissolved oxygen that would be caused by implementation of the SHEP, the project's mitigation plan includes an oxygen injection system. This system has been designed to remove the incremental impacts of the SHEP on the dissolved oxygen regime in the harbor. Due to the spacing of the system, the dissolved oxygen regime would be improved in over 90 percent of the estuary compared to existing conditions. The mitigation plan also includes various flow re-routing features in McCoy's Cut, Middle River, and Back River to supply that portion of the estuary with additional freshwater to reduce salinity levels. The project also includes a sill in Back River to reduce the amount of saltwater that would move up this tidal stream.

The risks and uncertainties of the proposed dissolved oxygen system for Savannah Harbor are fully discussed in the Risk and Uncertainty Analysis [pages 9-11]. Specifically, a risk analysis of the water quality model was prepared to predict post-project dissolved oxygen levels. As noted, an oxygen demonstration trial verified the efficacy of the Speece Cones to add oxygen to the harbor's estuarine waters. Extensive post-construction monitoring will determine whether initial predictions regarding oxygen levels are correct. Given the depth of analysis of this matter, there is little risk to decision-makers regarding the dissolved oxygen issue. Post-project, the adaptive management plan provides a means to change the oxygen injection system. This could range from increasing the amount of injected oxygen, modifying the oxygen injection equipment, or adding injection sites.

760-JK-400-EN110, 760-JK-400-EN111, 760-JK-400-EN112

Comment: *Much of the DEIS's analysis of potential water quality is based on models that are have some capability to predict "average" dissolved oxygen or chloride conditions, but limited ability to characterize the trends and variability in water quality. Therefore, it is unclear whether the models are accurately predicting the critical conditions for water quality protection. The DEIS provided little indication that model uncertainties were explicitly considered in either predicting impacts or designing mitigation strategies. This is an especially important concern for the mitigation of dissolved oxygen impacts, because the proposed technology is somewhat experimental and of highly uncertain benefit.*

Response: The models used to identify project impacts and develop mitigation plans were calibrated and validated [multiple times] prior to their approval. The approved, calibrated, and validated models are appropriate to identify project impacts and develop mitigation plans. The hydrodynamic and water quality models simulate the complex estuarine dynamics, viz., hourly, daily, and monthly tidal variations, salinity and dissolved oxygen dynamics together with their spatial distribution within the system. The models are applicable over a wide range of conditions including low and high freshwater flow. The model grid incorporates surveyed bathymetry and includes point and non-point pollution sources in the watershed. The grid extends from Clyo, Georgia (river mile 61, USGS stream gage 02198500) downstream through the harbor to Fort Pulaski (river mile 0), and out to 17 miles offshore [Atlantic Ocean]. The model was calibrated and validated using observed data from 1997 to 2006 and has been designed to meet the expectations of the SHEP Water Quality Interagency Coordination Tea, which followed in the footsteps of the modeling technical review group that was established in the late 1990s to oversee the development of a technically valid model for determining SHEP's environmental impacts and attendant mitigation features. The group included representatives from the District, US EPA Region 4, USGS, Georgia DNR-EPD, South Carolina DHEC, and private sector technical modeling experts [tasked with actual model development]. An independent technical review and uncertainty analysis have been

conducted on the models and the resulting comments/concerns were incorporated into the final version. Details regarding the hydrodynamic and water quality model development process, extensive reviews, and uncertainty analysis can be found in the report, "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project" dated January 2006 [included in the Supplemental Materials to the Engineering Appendix]. Acceptance letters from agencies involved in the modeling technical review group can be found in the document, "Correspondence Regarding Hydrodynamic & Water Quality Model Acceptability" [included the Supplemental Materials to the Engineering Appendix].

The model criteria and generated outputs were designed in concert with the stated needs/concerns of involved federal and state regulatory agencies. The oxygen injection system was never meant to elevate oxygen levels within the project area to the point that applicable water quality standards would be met. Rather, it was designed to make post-project dissolved oxygen levels equal to or greater than status quo conditions.

The dissolved oxygen estimates associated with operation of the Speece Cones are conservative, i.e., system was only assumed to function at 80% of its design efficiency. Moreover, two spare cones are included to provide for periods of maintenance/repair.

760-JK-400-EN113, 760-JK-400-EN114

Comment: *The pending dissolved oxygen TMDL is expected to have a major regulatory and economic impact on both industrial and municipal dischargers, many of which will have to make large capital investments to reduce wasteloads. It tends to be controlled by the location in which attainment of dissolved oxygen concentrations is most difficult. From this perspective, it would not matter if 97 percent of the system experienced oxygen improvements if the critical location(s) experienced degradation, or if the wasteload allocations to achieve full attainment would be lower. The DEIS currently does not allow this determination. Similarly, it is unclear if how the proposed mitigation approach would affect the ability of point source dischargers to use the same technology for TMDL compliance.*

Response: The impacts of the SHEP on the dissolved oxygen regime in the Savannah Harbor estuary are discussed in the EIS and in greater detail in the Engineering Appendix of the GRR. Based on the potential impacts to dissolved oxygen that would be caused by a harbor deepening, the project's mitigation plan includes an oxygen injection system. This system has been designed to remove the incremental impacts of the SHEP on the dissolved oxygen regime in the harbor. Due to the spacing of the system, the dissolved oxygen regime would be improved in over 90 percent of the estuary compared to existing conditions. The mitigation plan also includes various flow re-routing features in McCoy's Cut, Middle River, and Back River to supply that portion of the estuary with additional freshwater to reduce salinity levels. The project also includes a sill in the lower end of Back River to reduce the amount of saltwater that would move up this tidal stream.

While the injection of oxygen into an estuary [to improve dissolved oxygen levels] is a relatively new concept, the technology is not. Admittedly, the oxygen injection system is not designed to produce a large net increase in dissolved oxygen levels; rather, it is intended to raise oxygen levels approximately 0.36-0.43 mg/l. There is little objective doubt that the proposed systems can add oxygen to the project's estuarine waters. This position is verified by the results from a field demonstration of the subject oxygen injection equipment and subsequent water quality modeling of the effects of injection on dissolved oxygen levels [throughout the water column]. The monitoring plan provides for an evaluation of the predictions made with respect to the effects of harbor deepening on dissolved oxygen levels. The Transfer Efficiency Study would determine performance of the oxygen injection system. The

Adaptive Management Plan contains provisions to modify the oxygen injection system [as necessary]. These changes could include increasing the amount of injected oxygen, use of different equipment, altering the locations/number of the oxygen injections sites, etc. Since the system would restore oxygen levels to their present (without project) condition, the SHEP would have no effect on EPA's Draft TMDL. SHEP would have no impact on the ability of any point source discharger to use oxygen injection prior in their treatment plan prior to the discharge.

The applicability of this dissolved oxygen injection technology to/for other users of the Savannah River would be determined by the permitted discharger, the applicable State permitting agency (Georgia DNR-EPD or SC DHEC), and the US EPA.

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760-JK-400-EN115

Comment: *The analysis should be revised to (I) more accurately characterize the uncertainties associated with water quality impacts; (2) more explicitly consider those uncertainties in designing environmentally conservative mitigation strategies; and (3) specifically examine the impact on the project on water quality management of the estuary under the draft 2010 TMDL.*

Response: There is uncertainty attendant to all model predictions as detailed in EIS-Section 8 and Appendix Q. However, in this instance there was an extensive review/deliberation process prior to approval of the SHEP model. There was consensus this state-of-the-art platform is the best available tool for decision-making. Nonetheless, to minimize the impact of data variation, the SHEP tools were employed in a relative manner. Analysis of changes in the system's DO levels based on input adjustments (depths, loads, flows, etc.) was determined to be the most appropriate method to examine potential project impacts. Sensitivity analyses were completed on modeling parameters to help select the most appropriate rates for the model. Visual and statistical comparisons of simulated versus measured values showed acceptable model performance as detailed in the Tetra Tech SHEP Modeling Report and outlined in GRR-Section 7.4 of the Engineering Appendix.

The mitigation design is conservative [and has adaptive management tools available as a secondary safeguard against unforeseen conditions], and a specific objective of the mitigation design was to avoid affecting the 2010 Draft TMDL.

760-JK-400-EV158

Comment: *Affected Environment, p. 4-13, 2nd paragraphs: The description of South Carolina's dissolved oxygen criteria should include elements related to naturally-low oxygen conditions. These elements include a 0.1 mg/L allowable deficit from the natural dissolved oxygen concentration and a 10 percent allowable deficit in the event that it was demonstrated that resident aquatic species would not be adversely affected.*

Response: FEIS-Section 4.022 has been revised.

760-JK-400-EV159

Comment: *Affected Environment, p. 4- 13, section 4.02.04, 4th and 5th paragraphs: These paragraphs do not indicate any difference between class SA and SB waters, and should be revised to indicate the more stringent water quality criteria for class SA waters.*

Response: FEIS-Section 4.022 has been revised to indicate the difference between SA and SB waters.

760-JK-400-EV160

Comment: *Affected Environment, p. 4-14, section 4.02.04, 2nd paragraph: This paragraph incorrectly cites the Georgia D.O. criteria. The criteria listed have been revised, as noted in the third paragraph on this page, so should not be cited using the present tense.*

Response: FEIS-Section 4.022 has been revised to describe the revised D.O. standard.

760-JK-400-EV161

Comment: *Affected Environment, p. 4-13, 2nd and 3rd paragraphs: The description of Georgia's dissolved oxygen criteria should include elements related to naturally-low oxygen conditions. These elements include a 0.1 mg/L allowable deficit from the natural dissolved oxygen concentration and a 10 percent allowable deficit in the event that it was demonstrated that resident aquatic species would not be adversely affected.*

Response: FEIS-Section 4.022 has been revised to provide more detail about the Georgia D.O. standard.

760-JK-400-EV162

Comment: *Affected Environment, p. 4-14, section 4.02.04, 2nd paragraph: This paragraph mentions the 2006 TMDL for Savannah Harbor, but makes no mention that this TMDL is being revised by US EPA Region 4, and that a draft revised TMDL was issued in 2010. Statements such as " ... the Savannah River cannot accept anthropogenic oxygen demanding substances ... " are no longer true given the revised standards and updated TMDL Such statements should be modified to reflect the updated regulatory approach.*

Response: FEIS-Section 4.02.2 has been revised to discuss EPA's 2010 Draft D.O. TMDL.

760-JK-400-EV163

Comment: *Env. Consequences, section 5.2.1 (Dissolved Oxygen), Tables 5-19 through 5-23 and related discussion: The dissolved oxygen modeling results presented here-and the associated discussion--focus on the average dissolved oxygen concentrations in the bottom three layers of the 6-1ayer model. The more appropriate and environmentally conservative approach would be to examine the "critical" DO concentration; i.e., the lowest concentration of the 6 layers, which will usually occur in the bottom layer. This is because the state water quality criteria apply to entire water column without vertical averaging. The present approach underrepresents the project's impacts to oxygen.*

Response: In 2010, the District met with the EPA and the State natural resource agencies to discuss refinement of the water quality analyses and designs of the oxygen injection system. After deliberation, it was agreed that the water quality analyses should examine project effects in the lower half of the water column [three bottom layers of the model grid], rather than just the bottom grid layer. Further, the dissolved oxygen system design should focus its analysis on the bottom half of the water column. It was agreed that this tactic would yield a more representative [if conservative] picture of conditions throughout the water column. However, impacts to Shortnose sturgeon habitat were evaluated solely using values from the model's bottom grid layer. Therefore, these outputs [presented in the EIS] are more narrowly focused on bottom conditions because there is no averaging of values.

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760-JK-400-EV164

Comment: *Env. Consequences, p. 5-42, section 5.2.1 (Dissolved Oxygen): It is stated that "from a general perspective, the [project] would result in insignificant (1-2 percent) increases in the percentage of the harbor's waters with violations of existing water quality standards." It is unclear if this determination was correctly made by considering not only the 4-5 mg/L criteria, but also the maximum 0.1 mg/L allowable deficit from natural dissolved oxygen concentrations. Regardless, this is a misleading metric because of the widespread existing D.O. impairments. It is not recommended to use this metric to summarize general project impacts.*

Response: This section describes dissolved oxygen conditions without mitigation measures. A description of dissolved oxygen conditions with mitigation (Speece cones) is presented in Section 5.02.

760-JK-400-EV165

Comment: *Env. Consequences, p. 5-42, section 5.2.1 (Dissolved Oxygen): The analysis defines a "substantial" impact to dissolved oxygen as a reduction of 0.25 mg/L or more. Given the existing water quality impairment, any measureable reduction of dissolved oxygen is a water quality concern. It is not recommended to arbitrarily define a "substantial" impact or imply that only reductions of 0.25 mg/L or greater are a concern.*

Response: The terminology and degree of dissolved oxygen change deemed "substantial" were developed in coordination with the Water Quality Interagency Coordination Team. The referenced tables show dissolved oxygen conditions without any mitigation measures. A description of dissolved oxygen conditions with mitigation (Speece cones) is presented in Section 5.02.

760-JK-400-EV166

Comment: *Env. Consequences, section 5.2.1 and 5.2.2 (Dissolved Oxygen and related mitigation analysis}--general comment: There appears to be a disconnect between the manner in which the dissolved oxygen-related analysis was performed and the manner in which water quality is managed under existing regulations. USEPA has performed extensive water quality modeling and analysis to support the draft TMDL that was issued in 2010 and will be finalized in 2011. The TMDL is expected to have a major regulatory and economic impacts on both industrial and municipal dischargers, many of which will have to make large capital inveShnents to reduce wasteloads. The analys is in the DEIS does not allow the reader to determine whether the project would make full attainment of water quality standards easier or more difficult.*

Response: The dissolved oxygen analysis for SHEP consisted of model simulations that allowed comparison of existing to deepened [post-project] conditions. As anticipated, dissolved oxygen in the water column is projected to decrease after deepening. This difference is due to salinity changes and resultant stratification. That is, the deepened channel allows the salt wedge to move farther upstream, which increases stratification. This, in turn, results in less oxygen reaching the bottom of the water column. The SHEP model simulates this effect accurately. However, all models have a degree of intrinsic risk. This uncertainty is examined in the report, "Development of the Hydrodynamic and Water Quality Models" dated January 2006. Mitigation for the noted reductions in dissolved oxygen focused on injecting oxygen at three harbor locations [Front River near IP's wastewater lagoon, Back River upstream of Tidegate, and near Georgia-Pacific on the Savannah River (upstream of I-95)]. As emphasized previously, the oxygen system would only mitigate the effects of post-project deepening

[with some small incidental improvements]. However, it is not sized to inject enough oxygen to make the harbor meet State water quality standards.

The TMDL model is very similar to the SHEP model. In fact, EPA used the SHEP model for its latest TMDL application with only minor modification.

The TMDL was based on the water quality standard which is basically a deficit of 0.10 mg/L in both Georgia and South Carolina. The deficit is calculated using "natural" conditions coupled with the amount of point and nonpoint source load necessary to deplete the deficit. For the 0.10 mg/L DO deficit, the point source TMDL calculated values were essentially the same for both the existing condition- and the 6-foot deepening model runs. Therefore, since the dissolved oxygen mitigation for harbor deepening brings the dissolved oxygen concentrations back to existing conditions, the point source reductions to meet water quality standards should remain unchanged.

760-JK-400-EV167

Comment: *For example, the TMDL tends to be controlled by the location and time at which attainment of dissolved oxygen concentrations is most difficult. From this perspective, it would not matter if 97 percent of the system experienced oxygen improvements if the critical location experienced degradation, or if the wasteload allocations to achieve full attainment would be lower. The analysis should be revised to specifically examine the impact on the project on the critical cells that control wasteload allocations under the draft 2010 TMDL, under critical hydrologic/tidal conditions. This will allow determination of whether the project (with D.O. mitigation) would have a net positive or negative impact on water quality attainment.*

Response: The proposed oxygen injection system would effectively mitigate for reduced dissolved oxygen levels resulting from the proposed harbor deepening, but it would also have a minor positive incidental effect on the harbor's D.O. regime. Because the injection cones are located at different points in the harbor [see previous response and FEIS for details], the models predict there will be an incremental improvement in its overall water quality beyond that necessary to mitigate for SHEP [an increase in over 90 percent of the project effect's area when compared to the status quo]. Further, there is no evidence that SHEP [with mitigation] will affect any of the TMDL predictions [values] being made regarding existing point source loadings. For more details, on EPA's TMDL effort and/or its relationship to the SHEP [Section 4.02] and the noted dissolved oxygen mitigation measures [see Section 4.02 and Section 5.02, respectively].

760-JK-400-EV168

Comment: *Env. Consequences, section 5.2.2 (Mitigation for Impacts to Dissolved Oxygen) general comment: This section lacks detail with respect to the quantitative benefits of the mitigation on dissolved oxygen; i.e. it lacks the information corresponding to the tables in section 5.2. t. This is information is in the GRR Engineering Appendix, but it would be recommended to make section 5.2.1 and 5.2.2 consistent with regard to the type and level of detail of model results presented.*

Response: The model results presented in EIS-Sections 5.02 contain sufficient information for an engaged reader to make a reasoned decision about SHEP's impacts.

Page 6-31

760-JK-400-EV169

Comment: *Env. Consequences, section 5.2.1 and 5.2.2 (Dissolved Oxygen and related mitigation analysis) and Section 5 of Appendix Q (Risk and Uncertainty Analysis)—general comment: The Corps has inappropriately based its assessment of the dissolved oxygen model's capabilities on its ability to predict "'average" conditions, rather the critical conditions. Appendix Q of the DEIS (Risk and Uncertainty Analysis) describes how the dissolved oxygen model is relatively accurate for predicting the 50th percentile dissolved oxygen concentration and general spatial trends. However, it was also indicated that the model was much less accurate for predicting the variability of the dissolved oxygen concentration and the daily minima. DHEC concluded that the model has "limited ability to simulate the variability and trends in the data".*

Response: The hydrodynamic and water quality models employed for SHEP were developed through an iterative process which was closely coordinated among the members of Water Quality Interagency Coordination Team, which followed in the footsteps of the Modeling Technical Review Group that was established in the late 1990s. The groups reviewed numerous interim work products to determine the most applicable models for use with SHEP impact evaluations and mitigation development. Technical modelers from federal and state agencies [Corps, US EPA Region 4, USGS, Georgia DNR-EPD, South Carolina DHEC] together with private sector experts developed/refined the final product. After extensive review, the SHEP model received agency approval. From the beginning it was acknowledged that absolute prediction of dissolved oxygen is impossible because there is uncertainty in the data as well as the model. Nonetheless, there was consensus that this state-of-the-art tool was the best available vehicle for reasoned decision-making. To provide greater certitude, sensitivity analyses were performed on the important modeling parameters to help select the most appropriate correction [parameter] rates for the model.

760-JK-400-EV170

Comment: *Based on the 2010 draft TMDL, the dissolved oxygen metric of concern is not the 50th percentile but the 10th percentile, a value closer to the minimum value. Therefore, it is not clear from the DEIS that the model can accurately predict the dissolved oxygen metrics of greatest concern. Moreover, the DEIS gives no indication that uncertainty in the model was explicitly considered in characterized impacts. It is recommended that the DEIS explicitly address the ability of the model to predict the lower percentile dissolved oxygen concentrations, and make adjustments as to needed to ensure that it is an environmentally conservative analysis. in the meantime, the Corps has undercharacterized the uncertainty of the dissolved oxygen models, and the statement in Appendix Q that "the model's errors in predicting dissolved oxygen levels present little risk for decision-makers" is unwarranted.*

Response: There is uncertainty attendant to all model predictions as detailed in EIS-Section 8 and Appendix Q. However, in this instance there was an extensive review/deliberation process prior to approval of the SHEP model. There was consensus this state-of-the-art platform was the best available tool for decision-making. Nonetheless, to minimize the impact of data variation, the SHEP tools were employed in a relative manner. Analysis of changes in the system's DO levels based on input adjustments (depths, loads, flows, etc.) was determined to be the most appropriate method to examine potential project impacts. Sensitivity analyses were completed on modeling parameters to help select the most appropriate rates for the model. Visual and statistical comparisons of simulated versus measured values showed acceptable model performance as detailed in the Tetra Tech SHEP Modeling Report and outlined in GRR-Section 7.4 of the Engineering Appendix.

More details regarding the hydrodynamic and water quality model development process, extensive reviews, and uncertainty analyses can be found in the report "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project" dated January 2006. This is included in the Supplemental Materials to the GRR-Engineering Appendix. This report also includes language describing model accuracy for various parameters including dissolved oxygen throughout the Savannah River estuary including Middle and Back Rivers. The model was calibrated and validated using observed data from 1997 to 2006. The model met the expectations of the resource agency modeling experts and is applicable over a wide range of conditions including low and high freshwater flow. The recommendation to improve the model's ability to predict lower percentile DO concentrations is acknowledged, but will not be implemented. The analyses performed and suitability criteria employed were defined and agreed upon by the Cooperating Agencies and the Water Quality Interagency Coordination Team.

760-JK-400-EV171, 760-JK-400-EV172

Comment: *Env. Consequences, section 5.2.1 and 5.2.2 (Dissolved Oxygen and related mitigation analysis) and Section 5 of Appendix Q (Risk and Uncertainty Analysis)—general comment: There have been serious questions raised regarding the whether the proposed, experimental mitigation strategy will be effective. For example, the USGS review of the Speece cone pilot study concluded that the project might not have had any significant effect on DO concentration except near the injection point. The DEIS appears to have largely dismissed this concern based on the uncertain modeling analysis and very limited monitoring evidence. As a result, the DEIS significantly undercharacterizes the risk and uncertainty associated with the dissolved oxygen mitigation.*

Response: The District, in partnership with Georgia Ports Authority, conducted extensive analyses regarding water quality issues. Most germane in this regard would be the demonstration project that established the capability of the Speece Cones to add oxygen to Savannah's estuarine waters without causing adverse impacts. The results of the models are summarized in the *Oxygen Injection Design Report Savannah Harbor Expansion Project*, dated October 2010. The results of the demonstration project are summarized in the *SAVANNAH HARBOR REOXYGENATION DEMONSTRATION PROJECT*, dated January 2008. Both reports are included as part of the GRR-Engineering Appendix supplemental materials. Both the design analyses and the demonstration project verified that Speece Cones are an effective means to restore [and improve] dissolved oxygen post-deepening.

The risks and uncertainties of the proposed dissolved oxygen system for Savannah Harbor are fully discussed in the Risk and Uncertainty Analysis [Appendix Q, page 9-11]. In summary, it was concluded that the model's errors in predicting dissolved oxygen levels present little risk for decision-makers. Moreover, the results of the oxygen demonstration project together with intensive post-construction monitoring will further reduce the uncertainty associated with project implementation. The adaptive management plan also provides the means to make modifications in operating the oxygen injection system. These alterations could range from adjusting the amount of injected oxygen, modifying [or even replacing] the oxygen injection equipment, or adding to the number of sites where oxygen is injected.

Studies by independent engineering firms identified the use of an injection system [Speece Cones] as the most cost-effective method to address decreased dissolved oxygen levels in the post-project harbor. Experienced consultants subsequently used the various hydrodynamic and water quality models to design the specifics for operating the dissolved oxygen system. Preliminary evidence suggests that the programmatic system being proposed would result in a minor net improvement to the estuary's DO

levels. Table 5-28 titled, Percent of Cells with Improvement in D.O. Levels Over Existing Conditions with the D.O. Improvement Systems, demonstrates the extent of improvement to the harbor's DO levels.

A long-term management plan with an adaptive element specific to the mitigation of adverse impacts on dissolved oxygen has been prepared. Appendix D (Monitoring and Adaptive Management Plan) describes the cost estimates for adaptive management funding. These costs are to be viewed as a group, since the needed amount could be expended to modify any of the listed features as long as the expense does not exceed the total identified for Adaptive Management. It should be noted that the costs in the SHEP for mitigation and adaptive management requirements substantially exceed (on a percentage basis) the normal allocation for a more routine Corps of Engineers water resource development project. The SHEP would remain in a construction status (Construction General Funding) until all construction is complete, the post-construction monitoring is completed, and any required adaptive management measures are implemented. If more funds are required to conduct additional monitoring or modify any of the mitigation features associated with the project, these funds would be requested through the annual construction general budget process. Funding requests for mitigation measures receive high priority because they must be secured before project construction can be completed. Following completion of these activities, the project enters operation and maintenance status, which becomes responsible for costs associated with maintaining the mitigation features of the project, e. g., oxygen injection system. Funding requests for mitigation features for projects in the operation maintenance phase receive the Corps highest ranking for funding.

The District intends to request Adaptive Management funds along with the other construction funding (dredging) so that funds would be available for Adaptive Management purposes if/when needed. These funds could be supplemented during annual budget requests for construction general funds. The project is cost-shared and the local sponsor (Georgia Department of Transportation) would also be responsible for providing its annual share of funding. The sponsor, acting through the Georgia Ports Authority, has agreed to set aside, in advance, their cost-shared portion of adaptive management funds in an escrow account upon approval of the project.

760-JK-400-EV173, 760-JK-400-EV174

Comment: *For example, the DEIS gives no indication that uncertainties associated with the mitigation technology or associated modeling analysis were taken into account during the mitigation planning, such as by providing additional DO injection points in case the system is less effective than modeled. The elements that are proposed in Appendix Q to reduce risk primarily consist of references back to the original studies and post-construction monitoring. None of these elements would actually reduce dissolved oxygen impacts in the event that the mitigation strategy was ineffective. It is recommended that the mitigation strategy address the uncertainties of the selected technology in a more direct fashion, and include elements that reduce risk by providing environmentally conservative mitigation designs.*

Response: The adaptive management plan (FEIS-Appendix D) provides the means to make any required changes to the oxygen injection system. This could range from adjusting [increasing] the amount of injected oxygen, modifying the oxygen injection equipment, or adding to the number of injection sites.

Page 6-32

760-JK-400-EV175, 760-JK-400-EV176

Comment: *Env. Consequences, section 5.2.2 (Mitigation for Impacts to Dissolved Oxygen}general comment: Dissolved oxygen injection is a key TMDL compliance strategy for dischargers to the Savannah Harbor. Most of these dischargers are already permitted at or below best practical technology (BPT) wastewater treatment levels, and oxygen injection might be the most cost-effective manner for TMDL compliance. It is unclear whether the use of oxygen injection to mitigate the channel deepening impacts would reduce or substitute for the ability of wastewater dischargers to use this same technology for TMDL compliance. In conjunction with consideration of the project's impact on TMDL compliance (see comment above), it is recommended to explicitly consider how the dissolved oxygen mitigation plan would affect compliance options for existing dischargers, and if so, if this would be accompanied by a significant economic impact to those dischargers.*

Response: The applicability of the subject dissolved oxygen injection technology to other permitted dischargers along the Savannah River would be determined by the individual discharger and the States.

The proposed oxygen injection systems would not alter the compliance requirements of individual dischargers because the SHEP mitigation is designed to have a net zero effect on D.O. levels in the harbor. The project's minimal improvement in D.O. levels is not expected to be sufficient to change any of the point source dischargers compliance requirements.

760-JK-400-EV177

Comment: *Env. Consequences, p. 5-49, section 5.2.2 (Mitigation for Impacts to Dissolved Oxygen). Figure 5-1 8: The accompanying text mentions three locations for dissolved oxygen injection, but the map only shows two locations.*

Response: The IP site on Hutchinson Island would have an east/west component, i.e., it would inject oxygen into both the Front and the Back Rivers from one land-based location.

760-JK-400-EV178

Comment: *Env. Consequences, Section 5 of Appendix Q (Risk and Uncertainty Analysis}—general comment: Even if the dissolved oxygen mitigation works as intended, there would be a risk associated with lack of the funding for the Speece cone operations and maintenance, especially if the mitigation was dependent upon annual funding appropriations. This risk should be stated in Appendix Q. Similarly, this section should explain how this reisk could be reduced, such as by the provision of contingency funding.*

Response: The Corps will document in the project Record of Decision its binding commitment to install, operate, and maintain the oxygen injection system in accordance with the project mitigation plan subject to Congressional appropriation of funds for the project, and will make the oxygen injection system a top priority for annual operation and maintenance (O&M) funds appropriated and received for the project. Successful installation, operation, and maintenance of the DO system is a requirement of several environmental approvals for the project, including Georgia and South Carolina's water quality certifications and the National Marine Fisheries Service Biological Opinion.

760-JK-400-EV179

Comment: *The air quality analysis completed for the proposed project is very comprehensive in that it accounts for air emissions from all cargo-carrying vessels (containerships and other marine vessels) and landside cargo handling equipment at both the GPA and private terminals at the port. Further, emission estimates are provided for criteria pollutants, air toxics and greenhouse gases. Although the project is not subject to conformity determination requirements, the emission inventory completed for this project is similar to the comprehensive emission inventories prepared to satisfy conformity requirements.*

Response: The District acknowledges this comment finding the air quality analysis to be comprehensive.

760-JK-400-EV180, 760-JK-400-EV181

Comment: *While the emission inventory completed for the project is very comprehensive, the emission summary tab les presented in Appendix K have certain shortcomings. The reviewer was not able to calculate and confirm the accuracy of the emissions reported in many of the emission summary tables using the information provided in the descriptions preceding the emission summary tab les. To facilitate a review of the emission estimates, an example calculation should be provided for each primary emission summary table. Additionally, the emission estimates are presented using various terminology to represent vessel trips (e.g., tons per transit, tons per vessel, and ton/call). The use of consistent terminology is recommended.*

Response: In developing the air emission inventory for the Port of Savannah, the District used US Environmental Protection Agency's (EPA's) **"Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories, Final Report, dated April 2009"**. This document provided the framework from which air emission estimates were determined for all ocean going vessels, harbor vessels, and land-based equipment.

Example calculations were, in fact, shown. In Appendix K-Section 5.4, the formula [page 13] for calculating vessel emissions was discussed. This was followed by a step by step sample calculation as to how the emissions values found in Table 5-10 were derived.

The terminologies used (tons per transit, tons per vessel, and ton/call) are consistent. The tons per transit deal with those vessel emissions shown in Table 5-8, Travel Time. The tons per vessel is only used when the vessel is berthed or "hotelled" at the terminal. The ton/call is the total of all vessel emissions generated while traveling to the terminal, docking, hotelling, undocking, and leaving the port.

Page 6-33

760-JK-400-182

Comment: *Page 5~105, Section 5.6 - the word "volume" is used in the third sentence and in the second to last sentence of the first paragraph. Because mass emission rates are being referred to in these instances, "amount" or "quantity" should be used in lieu of "volume".*

Response: The word *volume* in Section 5.6 has been replaced by either amount or quantity in the FEIS.

760-JK-400-EV183

Comment: *Page 5-107. second sentence of the first paragraph ~ replace the word "volume" with "amount".*

Response: The word "volume" has been replaced with "amount".

760-JK-400-EV184
Comment: *Page 5-108, second paragraph - Table 6-4 in Appendix K is referenced comparing port emissions to total emission in Chatham County. The percentages indicated in the second sentence of this paragraph do not match those presented in Table 6-4. The percentage values presented in Table 6-4 and the percentages indicated in this paragraph should be reca1culatcd or checked to confirm their accuracy.*

Response: The percentages in both EIS-Section 5.06 and in Appendix K-Table 6-4 will be recalculated to ensure they are consistent.

760-JK-400-EV185, 760-JK-400-EV186
Comment: *Page 5-109, end of Air Quality section – a discussion is presented to explain why a conformity determination is not required for the project. Simply, a conformity determination is not required because the project location is in an attainment area (and the area is also not a designated maintenance area). This is well covered in the discussion under item a. It is suggested that item b. be deleted since it is not needed to support the conclusion that a conformity determination is not required. Further, a summary of project emissions is not provided in item b. for comparison with prescribed de minimus levcls to confirm that the project emissions are below the de minimus levels.*

Response: Item b has been deleted.

760-JK-400-EV187
Comment: *Page 142, Section 8.2.3 - in recognition that federal projects of this magnitude are typically subject to conformity determinations under the General Conformity or Transportation Conformity regulations, include an introductory statement to indicate that the project is exempt from conformity determination requirements because the project site is located in an area that is designated as an Attainment Area with respect to the National Ambient Air Quality Standards and the project area is not a maintenance area.*

Response: The GRR has been revised to be consistent with the conformity language discussion found in FEIS-Section 5.06 .

Page 6-34

760-JK-400-EV188
Comment: *5.7. 1. I.C. Dredge Plume - Pg 5-112, 2nd para - "Another source of turbidity and sedimentation from hopper dredges is through the deposition of their sediment loads at the placement site". Please discuss the potential impact of this type of turbidity.*

Response: Sediment placement and turbidity impacts at the Savannah Harbor Ocean Dredged Material Disposal Site (ODMDS) are discussed in EIS-Section 5.07.1, Direct Dredging Impacts . US EPA conducted a study on the long-term impacts of sediment placement and turbidity issues at the ODMDS, "*Savannah ODMDS Status and Trends dated May 2006*". The purpose of this study was stated in the introduction: "*Ocean disposal of dredged materials can affect the environment of a disposal site by disturbing the benthic community and potentially causing long-term reduction of oxygen in the pore waters of the sediments and the overlying waters. Natural oceanographic processes can also be responsible for transporting disposed materials offsite into nearby habitats.*" A number of parameters were sampled at the ODMDS and in adjacent waters: "*To characterize the general water quality associated with the*

dump site, the following water column parameters were sampled: conductivity, dissolved oxygen (DO), salinity, temperature, density, turbidity, % light transmission and Chlorophyll a". In addition to water quality sampling, the following parameters were also tested: sediment chemistry, benthic macroinvertebrate infauna, and sediment particle size. The US EPA study concluded: *When comparing the various study parameters between stations located within the ODMDS and those outside the ODMDS, no significant differences can be found. Table 6 (in the USEPA 2006 study) summarizes the main parameters of this study, demonstrating that no physical, chemical nor biological difference can be seen.*

[The ODMDS is located about 8 miles offshore from Tybee Island (see Figure 3-2). The US EPA approved ODMDS is a 4.26 square mile (or 2,726.4 acres) site and is centered at 31 56' 54" N and 80 45' 34" W].

760-JK-400-EV189

Comment: *5.7.1.1.C. Dredge Plume - Pg 5-112, 5th para - "Dredge-induced water quality conditions will only be short-term and impact a small cross-sectional area of the Savannah River". Please quantify "short-term" and estimate the cross-sectional area to be impacted.*

Response: District monitoring of O&M dredging in Savannah Harbor indicates that water quality effects from an operating dredge do not extend more than halfway across the river or extend more than several hundred feet down-current.

760-JK-400-EV190

Comment: *5.7. 1. 1.c. Dredge Plume - Pg 5-113. 3rd para - "All three shellfish harvesting areas are located a sufficient distance from the dredging in the Savannah River channel that sedimentation and high turbidity would not adversely impact these resources". Please state the distance from the dredging activity to the shellfish areas. Section 5.8.4.3 Confined Disposal Facilities (CDFs),*

Response: Mr. Dominic Guadagnoli, Shellfish Program Leader with the Georgia Department of Natural Resources – Coastal Resources Division provided the figure that shows the two commercial shellfish lease areas and one recreational shellfish harvest area in the project area.

760-JK-400-EV191

Comment: *Page 5-118 - This section discusses the minimal impacts predicted on various resources that utilize the CDFs; however, there is no reference to the work that was done regarding identifying cadmium as a contaminant of potential concern (COPC), primarily presented in the DEIS Appendix M-Final Sediment Quality Evaluation.*

Response: In the sections preceding 5.08 Terrestrial Resources, the impacts of cadmium on terrestrial resources in the CDF's (see 5.04 are discussed. The Sediment Quality Evaluation (Appendix M) and Section 5.04 states: Birds and mammals feeding in the CDF would not be exposed to cadmium-laden sediments (from the Station +16+000 to +45+000 reach) because this material will be covered with uncontaminated sediment. The sequestered cadmium sediments will then remain undisturbed for the remainder of the CDF's usable life. With these stipulations, there should not be any cadmium impacts to terrestrial resources.

760-JK-400-EV192

Comment: *Section 5.13 - Beneficial use of Dredged Sediment, Page 5- 142- " Impacts to fish (including larvae and eggs), shellfish and benthic communities within the near shore sediment placement areas are discussed in 5.7- Marine and Estuarine Resources. No long term adverse impacts are anticipated to any*

fishery resources or benthic communities from the near shore beneficial sediment placement." Section 5.7 does not provide adequate information to support this statement.

Response: Based on input from both GA DNR-CRD and the City of Tybee Island, the District no longer proposes to place new work sediments in the nearshore zone. The dredged material placement plan has been revised to reflect that all sediments excavated from the entrance channel would be deposited in previously-approved areas: the Offshore Dredged Material Disposal Site or an upland confined disposal site. The Final EIS contains the revised sediment placement plan. Please see previous response to this comment (760-JK-400-EV63 and EV 64).

760-JK-400-EV193

Comment: *4.01.2.1 Sediment Quality (potential contaminant impacts) - Pg 4-9, 2nd paragraph "The evaluation found that most of the sediments did not provide an concern for potential contaminant-related impacts associated with the proposed dredging and dredged sediment placement". What screening criteria were used to reach that conclusion?*

Response: This determination was based on the results of sediment sampling and analyses conducted in 1997. Approximately 31 core sediment samples were taken from the channel and at the proposed bend wideners, i.e., essentially the entire area proposed for harbor deepening. Parameters investigated included: metals, PCBs, PAHs, petroleum hydrocarbons, phenols, pesticides, dioxin congeners, cyanide, organotins, and nutrients. Please see Appendix M for a detailed discussion of the findings.

760-JK-400-EV194

Comment: *4.01.2.1 Sediment Quality (potential contaminant impacts) - Pg 4-9, 3rd paragraph - "Polycyclic aromatic hydrocarbons (PAHs) and cadmium were detected in a sample taken at about Station - 75+000B near the old RACON tower where a spill of fuel, batteries and paint lacquer occurred in November 1996. Subsequent sampling conducted in 2005 revealed that sediments at that location do not pose a potential for contaminant-related environmental impacts". What screening criteria were used to reach that conclusion?*

Response: This determination is based on the analysis of additional sediment samples taken at the old RACON tower site in 2005 [Appendix M. Twenty sediment samples were taken in a circular area at distances of 300 meters to 1500 meters from the tower and analyzed for cadmium. No cadmium was detected in any of the samples, with the MDL of 0.30 ppm or less. Four additional samples were taken at 300 meters from the tower. Their low molecular weight totals for detected PAHs ranged from 2.4 to 3.6 ppb whereas high molecular weight totals for detected PAHs ranged from 0.7 to 6.7 ppb [one outlier sample showed a high molecular weight PAH total of 23.6 ppb]. These observed values are well below threshold effect levels for both low molecular weight PAHs (311.7 ppb) and high molecular weight PAHs (655.34 ppb).

Page 6-35

760-JK-400EV195

Comment: *5.4.2.3 Expected Results of Monitoring Cadmium-Laden Sediments - Pg 5-102, 2nd paragraph - " In light of the information summarized above, the dredging and the placement of cadmium-laden sediment in CDF 14A, CDF 14B and covering these sediments with 2 feet of clean sediment is not anticipated to result in adverse impacts to the aquatic environment or biota found in the CDFs". A discussion of the potential impacts on the river's biota from the dispersion of cadmium-laden sediments during dredging is needed.*

Response: The potential impacts of cadmium-laden sediments being dispersed during the dredging process is detailed in FEIS-Chapter 5.

760-JK-400-EV196, 760-JK-400-EV197, 760-JK-400-EV198

Comment: *The Savannah Harbor Expansion Project, if completed as currently described at either 47 or 48 ft of depth, does not likely provide sufficient harbor depth and width necessary to make the Jasper Ocean Terminal a viable project. We now know that over 80 percent of container ship capacity on order is post-panamax in size and will require harbors with 50 feet mean low water and unrestricted two-way ship traffic capability, such as offered by New York, Baltimore, and Norfolk today, to reliably make Panama Canal appointments. Thus, it is likely that investment in the Jasper Ocean Terminal would require a further harbor deepening project to be cost-justified.*

Response: Conjecture that the SHEP would not likely provide sufficient harbor depth and width to make a Jasper Terminal a viable project has no bearing on the proposed action. The economic studies presented in the GRR and EIS indicate that under both scenarios: without and with project conditions, the Garden City Terminal would reach its capacity at 6.5 million TEUs [near 2030]. Upon reaching this build-out capacity, another terminal would have to accommodate future growth in container volumes.

A 50-foot deep channel and unrestricted two-way traffic are not economically necessary for a viable container port. Multiple studies show that the proposed deepening alternatives would result in annual net benefits up to $180 million.

Justification of a Jasper Terminal is outside the authorized purpose of the proposed SHEP. A Jasper Terminal is not presently a realistic alternative to SHEP for reasons explained in other responses.

760-JK-400-EV199

Comment: *If the Savannah Harbor Expansion Project is approved, the cost of dredging the 48 ft channel to the Garden City Terminal and the resultant environmental damage would make it extremely difficult if not impossible to get the additional dredging to 50 ft needed to make Jasper Ocean Terminal viable.*

Response: The environmental impacts resulting from SHEP would not preclude some future harbor deepening. However, a significant future action such as a new container terminal would be dependent on multiple economic considerations and the outcome of a host of very detailed environmental studies.

Also please see previous response.

760-JK-400-EV200

Comment: *DEIS Section 5.17 Aesthetics and Recreational, on page 5-143 fails to evaluate how increase ship traffic or speeds may affect recreational boaters and kayakers along the entire length of the project.*

Response: As the number of vessels calling at the port decreases, potential interaction between recreational boaters and commercial ship traffic should decline. Regardless, recreational vessels in commercial port areas should always exercise extreme caution and observe all public safety and basic boating laws ("The Rules of the Road").

Page 6-36

760-JK-400-EN116

Comment: *SHIP DRAFT CAPABILITY: The inshore project depth will not support post-panamax traffic except on high tide. The ship draft this project will accommodate will roughly equate to what Charleston can do now. Based on Army Corps channel design standards, which recommend channel depths of 110 percent of ship draft in protected waters, this project will support a 24 hour maximum draft of approximately 42 ½ feet, and 47 feet on high tide, in the inshore channels.*

Response: For the proposed entrance channel extension, the revised vertical motion study report indicates that an inbound (more restrictive than outbound) 47.5-foot draft vessel traveling at 10 knots would have 360 days per year accessibility given 52-feet of depth (Figure 32b). A 47.5-foot draft vessel traveling at 14 knots would have 357 days per year accessibility given 52-feet of water (Figure 32b).

760-JK-400-EN117

Comment: *SHIP SPEED LIMITATIONS: The narrow offshore channels are proven to be untenable for ships at 46 ft draft and greater. The maximum draft these channels can accommodate may be much less, but simulations were only done for 46 ft and 47.5 ft drafts. Additional simulations should be done to determine a viable draft. The findings were that ships at the drafts simulated must maintain speeds not greater than 6 knots. These speeds also require a range of tide that is exaggerated. The study assumed tide range offshore is the same as tide range in the mouth of the river. This is false. Offshore tide lift in this area is roughly 2/3 of the tide lift at Fort Pulaski.*

Response: These two drafts of T=46 and 47.5 ft are the design drafts selected for this study. Low 6 knot speeds were included for reference to illustrate effect of slower speed. The range of speeds in the report is from 6 to 16 knots, in 2 knot increments. The study results do not recommend speeds much slower than 10 knots in offshore portions of channel (with waves and currents) for ship maneuverability and control. The May 2010 draft report has been revised. The Corps contacted NOAA regarding differences in the tidal range offshore. At the furthest point of the channel extension, the tide range is reduced by multiplying the tidal range by factor of 0.91 to 0.94, which does not yield 2/3 of the tide lift at Fort Pulaski but more than 9/10 of the tide lift at Fort Pulaski.

760-JK-400-EN118, 760-JK-400-EN119

Comment: *No simulations were done to verify that ships could maintain sufficient directional control at such slow speeds to safely negotiate the unusually narrow offshore channel design incorporated this project. Narrow offshore channels often require 14 to 18 knots to maintain safe directional control depending on weather and currents. The draft capability of the offshore channels must incorporate a coordinated study to determine vertical ship motions at sufficient navigational speed. Until this study is done, the viability of the offshore channel is indeterminate, except that this report proves it will not support drafts of 46 feet or deeper.*

Response: Appropriate vessel speed is a function of location and conditions. The District agrees that within the entrance channel, slow speeds [six knots] would be problematic. However, Savannah pilots have indicated they are able to maintain sufficient navigational control at ten knots, which complies with NMFS speed restrictions during the whale watch season.

Agree that slow speeds, such as 6 knots, are not viable on the entrance channel. Savannah pilots are able to maintain navigational control at 10 knots, which complies with NMFS speed restriction during whale watch season. The range of speeds in the report is from 6 to 16 knots, in 2 knot increments. The

vertical motion study does not recommend speeds much slower than 10 knots in offshore portions of channel (with waves and currents) for ship maneuverability and control. A speed as fast as 18 knots was used to calculate ship squat, as this information may be useful. In the interest of consistency, the Corps limited the CADET runs to a top speed of 16 knots.

760-JK-400-EN120, 760-JK-400-EN121

Comment: *SHIP TRAFFIC: This project will not support two - way traffic of post-panamax traffic. No simulations were done with two full beam post-panamax ships, so passing has not been verified anywhere in the project. Simulations with smaller ships only identified one passing lane as viable, at Long Island Range. This lane is roughly in the middle of the project, meaning that one inbound may pass one outbound, provided timing two ships 32 miles apart at the start of their planned passing rendezvous can be precisely executed for an exact meeting in a location not longer than 6 1/2 ship lengths. This one marginally adequate passing lane is only viable if lengthened to 8000 feet, according to pilot feedback, requiring additional study.*

Response: The District used the *Susan Maersk* (post-panamax Generation 2) as the design vessel. Final channel dimensions and navigation requirements were developed using the Corps' state-of-the-art Ship Simulator along with input from the Savannah Harbor Pilots Association. These data supersede guidance from Corps of Engineers Design Standards and Procedures outlined in EM-1110-2-1613. The ship simulation confirmed that the new channel could safely accommodate transit of this vessel. The longer design vessel would result in the need for bend wideners in multiple locations. The new channel would allow the design vessel to meet a Panamax vessel at all locations along the channel. Two meeting lanes are included in the inner harbor to provide places where two design vessels could meet when transiting the harbor.

Long Island Range was identified by pilots as a suitable location for constructing a meeting lane [subsequently verified by ship simulation]. Pilots also determined its length [8,000 feet] was appropriate based on vessel speeds and their ability to plan where the meeting would occur.

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760-JK-400-EC16

Comment: *ECONOMIC BENEFIT LIMITATIONS: Economic benefit must account for accurate capabilities. Ships must be lightly loaded to 42 to 47 feet draft, and traffic density is limited to one-way traffic. Full economic benefit as estimated of Post-Panamax shipping is unattainable in this project. The economic limitations of predominantly one-way traffic and light loading would be significant.*

Response: The economic analysis is based on a review of how ships presently operate in Savannah Harbor, as well as how they call at other ports. Therefore, it includes an assessment of the capabilities of the vessels. Concur that many vessels need to light load when their design draft exceeds the depth of the navigation channel. That presently occurs and would continue in the future, but at a lesser extent if the channel is deepened. The potential effects of one-way traffic have been evaluated through use of the HarborSym Model. Details of that analysis can be found in the GRR-Economics Appendix.

760-JK-400-EN122

Comment: *JASPER TERMINAL BENEFIT: This project preempts availability of a South Carolina terminal on the Savannah River, because this project occupies the dredge disposal areas in way of the notionally proposed Jasper Terminal through 2060. No extra dredge material capacity is apparent in the operations and maintenance plan to free up these sites.*

Response: The SHEP's use of CDFs 14A/14B does not necessarily preclude using these areas to construct a container terminal in Jasper County within the project's 50-year economic life. The Georgia Department of Transportation has requested the District release its sediment disposal rights in the subject sites. The District is providing technical information to JPO to identify an alternative location which will replace disposal capacity lost to SHEP as well as mitigation features [marsh restoration] within the footprint of a proposed Jasper Terminal. The District has emphasized to GA DOT and the JPO that it would not consider releasing its disposal easements until development of the property is imminent, i.e. the developer obtains a Section 404 permit, and the developer provides assurance that the Federal government will be made whole for any incremental cost difference for disposal of sediments beyond the Federal standard , . It should be noted that a consultant working for the JPO has stated that the proposed placement of new work sediments [from SHEP construction] on Areas 14A and 14B would save a Jasper Terminal development project over $300 million by raising its elevation to a workable height. Therefore, if SHEP is constructed, it would benefit the development of a Jasper Terminal by significantly reducing initial construction costs.

760-JK-400-EN123, 760-JK-400-EN124, 760-JK-400-EN125

Comment: *This project also will not support navigability parameters to support a viable Jasper Terminal. The Jasper Terminal would only be viable if it can support fully loaded post-panamax ships largely unrestricted. The draft limitations of this project would only allow post-panamax ships that are substantially less than fully loaded. One -way traffic competing with the other terminals in the river would limit ship arrivals such that berth utility at jasper would be severely curtailed. If this project goes forward, and ship traffic density reaches maximum capacity on a one-way channel, there would be no extra capacity to handle increased traffic to a Jasper Terminal, and permitting of a Jasper Terminal would be difficult justify.*

Response: The deepening project is not designed to benefit a notional Jasper Terminal. A consultant working for the JPO has stated that a container terminal in Jasper County would need a 50-foot authorized channel depth. If SHEP is constructed, it would benefit the development of a Jasper Terminal by significantly reducing their initial construction costs. A JPO consultant also recently stated that the proposed placement of new work sediments [from SHEP construction] on Areas 14A and 14B would save the JOT development project over $300 million by raising its elevation to a workable height. Therefore, if SHEP is constructed, it would benefit the development of a Jasper Terminal by significantly reducing initial construction costs.

An ultimate capacity of the navigation channel has not been determined. That number would depend on a variety of factors, including the types of vessels (LNG) in the fleet. The proposed deepening of the channel does not preclude any future studies to address the needs of a future port in Jasper County.

The entrance channel is expected to handle two-way traffic of two design vessels. Therefore, there is no concern about channel capacity in that reach. The capacity of the inner harbor channel to the site of a new terminal would depend on a variety of factors, including the types of vessels (LNG) in the fleet and the length of that reach. The proposed deepening of the channel does not preclude any future studies to address the needs of a future port in Jasper County.

760-JK-400-EN126, 760-JK-400-EN127

Comment: *Within this plan is a projection of some 19 ship arrivals per day. With many of them dependent on the tide given the limited depth, this may be an unsustainable traffic load. Adding the Jasper Terminal would likely overwhelm the traffic density a one-way channel can support. Proceeding with this project may approach the environmental limits this waterway can sustain, leaving little or no capacity to add width or depth necessary to support a truly post-panamax capable Jasper Terminal.*

Response: The HarborSym models accounts for tidal delays and ship traffic for the projected fleet forecast. The results of these simulations indicate that the expected ship traffic can safely navigate the length of the navigation channel.

An ultimate capacity of the navigation channel has not been determined. That number would depend on a variety of factors, including the types of vessels (LNG) in the fleet. The proposed deepening of the channel does not preclude any future studies to address the needs of a future port in Jasper County.

Each project must obtain its own environmental approvals. Since a container terminal in Jasper County is still speculative, the potential environmental impacts resulting from its construction and operation can only be assessed on a conceptual level (not a detailed analysis).

760-JK-400-EN128

Comment: *In order to make a Jasper Terminal viable, a dredging project would have to be designed for full two-way traffic from the terminal to the end of the cannel at sea, with an inshore depth of 50 to 51 feet, and an offshore depth of 55 to 57 feet. This proposed project falls far short of those parameters and provides no utility to South Carolina's terminal expansion plans for the Savannah River.*

Response: The authorization for this project is specifically limited its channel depth to 48 feet or shallower [50 feet for the entrance channel]. Extensive environmental studies would be required for further deepening due to various concerns.

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760-JK-400-EN129

Comment: *Tide range at the seaward end of the project is four feet, at Fort Pulaski is six feet, and at Garden City is eight feet.*

Response: According to NOAA, the tide range at Ft. Pulaski averages 6.92 feet, whereas the tidal range offshore at the ocean entrance of the channel extension is from 6.30 to 6.51 feet.

760-JK-400-EN130

Comment: *Tide lag from the sea buoy to Garden City is one hour.*

Response: Concur.

760-JK-400-EN131

Comment: *Transit time from the sea buoy to Garden City would be three hours, on average.*

Response: Concur.

760-JK-400-EN132

Comment: *The Army Corps of Engineers channel design standards per their engineering manual on channel design, which requires project depths to be ILO percent of the target ship draft in internal waters and 120 percent in exposed waters, is not being adhered to, as is apparent in the draft GRR and DEIS. Therefore, a lesser standard has been assumed to be 108 percent in internal waters and 115 percent in exposed waters for the purpose of these calculations. It should be noted that International Maritime Organization safe navigation standards for navigation mimic the USACE's standards of 110 percent and 120 percent respectively.*

Response: The Savannah Harbor Pilots Association moves vessels through the harbor with a 4-foot underkeel clearance throughout the transit, which is a common requirement for US ports. Depending on the draft of the vessel, use of tides may be required to maintain a 4-foot underkeel clearance throughout the transit. In reference to the "Army Corps design standards" for the depth of a channel, the Corps, ASCE and PIANC all recommend a preliminary or concept design of channel depth in exposed entrance channels using the ratio of channel depth (h) to ship draft (T) of at least h/T =1.2. However, this h/T=1.2 standard is very conservative. A detailed design standard is recommended to conduct more extensive laboratory models, field measurements, numerical model simulations, and/or probabilistic models to refine the required channel depths. The Corps used the CADET program for the vertical ship motion study. That model is a probabilistic or risk-based model which includes probabilities of waves over a 20-year wave hindcast.

760-JK-400-EN133

Comment: *The result of the above assumptions is that an inbound ship will only be afforded 2/3 maximum tidal assistance at some point on their inbound voyage due to the duration of the voyage and the tide lag from the sea buoy to the terminal, and 113 of maximum tidal assistance on outbound voyages. The location of the ship at high tide, the speed of the ship, the length of a particular voyage within the project channel, and the actual tide range on a given day, determine actual tide assistance. The gross average of all these factors based on the above assumptions is 3 1/3 feet average benefit of high tide. For the purposes of this analysis, this has been rounded up to four feet, and therefore, this should be considered a liberal analysis, vice a conservative analysis. The USACE should report their findings and determinations on all of these factors and based economic projections on actual ship drafts this project can accommodate within Army Corps channel design standards.*

Response: The vertical motion study defines the adequacy of a channel in terms of days of accessibility. An inbound (more restrictive than outbound) 46-ft draft vessel traveling at 10 knots would have 360 days per year accessibility given a 50-ft depth (+1 ft tide) for durations up to 8 hr each day of the 12.5-hr tidal cycle (Figure 30, Table 18, and Table C9), and 364 days a year given a 52-ft depth (+3 ft tide) for durations up to 6 hours each day. A 47.5-ft draft vessel traveling at 10 knots (Figure 34, Table 18, and Table C10) would have 360 days of accessibility at a 52-ft depth, again available for durations up to 6 hours of the 12.5-hr tidal cycle. The economic analysis, however, indicates that ships will rarely call at that depth. Faster ship speeds, longer durations, and deeper depths are possible for both ship drafts, but require "trade-offs" in speed, duration, depth, and days of accessibility. The updated Vertical Motion Study is included in the Final Report. Tidal restrictions were taken into consideration for the fleet forecast though the HarborSym analysis.

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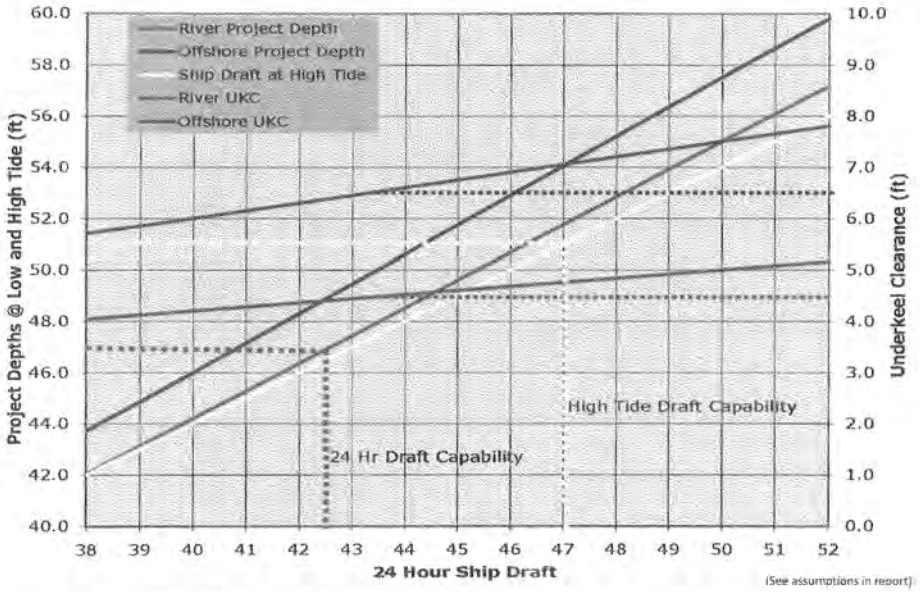
760-JK-400-EN134
Comment:

FIGURE 6-1:

Savannah Draft vs Project



Response: The graph does not include tidal lags and ranges; it only shows drafts and underkeel clearances that correspond to depths based on different h/T ratios. As noted, these h/T ratios are only designed to provide conceptual design guidance, not final designs based on detailed analysis using risk-based models and/or field or lab measurements.

Page 6-40

760-JK-400-EN135

Comment: *Pg.3, para 5: The ships modeled to investigate passing are a Panamax ship with a beam of 106 ft that no longer exists (this particular ship has been scrapped), and a less than Post-panamax ship of only 140 ft beam (post-panamax beam is 160 ft). There is no testing done of two full post-panamax ships passing, so the channel has not been evaluated for post-panamax capacity. In some cases, they have considered a successful run where there was only 25 feet of clearance, indicating a true post-panamax ship would not have been successful.*

Response: There are no standards for the required amount of clearance in ship simulations. The existing channel dimensions can accommodate meeting the deepening design vessel (post-panamax Generation 2; 140' beam) and a smaller vessel. Ship simulation verified, and the Savannah Harbor Pilots Association (SHPA) confirmed, that the channel could be deepened and widened at 2 bends in the inner harbor channel to maintain two-way traffic capability for the design vessel and a smaller vessel. Two meeting areas were also verified in ship simulation and are included to provide for meeting of two design vessels. The simulation included meeting of two design vessels on Bloody Point Range, as well.

760-JK-400-EN136

Comment: *Pg 3, para 7 & 8, Pg 4 Para 14.b & 15, Encl pg. 1 & 4: The inbound runs were reliable only when ranges were used, meaning the channel is only viable in clear visibility. Fog is prevalent in Savannah, as noted in the NOAA Coast Pilot, so dependence on ranges curtails the economic viability of the channel only to the extent of fair weather.*

Response: Although infrequent, if visibility becomes restricted to the point that safe transit of the channel is threatened, ship traffic is prohibited. Given the potential for closure exists under current conditions, it is reasonable to assume this would be the case for the deepened channel as well.

760-JK-400-EN137

Comment: *Pg 4, Para 13 & 14.c, Plates 12 & 14: The conclusion in paragraph 14c that two-way runs were successful is contradicted by paragraph 13 and Plates 12 & 14 that shows a ship left the channel in a passing run. It is also contradicted by the runs for one-way traffic that found that ranges were necessary for reliability.*

Response: During simulation, a vessel may leave the channel for a variety of reasons other than poor design, e.g., pilot error/unfamiliarity, equipment malfunction, etc. Hence, a channel's design is only finalized after multiple model runs are coupled with iterative pilot input. The preference for ranges does not limit the channel to one-way traffic.

760-JK-400-EN138

Comment: *Plate 5: While the ships outbound remained in the channel, the margin of safety was very thin. The report does not state a tolerance for satisfactory.*

Response: In simulation, there are no established standards for clearances/ tolerance for a successful model run.

760-JK-400-EN139

Comment: *Encl, pg. 2, para 4 and 7: There are no simulations of steady steaming in the lengthy ranges offshore with limited width, especially considering the slow speeds necessary to limit squat per item 1.1.16, Vertical Motions. These notes indicate crabbing is common in "most transits". The width offshore is only 560ft. A post-panamax ship of 1050 ft length and 160 ft beam with 10 degrees crab takes up 330 ft of width, effectively doubling the beam. That leaves only 115 ft on each side. No runs evaluated the reliability of this channel in the long straight reaches, despite notes verifying crabbing is common. The narrow width of this lengthy offshore channel needs to be validated.*

Response: There was no request to evaluate the channel's reliability along long, straight reaches. Rather, the areas selected for ship simulation runs were determined based on their difficulty of execution [from harbor pilots' input]. The pilots indicated that cross winds can be a problem, but velocities [which would necessitate crabbing to the degree safe transit was endangered] are rare. There were errors in the vertical motion study dealing with under keel clearance. As a result, the relatively slow vessel speed [in the deepened channel] initially determined as necessary was increased as a result of further analysis.

760-JK-400-EN140

Comment: *Summary: The offshore channel has not been validated as a safe channel for even one-way traffic of a full size post-panamax ship. Two way traffic has not been proven reliable in any segment of the channel, even with ships smaller than full post-panamax. The turn cannot be navigated safely inbound in limited visibility. The economic analysis needs to account for one-way traffic, high probability of ships leaving the channel, and closing the offshore channel in low visibility.*

Response: The offshore channel has already been used safely for two-way traffic of post-panamax ships. Moreover, two-way traffic with design vessels was successfully simulated on Bloody Point Range. Harbor pilots use their experience and professional judgment to determine safety margins during periods of low visibility. There is no basis for an economic analysis which included ships exiting the channel or just one-way traffic. Currently, the existing offshore channel could experience closure just as well as the deepened channel; therefore, there is no need for additional economic analysis for the latter.

760-JK-400-EN141

Comment: *The channel needs to be simulated throughout the entire length with full size postpanamax ships both one way and passing.*

Response: It is neither feasible nor necessary to simulate the entire of length of the channel. Ship simulations focused on critical areas including bends and constricted reaches.

Page 6-41

760-JK-400-EN142

Comment: *Pg 2, para 5, Recommendations: The recommendation for an 8000 ft passing lane in Long Island Channel has not been studied. It is recommended by hypothesis based on the failure of the 7000 ft passing lane.*

Response: The subject recommendation was based on observations from harbor pilots regarding how they were able to use a modeled meeting lane. A channel design based on modeling/ship simulations is more than just hypothesis.

760-JK-400-EN143

Comment: *The Susan Maersk is only 140 ft beam. The project has not yet been studied for full postpanamax traffic. The population of ships greater than 140 ft beam is significant. Already, there are 347 container ships with a beam of greater than 140 ft in the world fleet. This represents 23 percent of the current post-panamax fleet. This population is certain to grow, and this project is not post-panamax capable without verifying the capability to handle full post Panama beam.*

Response: The deepened channel is designed for two 140' beam post-panamax vessels meeting within the designated areas. Ships with a beam width greater than 140' could be restricted to one-way traffic. The economic model accounts for the predicted makeup of the future vessel fleet and any associated delays.

760-JK-400-EN144

Comment: *Enclosures: Almost every pilot recommended the entire Long Island Range be widened, vice just a segment of the Range, to allow for passing, citing that a minimal passing lane requires precise timing for each vessel to arrive in the lane, which is not realistic.*

Response: With no other constraints present, pilots would prefer using the entire length of a range as a meeting lane. However, the cost and environmental impacts of constructing such a feature have to be considered. The meeting lanes were studied by ship simulation to optimize their length [within the noted constraints].

760-JK-400-EN145

Comment: *Plates 18 - 21 and Enclosures: Many pilots refuted the finding that passing in Oglethorpe Range is safe. The simulation runs do not show any appreciable margin of safety, even if the ships technically did not leave the channel. This reduces the passing opportunities to just the Long Island Range.*

Response: The pilots indicated that the proposed meeting lane length [shorter] was feasible because of slower vessel speeds in the noted area. True, one set of pilots did not complete a successful run, but after inspection it was determine that there was a problem with the simulator software. After correction, all of the other runs were successful. No specific tolerance is established to determine a successful simulation run.

760-JK-400-EN146

Comment: *Pg 34, Plate 21: This study shows the Susan Maersk grounds in 6 ft seas in even a 52 ft deep offshore channel, verifying that the channel is not suitable for post-panamax drafts. At most, this simulation shows the channel is suitable for 44.5 foot drafts in 6 ft seas. At 44.5' (which would create only 2 feet of under keel clearance), the Susan Macrsk is limited to some 600 fewer TEU's than fully loaded.*

Response: The *Vertical Motion* report [May 2010] was extensively revised after ERDC received additional data from the shipping lines. In addition, ERDC corrected errors in the CADET code that were noted during the new runs. The results of the latest study comport with the *Navigation Study for Savannah Harbor Channel Improvements* that included the earlier Tracor Hydronautics analysis [September 2004]. The updated analysis [*Vertical Motion Study for Savannah, GA Entrance Channel*, April 2011] includes more data on ship speeds and wave characteristics. It is included in the final report (GRR Engineering Appendix, Attachment 3, Supplemental Studies).

760-JK-400-EN147
Comment: *Pg 18 & Plates 3, 5, 7 & II, 15, 17, 19, 23, 25,27: Jones Island Range failed simulation runs.*

Response: During simulation, a vessel may leave the channel for a variety of reasons other than poor design, e.g., pilot error/unfamiliarity, equipment malfunction, etc. Hence, a channel's design is only finalized after multiple model runs coupled with iterative pilot input. However, a widener was added on the north side of channel based on this set of simulation runs.

760-JK-400-EN148
Comment: *Pg 25: Flats area failed simulation runs.*

Response: During simulation, a vessel may leave the channel for a variety of reasons other than poor design, e.g., pilot error/unfamiliarity, equipment malfunction, etc. Hence, a channel's design is only finalized after multiple model runs coupled with iterative pilot input. However, the channel would be deepened on the existing south toe of the channel based on this set of simulation runs.

760-JK-400-EN149
Comment: *Pg 31: Jones Island Range failed even with a lightly loaded Susan Maersk.*

Response: During simulation, a vessel may leave the channel for a variety of reasons other than poor design, e.g., pilot error/unfamiliarity, equipment malfunction, etc. Hence, a channel's design is only finalized after multiple model runs coupled with iterative pilot input. However, a widener was added on the north side of channel based on this set of simulation runs.

760-JK-400-EN150
Comment: *Pg 32: Flats area failed even with a lightly loaded Susan Maersk.*

Response: During simulation, a vessel may leave the channel for a variety of reasons other than poor design, e.g., pilot error/unfamiliarity, equipment malfunction, etc. Hence, a channel's design is only finalized after multiple model runs coupled with iterative pilot input. However, the channel would be deepened on the existing south toe of the channel based on this set of simulation runs.

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760-JK-400-EN151
Comment: *Pg 36: Recommendations ignored that the Susan Maersk grounded in a 52 ft channel in 6 ft seas. The recommendation that the channel as proposed is satisfactory is unfounded.*

Response: The pilots indicated that the proposed meeting lane length [shorter] was feasible because of slower vessel speeds in the noted area. True, one set of pilots did not complete a successful run, but after inspection it was determine that there was a problem with the simulator software. After correction, all of the other runs were successful. No specific tolerance is established to determine a successful simulation run.

760-JK-400-EN152

Comment: *Anny Corps standards are that the offshore channel will provide for 120 percent depth compared to the target ship draft. On this measure, a 49 ft deep offshore channel will accommodate drafts up to 41 feet on low tide. Economic analyses must consider this limitation. The capacity of a typical 7000 TEU ship is some 200 TEU per foot of draft, so the capacity of a 7000 TEU ship limited to 6.5 less than full load draft foregoes 1300 TEU, or 19 percent of its cargo capacity.*

Response: The Savannah Harbor Pilots Association moves vessels through the harbor with a 4-foot underkeel clearance throughout the transit, which is a common requirement for US ports. Depending on the draft of the vessel, use of tides may be required to maintain a 4-foot underkeel clearance throughout the transit. In reference to the "Army Corps design standards" for the depth of a channel, the Corps, ASCE and PIANC all recommend a preliminary or concept design of channel depth in exposed entrance channels using the ratio of channel depth (h) to ship draft (T) of at least h/T =1.2. However, this h/T=1.2 standard is very conservative. A detailed design standard is recommended to conduct more extensive laboratory models, field measurements, numerical model simulations, and/or probabilistic models to refine the required channel depths. The Corps used the CADET program for the vertical ship motion study. That model is a probabilistic or risk-based model which includes probabilities of waves over a 20-year wave hindcast. The economic analysis of this project took into consideration requirements for underkeel clearance.

760-JK-400-EN153

Comment: *This is a draft report. The project should be based on completed reports.*

Response: The final report was used by the District and is included in the GRR Engineering Appendix, Attachment 3, Supplemental Materials.

760-JK-400-EN154

Comment: *Pg 65: The simulated ship squats and grounds at speeds as low as 10 knots in channels deeper than the proposed. 10 knots has been found to be too slow to maintain control of a ship in a narrow channel subjected to ocean currents and waves. Maintaining control of the ship at 10 knots in a 550 ft wide channel needs to be studied carefully. 14 knots is widely considered the lowest safe speed to maintain control in confined offshore channels.*

Response: The Savannah Harbor Pilots Association was consulted concerning their mode of operation in the entrance channel. The Pilots confirmed they are able to pilot vessels at 10 knots, which is required by Coast Guard regulation during right whale season.

760-JK-400-EN155

Comment: *Pg 73: This shows that the channel only has viability for a fully loaded ship in a 49 ft channel 70 days a year at ten knots, an unsafe speed. A safer speed of 14 knots has zero days of viability.*

Response: The first draft of the CADET vertical motion report was revised after Maersk provided proprietary data on its ship's parameters/lines. Additionally, errors were corrected regarding how the code for the CADET program was compiled. The updated version of the report is available for inspection. The Savannah Harbor pilots routinely observe a 10 knot speed restriction on the entrance channel during the right whale season.

760-JK-400-EN156

Comment: *This report verifies that the offshore channel cannot support 46 ft draft or 47.5 ft draft.*

Response: The Savannah Harbor Pilots Association moves vessels through the harbor with a 4-foot underkeel clearance throughout the transit, which is a common requirement for US ports. Depending on the draft of the vessel, use of tides may be required to maintain a 4-foot underkeel clearance throughout the transit. In reference to the "Army Corps design standards" for the depth of a channel, the Corps, ASCE and PIANC all recommend a preliminary or concept design of channel depth in exposed entrance channels using the ratio of channel depth (h) to ship draft (T) of at least h/T =1.2. However, this h/T=1.2 standard is very conservative. A detailed design standard is recommended to conduct more extensive laboratory models, field measurements, numerical model simulations, and/or probabilistic models to refine the required channel depths. The Corps used the CADET program for the vertical ship motion study. That model is a probabilistic or risk-based model which includes probabilities of waves over a 20-year wave hindcast. The project economic analyses takes into consideration the fact that vessels do not operate at full draft all of the time. The vertical motion study defines the adequacy of a channel in terms of days of accessibility. The revised report indicates that an inbound (more restrictive than outbound) 46-foot draft vessel traveling at 10 knots would have 345 days per year accessibility given 50-feet of water (Figure 30) with no tidal restriction. It would have 365 days a year of accessibility given 52-feet of water, which is available for 7 hours of the 12.5-hour tidal cycle. A 47.5-foot draft vessel traveling at 10 knots would have 347 days of accessibility at 51-feet of water, which is available for durations of up to 8 hours of the 12.5 hour tidal cycle.

760-JK-400-EN157

Comment: *This report does not address channel depths as shallow as 49 feet, which is proposed. It does not evaluate the ability to maintain control of the vessels at slow speeds. It does not derive a maximum safe draft that is reliable most of the year (350 days plus).*

Response: The final report was revised after additional data was received from Maersk on ship lines and errors in CADET program were corrected. The shallowest project depth studied for the entrance channel is 50 feet. The associated project depth for the inner harbor channel is 48 feet. Tables can be used to determine to address the 49-foot channel depth, as well. Ship control at 10 knots has been noted previously by the pilots. The revised report completed in March 2011 discusses maximum safe depths for design drafts of 46 and 47.5-feet.

760-JK-400-EN158

Comment: *This report does verify that this project is not suitable for post-panamax traffic.*

Response: The channel design is based on ship simulations that confirm suitability for post-panamax traffic [with 140' beam width].

760-JK-400-EN159

Comment: *A full-length simulation run needs to be conducted of a 160 ft wide ship at 47.5 feet draft at 6 knots as suggested here, or higher sped without inducing excessive squat, throughout the narrow 550 ft wide offshore channels. Controllability and under keel clearance must both be verified. A maximum safe draft for this channel should be derived and used as a basis for economic evaluations.*

Response: The design vessel [used for simulation/economics] is a post-panamax 140' beam vessel. The under keel clearance has been verified through the vertical motion study. It is not necessary to simulate the entire of length of the channel. Ship simulations focused on critical areas including bends and constricted reaches.

760-JK-400-EN160

Comment: *Paragraph 1.1: The projection for how much maintenance material needs to be handled each year is not substantiated. Past actual volumes dredged are reported to be less than the optimal volumes to keep pace with shoaling, but the amount reported for optimal maintenance, 6.225 million cubic yards (CY) is not substantiated.*

Response: The noted dredging volumes have been substantiated via the harbor's long-term records. In the Engineering Appendix under Section 12.4 "Summary of Operation and Maintenance Impacts", Tables 12.4-2, 12.4-3, and 12.4-4 depict the annual O&M increase due to expansion and the annual O&M project cost after expansion for the 46-, 47-, and 48-foot projects. These tables indicate that for the 47-foot project $13M has been budgeted for dredging purposes. However, to maintain the harbor completely an additional $13.8M [$26.8M total] would be necessary.

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760-JK-400-EN161, 760-JK-400-EN162, 760-JK-400-EN163

Comment: *The November 2010 ACOE Savannah District channel surveys show that all three offshore ranges have shallow quarters, as much as I Y: feet shy of project depth. Seven of thirteen river ranges have shallow quarters, as much as 4 feet shy of project. Over half of the Kings Island turning basin is 8 to 18 feet shy of project depth. This indicates that a significant amount of maintenance dredging is being deferred. It is entirely possible that some of this shoaling has reached equilibrium depth, having been deferred for so long, and, therefore, the current state does not indicate a linear progression of annual shoaling rates. It is safe to assume that with an improved channel, deferring maintenance as has been done in the past will no longer be tolerable, and therefore, annual maintenance dredged material will certainly increase. Due to the pattern of deferred maintenance and current shoaling, historical maintenance dredging data bears no credible indication of future annual demand, other than to indicate that proper maintenance dredging will greatly exceed historical dredging projects which have failed to keep pace with shoaling.*

Response: Inadequate funding for maintenance dredging is a problem nationwide and is not unique to Savannah Harbor. The Corps is presently prioritizing maintenance dredging to assure that high volume harbors are properly maintained.

Savannah Harbor is maintained by two annual dredging contracts. Annual funding typically has been about $13M. For FY 2011, the District received approximately $12.5M. The dredging contracts use a format that allows for the efficient use of additional funds that may be obtained during the year so that this money can be used with minimal contract execution delay. For the inner harbor, the 2011 dredging contracts are limited to the critical locations excavated in 2010, but do not address all shoaling areas along the river. No advance maintenance is included and the Kings Island Turning Basin would not be dredged to its full authorized depth.

For the entrance channel, dredging costs have significantly increased [2010 costs have doubled] due to the movement of hopper dredges into the Gulf of Mexico to deal with the BP oil spill. Only half of the

annual dredging program will be accomplished this year, which will require the remaining work to be moved into next year [if sufficient funding is obtained].

As stated earlier, the District has 40 years of O&M dredging history on which to base its sediment analysis/quantitative predictions. To date, the average is approximately 6.2 million cubic yards per year. This is the amount on which the DMMP bases its work plan. The District has no reason to doubt this long term average, and no commenter has provided any peer-reviewed analyses that indicate otherwise.

As part of the new work dredging for SHEP, the O&M material that has accumulated would be removed to provide a clear template. It is possible that the channel would experience atypical [larger] quantities of O&M materials for a short period after a harbor deepening. However, the District sees no reason to believe that the long term average would not revert to the mean [6.2 million cubic yards] observed over the last 40 years.

Historical dredging volumes include a long period of record under varying conditions and the average shoaling rate has remained relatively constant. After initial dredging of maintenance material during project construction, it is anticipated that shoaling will continue at historic rates.

There have been numerous changes to the harbor over the 1971-2011 period, e.g., widening, Tidegate/Sediment Basin construction, cessation of operating the Tidegate, irregular maintenance of the Sediment Basin, and deepening of the harbor from -38 feet to -42 feet. Throughout all those events, the amount of maintenance sediment has remained relatively constant, with only its deposition location changing. Hence, the allegation that historical maintenance rates have little relevance to future dredging needs is factually incorrect.

760-JK-400-EN164, 760-JK-400-EN165

Comment: *Table 3; Predicted O&M Volumes: This table projects maintenance dredging through 2060. It shows dependence on sites 138, 14A, and 14B, which extend throughout the area notionally considered for an eventual Jasper County, SC marine terminal. The existing channel, unimproved, would likewise depend on the entire Jasper terminal site for annual maintenance perpetually. The Jasper terminal site is occupied by maintenance disposal demand indefinitely. With the increased maintenance load of a deeper channel, projected over an indefinite period, South Carolina's opportunities to develop a terminal on the Savannah River are even more obstructed.*

Response: The SHEP will use CDFs 14A/14B [the latest proposed site for a Jasper terminal] to deposit excavated material since it is the least-cost, environmentally acceptable alternative. However, this decision does not necessarily preclude using these areas to construct a Jasper Terminal within the SHEP's 50-year economic life. The Georgia Department of Transportation has requested the District release its sediment disposal rights in the subject sites. The District is providing technical information to assist JPO in identify replacement disposal capacity and mitigation features [marsh restoration] within the footprint of the proposed Jasper Terminal. The District has emphasized to GA DOT and the JPO that it would not consider releasing its disposal easements until development of the property is imminent, i.e. the developer obtains a Section 404 permit, and the developer provides assurance that the Federal government will be made whole for any incremental cost difference for disposal of sediments beyond the Federal standard. It should be noted that a consultant working for the JPO has stated that the proposed placement of new work sediments [from SHEP construction] on Areas 14A and 14B would save the JOT development project over $300 million by raising its elevation to a workable height. Therefore,

if SHEP is constructed, it would benefit the development of a Jasper Terminal by significantly reducing initial construction costs.

The dredged material management plan (DMMP) for the harbor is required to show 50-years of capacity and reflect current conditions. As such, it has been updated to show relevant maintenance dredging information through 2066. For the Corps to release its easements on the subject sites for development, alternative dredged material disposal site[s] would need to be identified by JPO for use by the Savannah Harbor Navigation Project to replace lost capacity. The CDFs are essentially surrounded by sensitive marsh habitat; therefore, in-kind replacement of CDFs 14A/14B in the immediate vicinity will be extremely difficult.

The amount of O&M dredged material for the 50-year life of the project has been calculated for CDFs 14A /14B. This amount has been given to Moffatt and Nichol [engineering firm hired by the JPO] for project development. The subject sites would only be relinquished after the lost capacity has been replaced. Currently, DMCAs 14A and 14B are at a slightly higher elevation than the surrounding marsh. Placement of new work would raise the sites to a level required for the construction of a dock. The total volume of O&M sediments are not expected to increase substantially if the harbor is deepened as proposed.

760-JK-400-EN166, 760-JK-400-EN167

Comment: *The comparison to Charleston fails to take into account the salinity difference between the ports. Post - Panamax ships would sink approximately one foot as they enter the brackish water of the Savannah River. This phenomenon does not exist in Charleston where draft changes due to salinity are negligible. The other factor that differs is that the transit time is so long in Savannah that high tide only offers assistance for a portion of the transit. Even with the time lag between high tide at the sea buoy and high tide well into the port, and the higher amplitude of the tide inside the port, the ship will not be able to keep up with high tide throughout, and will be at half tide or worse at some point in the transit. Therefore, the tide only allows for an additional 4 \/2 feet of draft in optimal conditions. These factors contribute to the estimated potential of this channel project allowing only for the existing draft capability of the channel in Charleston, even though this project is two feet deeper.*

Response: The lesser density of freshwater [harbor complex] compared to saltwater [open ocean] results in a ship's draft increasing by 2.8 % [see EM1110-2-1613, page 6-29]. For a draft T=47.5 ft, this equates to an increase in draft of 1.33 feet for pure freshwater. For brackish water, the draft will increase approximately half of this amount, or 0.67 feet. The Savannah Harbor Pilots Association confirmed that the difference in draft between the entrance channel and the Garden City Terminal is 20 cm or 0.66 feet. All drafts reported by the Savannah Harbor Pilots Association are referenced to a fresh water datum; therefore, the presence of salinity would only serve to reduce the under keel requirement.

Tidal delays were considered as part of the economic analysis of the project. Routinely, pilots use their professional judgment and training to take advantage of the tide. The vertical motion study report [revised] indicates that an inbound [more restrictive than outbound] 47.5 foot draft vessel traveling at 10 knots would have 365 days per year accessibility given 54.5 feet of water (Figure 32b). A vessel with a 47.5 foot draft traveling at 14 knots would have 360 days per year accessibility given 54.5 feet of water (Figure 32b). The inbound transit presents the worst-case condition relative to vertical ship motions. The report does not draw comparisons between Port of Savannah and Charleston.

760-JK-400-EN168, 760-JK-400-EN169

Comment: *The traffic density this project can support is severely constrained by the predominantly one-way capability. This limitation was documented in the Anny Corps' letter to the Savannah Pilots on March 28, 2002: "The channel was not designed for full two- way traffic for the design ship at all times." Given that the width is static, and is not afforded any benefit of tidal assistance, if the channel is only wide enough for one-way traffic some of the time, it is only wide enough for one-way traffic all the time for the design ship. It has also been noted, the design ship is not a full size post Panamx ship. The nearby Port of Charleston is currently wide enough for full post-panamax traffic all the time.*

Response: Although the channel is not designed for full two-way traffic [all times / locations / conditions] for the design ship, the channel is not restricted to one-way traffic for the design ship. Design vessels would continue to meet in the entrance channel as well as the two designed meeting lanes in the inner harbor. The channel would still be able to accommodate two-way traffic for the design vessel and a smaller vessel except in the Bight and turns where [by design] meeting will not take place.

The design vessel for the project is the Susan Maersk. It has a 140' beam and represents the largest class vessel expected to call at Savannah regularly. The channel's dimensions would allow two design vessels to meet [pass one another] at designated areas. On those rare occasions when larger width vessels call, the channel may be restricted to 1-way traffic at the discretion of the harbor pilots.

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760-JK-400-EN170

Comment: *Therefore, the combined utility of this project would bring the ship handling capability of the Port of Savannah to roughly a one-way equivalent of the existing Port of Charleston Economic and alternative studies should reflect this.*

Response: Comparisons with the Port of Charleston are not a part of the report objectives.

760-JK-400-EV201

Comment: *As noted in Section 5.20, Protection of Children and Environmental Justice, Federal agencies are required by Executive Order 12898 to identify and address "disproportionately high and adverse human health and environmental effects . .. on minority populations and low- income populations in the United States." Section 5.20, on Page 5- 145, Paragraph 4 references figures that " ... show the location of various poverty levels" in an area of Jasper County " ... where the Garden City Terminal is located and most of the effects of the existing container terminal are experienced." The text further states " ... that the closest area with the highest poverty level (40-100 percent) is located roughly a mile from the terminal", and this " . . . same area as being the closest one with the highest category of minorities (40-100 percent)." It is not clear in the text why this area is the focus of the analysis, rather than the area that may be potentially affected by the proposed action and alternatives. If the area identified on Figures 5-54 and 5-55 encompasses the region of influence, or area potentially affected by the proposed action and alternatives, it should be clearly stated as such in the text, if it does not, then the analysis needs to encompass that affected area, which needs to be defined based on the geographic extent of air quality and other impacts associated with the proposed action and alternatives that could potentially have adverse human health and environmental effects on minority populations and low- income populations.*

Response: Under both the without- and with-project conditions, the Corps expects the Garden City Terminal to reach its build-out capacity near 2030 when the total number of TEUs processed reaches 6.5 million. This annual capacity will be constrained by the following factors: size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the container cranes, the number of jockey trucks that move the containers within the terminal, how the containers are stacked within the terminal, and the number of railroads that service the terminal and the frequency of their trains. It is projected that without deepening, more vessels would be required to transport this volume of cargo whereas with channel deepening, the total number of vessels decreases as they would be able to load/unload without current draft constraints. No incremental increase in cargo is expected to occur as a result of the proposed harbor deepening. As a result, the number of containers that transit the areas surrounding the port would remain a zero sum [compared to the status quo]. Hence, overall landside impacts outside the Garden City Terminal, e.g., noise, air emissions [including air toxics], and traffic, would not be increased as a result of the proposed deepening. The project's economic benefits accrue from the use of larger, more cost-effective container ships, not an overall increase in the number of containers.

760-JK-400-EV202, 760-JK-400-EV203

Comment: *Additionally, Section 5.20 does not define what low-income population was assessed as part of the environmental justice analysis. It would appear from the text to be the segment of the population with the highest category of people at or below the poverty level (40 -100 percent), but that is not clear from the text. It is also not clear if the low-income population included in the environmental justice analysis comprised all people at or below the poverty level. The analysis should identify and assess disproportionately high and adverse effects on minority and low-income populations. Based on the mapping on Figures 5-54 and 5-55, it appears that minority and low-income populations may be closer to the project than one mile. What is not clear from the evaluation and needs to be included is an assessment (more than merely a statement) of whether or not minority and low-income populations (not the highest category of minority and low-income populations) are disproportionately affected by any adverse human health and environmental effects of the proposed action and alternatives.*

Response: FEIS-Section 5.19 was revised to define [what constitutes a] low income populations.

See response to above Comment.

Page 6-45

760-JK-400-EV204, 760-JK-400-EV205

Comment: *Section 5.20 also states that Executive Order 13045 requires that Federal agencies "identify and assess environmental health risks and safety risks that may disproportionately affect children;" and are required to "ensure that its ... activities ... address disproportionate risks to children that result from environmental health risks or safety risks." Figure 5-56 of the EIS shows the locations of schools, hospitals and child care facilities in the project area. It is presumed that the identification of these facilities is intended to represent locations where children would be exposed to environmental health risks or safety risks from the proposed action and alternatives. This is not clearly stated, however, but needs to be if that is the intent. There may be other locations in the affected area where children could be present and at risk, and they would include outdoor recreational areas (e.g., ball fields, playgrounds) and residential areas (for pre-school children not in child care facilities or all children present in residential areas if project activities would occur after school hours, for example, or during the weekend). If these areas exist in the area potentially affected by project activities, then they need to be included in the analysis.*

Response: Figure 5-59 shows the location of those facilities where children may be exposed to environmental health- or safety risks from the proposed action.

Figure 5-59 adequately displays the at-risk locations for children in the project area.

760-JK-400-EV206

Comment: *Moreover, with regard to the evaluation under E.O. 13045, Section 5.20, Paragraph 1 on Page 148 states that « ... schools, hospitals and child care facilities ... are dispersed throughout the community and are not located disproportionately near the navigation channel." The disproportionate or non-disproportionate location of facilities, however, is not what needs to be evaluated. The analysis needs to identify and assess the effects of the proposed action on children and whether or not children may suffer disproportionately from environmental health risks and safety risks when compared to the adult portion of the population.*

Response: FEIS-Section 5.19 was revised to provide more information on the demographics of children (below the age of 18) in the Garden City Terminal area. The potential effects of air emissions (criteria pollutants/air toxics) from port traffic and SHEP related sourceswas also disclosed.

760-JK-400-EV207, 760-JK-400-EV208

Comment: *Section 5.20 concludes on Page 5- 149, Paragraph I that "[t]he dredging activities, including deposition of the dredged sediment, will not have significant impacts on any populations, including minority populations and low-income populations." The basis for this conclusion is unclear from the text in Section 5.20 prior to this statement. The document needs to indicate the basis for this conclusion, i.e., whether it is from the results of air quality and other impact analyses of the proposed action and alternatives. If from air quality analyses, the document needs to explain how this conclusion was derived, as Section 5.6, Air Quality, indicates that the assessment of impacts on air quality " ... did not include a detailed dispersion modeling assessment of air emissions of the alternatives", nor did it include " ... a risk-based assessment of the health effects associated with the proposed project".*

Response: Section 5.19 includes a "Summary of Project Effects on EJ Populations and Children" which concludes that : *the Corps evaluated potential project impacts of the proposed harbor deepening and found that the information shows that the proposed action would not cause disproportionately high and adverse impacts on minority populations, low-income populations, or children.*

Under both the without and with project conditions, the District expects the Garden City Terminal to reach its maximum annual capacity near 2030 [6.5 TEUs]. This annual capacity will be constrained by the following factors: size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the container cranes, the number of jockey trucks that move the containers within the terminal, how the containers are stacked within the terminal, and the number of railroads that service the terminal and the frequency of their trains. Moreover, there is the prediction that without deepening, more vessels would be required to transport the cargo expected to move through the port. With deepening, the total number of vessels would decrease, as they would be able to load/unload without the current constraints of draft.

No incremental increases in cargo are expected to occur as a result of the proposed harbor deepening. Since the number of containers per year [with-/without project] is a zero sum, no landside changes in emissions would occur as a result of the deepening. Air emissions [including air toxics], and traffic would not be increased as a result of the proposed deepening. Overall air emissions in the port may even

decrease slightly as a result of the project; consequently, there is no technical need to conduct a detailed analysis of emission dispersal. Given this overall decrease in emissions (including air toxics), violations of the National Ambient Air Quality Standards (NAAQS) violations are very unlikely. Therefore, a risk based assessment of the health effects associated with the proposed action will not be conducted.

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760-MR-400-EV209

Comment: *5.1.2.2 Impacts Without Mitigation - Pg 5- 12. 2nd para - "Tidal freshwater marshes located outside the SNWR are subject to development threats and could be filled if the owner obtained a Department of the Army Permit". Please explain in detail the belief that those wetlands are threatened by development.*

Response: The District as well as regional planning entities forecast that the Savannah Harbor, and areas surrounding the SNWR, will continue to experience population growth, industrial/commercial development, and changes in land use. In addition to the industrial developments that have been permitted by the District in recent years, the US Geological Survey, Water Science Center (GaWSC) commented on the large number of industrial facilities and associated impacts that are anticipated on lands in close proximity to the Georgia Ports Authority and the SNWR. The proposed preservation of up to 2,245 acres ensures aquatic resources on the associated properties will be protected in perpetuity. The preserved land would provide additional buffer so that any future development in the vicinity will not result in a secondary and/or indirect impact to existing Refuge lands. There is also a threat that changes in adjacent land use will also have a detrimental impact on the SNWR. For example, a Public Notice published by the Charleston District, Corps of Engineers on September 28, 2009 requested comment on a proposal from a private landowner to alter the hydrology within a relict rice impoundment [485 acres] via diversion of tidal flows. The entire property [693 acres] would then be used as a mitigation bank. Presently, this parcel provides stop-over benefits to migratory waterfowl similar to those provided by Refuge lands. Conversion to saltmarsh lessens its waterfowl potential and potentially results in crowding on adjacent preferred habitat. There is the immediate implication that birds could shorten their stay in the area and result in the populations that the Refuge currently serves resuming their migration with less rest. The expected effects of the proposed regulatory action on the SNWR have not been quantified, but the proposed project is an example of the continued threat that manipulation of adjacent lands poses to the SNWR and the resources it protects/fosters. Acquisition and preservation of the proposed 2,245 acres (maximum) as mitigation for SHEP would provide additional buffer and protection from this type of activities. The mitigation lands would include a restrictive covenant/conservation easement with subsequent conveyance to the USFWS.

760-MR-400-EV210

Comment: *6.11 Executive Order 11990 (Protection of Wetlands) - Pg 6-3, 6th para - "A small amount of saltmarsh and brackish marsh (14.08 acres) would be lost through excavation of the turning basin and two wideners", The Corps estimates that approximately 1200 acres of tidal freshwater wetlands could be converted to another wetland type without mitigation, and over 300 acres of tidal freshwater wetlands will be impacted after mitigation. The Corps proposes as mitigation the preservation of existing tidal freshwater wetlands that are not under imminent threat of loss. How is that in compliance with Executive Order 11990, and how is that consistent with "no net loss"?*

Response: Without implementation of the flow diversion structures, the 47-foot alternative would indirectly impact up to 1,177 acres of tidal freshwater marsh. However, use of Flow Rerouting Plan 6A reduces the resulting impact to 223 acres. The District conducted a functional assessment of freshwater marsh aquatic resources relative to their potential impact [from SHEP]. A watershed assessment was also performed to identify and evaluate potential mitigation options to compensate for SHEP impacts. Ultimately, up to 2,245 acres adjacent to the SNWR were identified for preservation. These lands would be conveyed to USFWS as compensation for freshwater wetland impacts [species shifts]. This acreage complies with the 2008 Final Mitigation Rule. The District's functional assessment, watershed assessment, and evaluation of impact was the basis of the conclusion that SHEP complies with Executive Order 11990 (please see responses specific to the functional assessment and watershed assessment; Appendix C – Mitigation Planning, Section VII Consideration of the 2008 USACE/USEPA Mitigation Rule has also been updated with this information).

760-MR-400-EV211

Comment: *5.2.2 Mitigation for Impacts to Dissolved Oxygen - Pg 5-48, 2nd para - "Identified the use of Speece cones as the specific technique to inject oxygen into the water, although another land-based technique might be found later that could be more cost-effective." Where has this technology been employed to the degree needed for the SHEP and what was the result?"*

Response: Speece Cones have been widely used in industrial settings and several environmental applications. However, this is the first time that Speece Cones have been used in tidal systems to improve dissolved oxygen in a harbor. See also other responses on this issue.

760-MR-400-EV212

Comment: *5.3.2 Mitigation for Impacts to Fisheries - Pg 5-91 - Adding a table to this section that identifies the quantity of fish habitat lost (by species) versus the quantity of habitat expected to be gained (by species) through mitigation would be helpful to understanding the magnitude of the potential impact.*

Response: The requested tables are 5-36 through 5-41 in EIS-Section 5.03. This material is also included in Appendix C.

760-MR-400-EV213

Comment: *6.04 Magnuson-Stevens Fishery Conservation and Management Act - Pg 6-2, 2nd para - "Conversion of freshwater marshes to brackish would require mitigation for all channel depths except the 44-foot project. Mitigation would be accomplished through the flow rerouting and preservation of wetlands in the Savannah River estuary". There appears to be no analysis of impacts to the plant and animal communities that reside in and adjacent to the streams that will have freshwater diverted from them, and no analysis of mitigation if impacts are likely to occur. Mitigation in the form of existing wetlands preservation does not comply with "no net loss of function and value", a basic principal of the Corps' Section 404 regulatory program.*

Response: Appendix S provides the details of the EFH assessment and Appendix C supplies details on the mitigation plan. For the 15.68 acres of estuarine emergent wetlands lost to excavation, in-kind mitigation would be provided by restoring 40+ acres of wetlands in the Savannah Harbor environs. A portion of the restoration (11+ acres) is considered advance mitigation and will be available for District use should the need arise in the future operation/maintenance of the Savannah Harbor Navigation Project.

Without mitigation, the hydrodynamic related changes would impact 1,177212 acres of freshwater wetlands (Table 3-6 in Section 3.0 and EIS-Appendix C) for the 47-foot alternative. However with mitigation, the hydrodynamic related changes would be minimized to 223 acres. No net loss of wetland [functions] was the original goal, but methods to avoid/minimize SHEP impacts had been exhausted as well as restoration/enhancement of existing environmental functions. At this point, the next mitigation step is preservation as a means of addressing expected project impacts. The details of the preservation effort are indicated in Appendix C, Section V, C.

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760-MR-400-EV214
Comment: *5.22 Mitigation - Pg 5-157, 3rd para - "The project includes design features to avoid environmental impacts as well as features that reduce the amount of impacts that otherwise occur". The design features and features that reduce impacts should be identified in the text, or provide a reference to another section of the DEIS where those features are discussed in detail.*

Response: The design features that reduce species change impacts consist of the diversion structure at McCoys Cut, the closure structure at the western end of McCoys Cut, closure of Rifle Cut, and the sill/broad berm in Back River below the Tidegate. Figure 5-11 illustrates their locations. A complete discussion of these flow rerouting measures is in Appendix C.

Page Appen. B-1

760APB-MR-76-EV01
Comment: *Section 5.04.2.A. Line 5. How and to what degree will lighting affect sea turtles? Will it increase the likelihood of a take?*

Response: Lighting is only an important concern with sea turtles during the hatching season. Bright lights [onshore] often disorient the hatchlings causing them to move inland instead of out to sea. There are no on-shore activities associated with the SHEP that would adversely affect sea turtles. As a requirement of the BO, all lighting aboard hopper dredges and hopper dredged pumpout barges operating within 3 nm of sea turtle nesting beaches is limited to the minimal lightning necessary to comply with US Coast Guard and/or OSHA requirements during the nesting and hatching season. All non-essential lighting on the dredge is minimized to reduce illumination of the water to minimize potential disorientation effect on female turtles approaching the nesting beaches and sea turtle hatchlings making their way seaward.

760APB-MR-76-EV02
Comment: *Section 5.04.2.0. Has the use of a bed leveler been cleared by NOAA? Endangered species surveys should be conducted prior to use. How will the project determine if use of a hopper dredge would result in equal or greater take of endangered species?*

Response: The use of bed levelers to clean up high spots in the entrance channel was requested as a part of the Biological Assessment (BA). The use of bed levelers in the entrance channel was approved by the NMFS in the BO based on their belief that it is unlikely that turtles may be adversely affected by bed-leveling activities to clean up high spots.

760APB-MR-76-EV03

Comment: *Section 5.04.2.E. The narrative states that noise above ISO dB is the level of a take. However, noise levels above 150 dB and below 180 dB are proposed to be allowed under monitoring even though they are above the level of a take. This is counterintuitive and against a tenant of the ESA, which is to prevent a take of an endangered species.*

Response: The 150 dB and 180 dB values (from the quote in italics) came from ATM (2000) and was not intended to represent the dredging noise levels anticipated for the proposed project. The following quote from page 121 of Appendix B indicates the anticipated noise levels: *"According to Clarke et al. (2002), hopper dredge operations had the highest sustained pressure levels of 120-140 dB among the three measured dredge types; however, this measurement was taken at 40 m from the operating vessel and would likely attenuate significantly with increased distance from the dredge. Based on: (1) the predicted noise impact thresholds noted by Richardson et al. (1995), (2) the background noise that already exists within the marine environment, and (3) the ability of marine mammals to move away from the immediate noise source, noise generated by bucket, cutter head, and hopper dredge activities will not affect the migration, nursing/breeding, feeding/sheltering or communication of large whales."* This and other similar information is discussed throughout much of Appendix B.

760APB-MR-76-EV04

Comment: *Section 6.00.f. Authorization of the sites through LTMS in 1996 does not preclude the need for study and assessment in this EIS. Since 1996, additional species have been listed as threatened or endangered. In addition, these areas may currently be used by protected species. If, in fact, the allowable timeframe in the L TMS was indeterminate, the L TMS process is flawed.*

Response: As noted in Appendix B, the dredged material placement plan serves as the updated documentation for both new work and O&M sediments. Because of concerns voiced by GA DNR and City of Tybee Island, the plan has been revised to remove the nearshore placement sites from use. All new work sediments excavated from the entrance channel would be deposited in previously-approved areas: the Offshore Dredged Material Disposal Site or an upland confined disposal site. The FEIS details the revisions to the sediment placement plan. Although the nearshore areas off Tybee Island will not be used for placement of new work material from the SHEP, Section 5 and Appendix B contain discussions of the impacts that would be expected to occur if that plan of action were pursued.

760APB-MR-76-EV05

Comment: *Page 46, 4th paragraph states "The proposed action does not plan to place any excavated sediment ... on any upland beaches ... " (emphasis added) The project should specify whether it will or will not. The words 'does not plan' suggest that it may occur at a later date if the plans change. This impact is not assessed in the EIS and should therefore be changed to either state that it will not occur or that it may occur and address the environmental impacts of the action.*

Response: No new work sediment sediment would be placed on the upland beaches at Tybee Island. In addition, the District no longer proposes to place construction sediments in the nearshore for beneficial purposes [feeder berms]. As discussed in previous responses, suitable maintenance material from the completed project could be placed directly on Tybee Beach or in the nearshore are off Tybee Island and in sites adjacent to the entrance channel (See Figure 3-3).

The Base Plan (the plan which is the most cost efficient and meets all applicable environmental standards) for the disposal of dredged material from the first portion of the inner harbor and the entrance channel is to place that material into the Jones Island/Oysterbed Island CDF or the ODMDS

However, suitable maintenance material could be placed directly on the beach at Tybee Island or into the nearshore areas off Tybee Island as shown in Figuure 3-3 providing a cost-sharing sponsor was willing to pay the additional costs associated with placing the material into these areas over the Base Plan costs.

760APB-MR-76-EV06
Comment: *Page 46, 2nd to last paragraph, line 2. EROC Mearshore should be corrected to read ERDC Nearshore.*

Response: This correction has been made.

760APB-MR-76-EV07
Comment: *Section 7.01, 4th Paragraph. The text discusses how the increase in salinity and decreased 00 will remain downstream of the 1-95 bridge. How does this compare to existing levels? It is difficult to assess impact when the document does not state how this is a change from existing conditions.*

Response: The anticipated changes in both dissolved oxygen and salinity are well documented in FEIS-Section 5.02. FEIS-Table 5.23 presents summary information on changes in dissolved oxygen and Section 5.03 presents anticipated impacts to fishery resources resulting from changes in salinity and dissolved oxygen.

760APB-MR-76-EV08
Comment: *Section 7.02.2 (c). The assessment does not account for the loss of salt marsh due to increased wave action from the larger ships that will be using the channel.*

Response: The District examined the effects of wave activity on adjacent shorelines [GRR, Appendix C, Section 9.0] and concluded that deepening the navigation channel would not affect the present erosion rate for the inner harbor shoreline. Therefore, no additional wetlands impacts are expected to occur due to SHEP-related wave activity.

Page Appen. B-2

760APB-MR-76-EV09
Comment: *Section 7.02.5 (c & d). The last paragraph of section c and the first paragraph of section d are contradictory. Section c states that "[i]ncreases in ship traffic are expected to occur in the future ..... Section d then states "the number of vessels ... is expected to decrease ... " Which is it? The data to back up this information should also be cited in order to substantiate the claim.*

Response: Section 7.02.5, paragraphs c. and d. have been revised as necessary to address issues associated with ship traffic. As discussed previously, after deepening, vessel traffic would decrease as ships are able to load/unload more deeply without the present constraints of draft.

760APB-MR-76-EV10
Comment: *Section 7.02.7 (c). The document states that sediment deposition would be conducted in a manner to not interfere with nesting terns. There is no detail provided to substantiate this claim. Has a monitoring plan been developed in order to determine the location of nests prior to deposition of sediments? Will deposition occur near nesting terns? If so, how close? If CDF's are being used for breeding, feeding, and loafing for any listed species, the relevant laws related to protection of sensitive*

species would apply and mitigation should be required if the disturbance of the sensitive species habitats are not authorized by the specific law that protects the sensitive species.

Response: All new work dredged sediment would be placed in the EPA-approved Ocean Dredged Material Disposal Site or an existing upland confined disposal facility (CDF). Management of the CDFs for birds has been and will continue to be in accordance with the Long-Term Management Study [LTMS]. In essence, the LTMS [1996] dictates that when a CDF is in use, it will experience an alternating wet and dry phase, of three years respectively. Thus, about half the CDFs are wet and the other half dry at any given time, but there are always CDFs available for breeding, feeding, and loafing. The CDFs are monitored for colonial beach nesting birds and Black-necked Stilts. The dredger is required to set his head section in a manner which will minimize initial/subsequent nest flooding. Water is also held in the CDFs to induce the Stilts to nest at the highest elevations [periphery] to minimize potential chick losses if disposal operations occur later in the rearing season.

760APB-MR-76-EV11

Comment: *Section 7.02.9 (d). Has a monitoring plan been developed? What monitoring protocol will be used and how will it be used in order to ensure adequate habitat is available during the project for nesting? If the entire area is disturbed in a short period of time, it is highly unlikely that any habitat will be available for nesting during the project.*

Response: Plans to protect nesting terns in the CDFs have been in place for years. The Long-Term Management Study (LTMS) included the establishment of "bird islands" in some of the CDFs with specific features which facilitate nesting of terns and other shorebirds. Water levels in the CDFs are maintained at levels which permit the birds to use the raised islands for nesting, but limit access for most non-avian predators. The areas are also monitored [District wildlife biologist] to ensure that water levels do not endanger the nests/young chicks.

760APB-MR-76-EV12

Comment: *Section 7.02.10 (c). Lines 6 and 7. There is nothing in the document to substantiate this claim. A reference should be cited.*

Response: The avoidance statement was made based on recurrent field observations, but no specific reference is available. The sentence will be revised to reflect that the vibrations from the heavy equipment appear to be sensed by some species, allowing them to elude danger.

760APB-MR-76-EV13

Comment: *Section 7.02.11 (c). Have any nest surveys been completed near the impact areas? Surveys should be completed prior to determination of no impact.*

Response: No bald eagle nests have been observed on any of the subject CDFs.

760APB-MR-76-EV14

Comment: *Section 7.02.14 (c). The document does not consider or mention the impacts from saltwater intrusion into freshwater, thereby reducing available habitat. The reduction in available freshwater habitats is an impact that must be considered.*

Response: In fact, increased salinity and loss of freshwater habitats was considered extensively. As indicated in the BATES, the SHEP would primarily affect palustrine, estuarine, and marine habitats. Construction of the fish bypass at New Savannah Bluff Lock and Dam would provide access to historic spawning habitats at the Augusta Shoals for the Shortnose sturgeon.

760APB-MR-76-EV15

Comment: *Section 7.02.15 (c). The document states that sediment deposition would be conducted in a manner to not interfere with nesting yellow crowned night herons. There is no detail provided to substantiate this claim. Has a monitoring plan been developed in order to determine the location of nests prior to deposition of sediments? Will deposition occur near nesting areas? If so, how close?*

Response: All dredged material would be placed in the EPA-approved Ocean Dredged Material Disposal Site or an existing upland confined disposal facility (CDF). Management of the CDFs for birds has been and will continue to be in accordance with the Long-Term Management Study [LTMS]. In essence, the LTMS [1996] dictates that when a CDF is in use it will experience an alternating wet and dry phase, of three years respectively. Thus, about half the CDFs are wet and the other half dry at any given time, but there are always CDFs available for breeding, feeding, and loafing. The CDFs are monitored for colonial nesting birds and Black-necked Stilts. The dredger is required to set his head section in a manner which will minimize initial/subsequent nest flooding. Water is also held in the CDFs to induce the Stilts to nest at the highest elevations [periphery] to minimize potential chick losses if disposal operations were to occur later in the rearing season.

760APB-MR-76-EV16

Comment: *Section 7.02.17 (b). The document states that no gopher frogs have been observed at the CDFs, but does not provide any reference to a study that has looked for the frogs. Information should be provided as to which studies would have been expected to document gopher frogs had they been present. Non-presence cannot be determined by a lack of study.*

Response: Appendix B-Section 7.00 has been revised. CDFs 12A, 13A, 13B, 14A, 14B, and Jones/Oysterbed are located in South Carolina. The gopher frog has ecological value, but since it is not federally-listed threatened or endangered, a detailed survey is not warranted. In addition, all areas that would be physically impacted (e.g. CDFs, ship channels) have been previously disturbed and are recurrently in use. Thus, they are not likely to harbor sensitive/reclusive species.

The SC Department of Natural Resources, Heritage Trust Program indicated that there have been "no known occurrences" of gopher frogs located in the subject CDFs (Personal Communication, 1 March 2011, Ms. Julie Holling, SC Department of Natural Resources, Heritage Trust Program).

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760APB-MR-76-EV17

Comment: *Section 7.02.20 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.*

Response: The American oystercatcher has ecological value, but since it is not federally listed threatened or endangered, a detailed survey is not warranted. Although water bird colonies are located in areas [CDFs, ship channels] that would be physically impacted by SHEP, the American oystercatcher has not been documented in these environs.

760APB-MR-76-EV18

Comment: *Section 7.02.21 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.*

Response: State-listed sensitive species have ecological value, but since they are not federally listed as threatened or endangered species, a detailed survey was not warranted. In addition, all areas that would be physically impacted [CDFs, ship channels] have been previously disturbed and are not likely to harbor sensitive species.

760APB-MR-76-EV19

Comment: *Section 7.02.22 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.*

Response: This species has ecological value, but since it is not federally-listed threatened or endangered, a detailed survey is not warranted. In addition, all areas that would be physically impacted [CDFs, ship channels] have been previously disturbed and are not likely to harbor sensitive species.

760APB-MR-76-EV20

Comment: *Section 7.03.Savannah River. The document states that the overall effect on the river and its fisheries are not expected to be significant. The impact on fisheries was not adequately addressed considering the fact that over 400 acres of habitat is expected to be lost to the shortnose sturgeon alone. In addition, the lost habitat may have been underrepresented by the modeling. For example, a baseline level of 4.5 mg/l of dissolved oxygen was used to determine if habitat was available for shortnose sturgeon. This is a minimum level at which the agencies determined shortnose sturgeon can survive, but does not necessarily indicate the dissolved oxygen level that is necessary for foraging, resting, and moving. For example, the Collins et al. (2001) study ofshortnose sturgeon habitat use cited in Section 8.02.7 of this appendix, reported minimum mean dissolved oxygen levels of 6.36 and 6.45 in areas where adults and juveniles were found, respectively.*

Response: The criteria, data, and model outputs presented in the FEIS are sufficient to evaluate impacts under the different project alternatives. The habitat suitability criteria used in the model runs were defined and agreed upon by the Cooperating Agencies and the Fisheries Interagency Coordination Team. Recent model runs were performed for juvenile sturgeon with the salinity tolerance adjusted from <= 4 ppt to <=14.9 ppt. The revised modeling results are incorporated into the Final EIS.

The District conducted studies and worked in conjunction with a Fisheries Interagency Coordination Team (of which NOAA Fisheries was a member) to identify critical species and acceptable habitat criteria for each life stage. The results of the extensive analyses and mitigation planning, including fish passage at New Savannah Bluff Lock and Dam, flow re-routing, and addition of dissolved oxygen, have minimized impacts to Shortnose Sturgeon habitat. The fisheries studies/analyses identified by the Fisheries

Interagency Coordination Team have been completed and the results/conclusions thereof have adequately evaluated the impacts of the various project alternatives.

As noted in DEIS-Section 5.03.2, the Cooperating Agencies and the Fisheries Interagency Coordination Team could not identify measures within the estuary that could completely restore Shortnose Sturgeon habitat. As a result, the team agreed [2007] that passage around the New Savannah Bluff Lock and Dam would compensate for habitat losses by increasing access to the sturgeon's historic upstream spawning areas at the Augusta Shoals.

760APB-MR-76-EV21

Comment: *The habitat use information, in conjunction with agency comments reported on page 128 #4, 2nd paragraph in Appendix N, again suggests the habitat modeling overrepresented the available habitat for sturgeon by denoting it all as equally beneficial at the 4.5 mg/1 dissolved oxygen threshold and thus failed to quantify the intensity of the impact to the fisheries. In the Appendix N documentation, Prescott Brownell, from NM.FS requested that a range of suitable habitat thresholds be used for modeling habitat availability. The agency panel then redacted his comments from the record without providing an adequate basis for the redaction. The panel decided the current methods were "acceptable for now." This comment would suggest that additional work would be necessary in the future in order to adequately asses the impacts. The narrative does not provide adequate discussion as to why the pass/fail approach was more adequate than the range approach suggested by Mr. Brownell.*

Response: The habitat suitability criteria that were used to assess habitat availability for a particular fish species, including Shortnose sturgeon, were developed by the Fisheries Interagency Coordination Team. These criteria were based on its member's professional expertise/experience, pertinent literature, and site specific data for the Savannah River. Comments made during the process remain available for inspection; however, further deliberation sometimes resulted in a change of opinion by ICT members [the NMFS representative in this particular instance].

760APB-MR-76-EV22

Comment: *Additional questions as to the validity of the fisheries assessment are based on the habitat models and their interpretation for impact determination. On page 132 of Appendix N. the memorandum for the record states that other fish were not modeled for habitat suitability because the Corps did not wish to spend the time modifying existing models and they would instead use other species as surrogates. Avoidance of spending time developing models is a suspect reason for not pursuing the assessment of some species. This is especially true when no documentation, reference, or justification was given as to the acceptability of using modeled species as surrogates for those species that were not modeled. Furthermore, the completed models were not used to extrapolate the potential impacts to species that were not modeled when determining potential impacts.*

Response: It is a common/accepted practice in modeling development to use a limited number of species. However, the species selected should adequately represent the range of impacts anticipated for the action. The selected species in this instance meet that test.

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760APB-MR-76-EV23

Comment: *Section 7.04. The note on Rafinesque's big-eared bat states that some bottomland hardwood tress could be affected by salinity. Other sections of the document state that upland areas will not be affected by the project; however, this area highlights that effects may occur in upland areas. The potential effects should be investigated in greater detail in order to provide quantifiable impacts for the assessment of loss of habitat for this species.*

Response: This species has ecological value, but since it is not federally listed threatened or endangered, a detailed survey is not warranted. Because bottomland hardwoods recurrently flood [typically on a seasonal basis], they are not generally characterized as uplands.

760APB-MR-76-EV24

Comment: *Section 7.04.2 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.*

Response: CDFs 12A, 13A, 13B, 14A, 14B, and Jones/Oysterbed are located in South Carolina. The barrel floater has ecological value, but since it is not federally-listed threatened or endangered, a detailed survey is not warranted. In addition, all areas that would be physically impacted (CDFs, ship channels) have been previously disturbed and are recurrently in use. Thus, they are not likely to harbor species requiring a structured environment.

The SC Department of Natural Resources, Heritage Trust Program indicated that there have been "no known occurrences" of barrel floaters inhabiting the subject CDFs (Personal Communication, 1 March 2011, Ms. Julie Holling, SC Department of Natural Resources, Heritage Trust Program). This information has been added to EIS-Appendix B.

760APB-MR-76-EV25

Comment: *Section 7.04.5 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.*

Response: All of the CDFs to be used for this project (12A, 12B, 13A, 13B, 14A, 14B, and Jones/Oyster bed) are located in South Carolina. The Carolina slab shell has ecological value, but since it is not federally-listed threatened or endangered, a detailed survey is not warranted. In addition, all areas that would be physically impacted (e.g. CDFs, ship channels) have been previously disturbed and are not likely to harbor sensitive species.

The SC Department of Natural Resources, Heritage Trust Program indicated that there have been "no known occurrences" of the Carolina slabshell in these CDFs (Personal Communication, 1 March 2011, Ms. Julie Holling, SC Department of Natural Resources, Heritage Trust Program). This information has been added to Appendix B of the EIS.

760APB-MR-76-EV26, 760APB-MR-76-EV27

Comment: *Section 7.04.7 (c). 2nd paragraph. The narrative states that ship encounters with pygmy sperm whale are extremely rare, but do not provide a reference or other information to substantiate this claim. The data to back up this information should also be cited in order to substantiate the claim. The*

last paragraph of section c and the first paragraph of section d are contradictory. Section c states that "[i]ncreases in ship traffic are expected to occur in the future ... " Section d then states "the number of vessels ... is expected to decrease ... " Which is it? The data to back up this information should also be cited in order to substantiate the claim.

Response: Information was added to Section 7.04.7 of EIS-Appendix B to explain why ship encounters with the pygmy sperm whale are expected to be extremely rare.

760APB-MR-76-EV28

Comment: *Section 7.04.8 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.*

Response: All of the CDF's to be used for this project (i.e., 12A, 12B, 13A, 13B, 14A, 14B, and Jones/Oyster bed) are located in South Carolina. The yellow lamp mussel has ecological value, but since it is not federally listed threatened or endangered, a detailed survey is not warranted. In addition, all areas that are to be physically impacted (CDFs, ship channels) have been previously disturbed and are not likely to harbor sensitive species.

The SC Department of Natural Resources, Heritage Trust Program indicated that there have been "no known occurrences" of the yellow lamp mussel in these CDFs (Personal Communication, 1 March 2011, Ms. Julie Holling, SC Department of Natural Resources, Heritage Trust Program). This information has been added to EIS-Appendix

760APB-MR-76-EV29

Comment: *The narrative also provides 2c sections and 2d sections that have different impact and effect determinations. Which apply here?*

Response: This section has been revised.

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760APB-MR-76-EV30

Comment: *Section 7.04.9 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.*

Response: All of the CDFs to be used in this project (12A, 13A, 13B, 14A, 14B, and Jones/Oyster bed) are located in South Carolina. The dwarf siren has ecological value, but since it is not federally listed threatened or endangered, a detailed survey is not warranted. In addition, all areas that would be physically impacted (CDFs, ship channels) have been previously disturbed and are not likely to harbor sensitive species.

The SC Department of Natural Resources, Heritage Trust Program indicated that there have been "no known occurrences" of the dwarf siren in these CDFs Personal Communication, 1 March 2011, Ms. Julie Holling, SC Department of Natural Resources, Heritage Trust Program). This information has been added to EIS-Appendix B.

760APB-MR-76-EV31

Comment: *Section 7.04.11 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.*

Response: All of the CDFs to be used for this project (i.e., 12A, 13A, 13B, 14A, 14B, and Jones/Oyster bed) are located in South Carolina. The eastern floater has ecological value, but since it is not federally listed threatened or endangered, a detailed survey is not warranted. In addition, all areas that would be physically impacted (CDFs, ship channels) have been previously disturbed and are not likely to harbor sensitive species.

The SC Department of Natural Resources, Heritage Trust Program indicated there have been "no known occurrences" of the eastern floater in these CDFs (Personal Communication, 1 March 2011, Ms. Julie Holling, SC Department of Natural Resources, Heritage Trust Program). This information has been added to EIS-Appendix B.

760APB-MR-76-EV32

Comment: *Section 7.04.15 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.*

Response: All of the CDF's to be used for this project (i.e., 12A, 13A, 13B, 14A, 14B, and Jones/Oyster bed) are located in South Carolina. The eastern creek shell has ecological value, but since it is not federally listed threatened or endangered, a detailed survey is not warranted. In addition, all areas that would be physically impacted (CDFs, ship channels) have been previously disturbed and are not likely to harbor sensitive species.

The SC Department of Natural Resources, Heritage Trust Program indicated that there have been "no known occurrences" of the eastern creek shell in these CDFs (Personal Communication, 1 March 2011, Ms. Julie Holling, SC Department of Natural Resources, Heritage Trust Program). This information has been added to EIS-Appendix B.

760APB-MR-76-EV33

Comment: *Section 7.04.16 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.*

Response: All of the CDF's to be used for this project (i.e., 12A, 13A, 13B, 14A, 14B, and Jones/Oysterbed) are located in South Carolina. The water hyssop has ecological value, but since this species is not federally listed threatened or endangered, a detailed survey is not warranted. In addition, all areas that would be physically impacted (CDFs, ship channels) have been previously disturbed and are not likely to harbor sensitive species.

The SC Department of Natural Resources, Heritage Trust Program indicated that there have been "no known occurrences" of the Coastal Plain water hyssop being found in these CDFs (Personal Communication, 1 March 2011, Ms. Julie Holling, SC Department of Natural Resources, Heritage Trust Program). This information has been added to EIS-Appendix B.

760APB-MR-76-EV34

Comment: *Section 7.04.21 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.*

Response: All of the CDFs to be used for this project (12A, 13A, 13B, 14A, 14B, and Jones/Oysterbed) are located in South Carolina. The grassland arrowhead has ecological value, but since it species is not federally listed threatened or endangered, a detailed survey is not warranted. In addition, all areas that would be physically impacted (CDFs, ship channels) have been previously disturbed and are not likely to harbor sensitive species.

The SC Department of Natural Resources, Heritage Trust Program indicated that there have been "no known occurrences" of the grassland arrowhead in these CDFs (Personal Communication, 1 March 2011, Ms. Julie Holling, SC Department of Natural Resources, Heritage Trust Program). This information has been added to EIS-Appendix B.

760APB-MR-76-EV35

Comment: *Section 7.04.22 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.*

Response: All of the CDFs to be used for this project (12A, 13A, 13B, 14A, 14B, and Jones/Oysterbed) are located in South Carolina. The Florida yellow-eyed grass has ecological value, but since it is not federally listed threatened or endangered, a detailed survey is not warranted. In addition, all areas that would be physically impacted (CDFs, ship channels) have been previously disturbed and are not likely to harbor sensitive species.

The SC Department of Natural Resources, Heritage Trust Program indicated that there have been "no known occurrences" of the Florida yellow-eyed grass in these CDFs (Personal Communication, 1 March 2011, Ms. Julie Holling, SC Department of Natural Resources, Heritage Trust Program). This information has been added to EIS-Appendix B.

760APB-MR-76-EV36

Comment: *Section 7.04.23 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.*

Response: All of the CDFs to be used for this project (12A, 13A, 13B, 14A, 14B, and Jones/Oysterbed) are located in South Carolina. The acid swamp yellow-eyed grass has ecological value, but since it is not federally listed threatened or endangered, a detailed survey is not warranted. In addition, all areas that would be physically impacted (CDFs, ship channels) have been previously disturbed and are not likely to harbor sensitive species.

The SC Department of Natural Resources, Heritage Trust Program indicated that there have been "no known occurrences" of the acid swamp yellow-eyed grass in these CDF's (Personal Communication, 1 March 2011, Ms. Julie Holling, SC Department of Natural Resources, Heritage Trust Program). This information has been added to EIS-Appendix B.

760APB-MR-76-EV37

Comment: *Section 7.04.24 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.*

Response: All of the CDFs to be used for this project (12A, 13A, 13B, 14A, 14B, and Jones/Oysterbed) are located in South Carolina. The slender leaved dragon head has ecological value, but since this species is not a federally listed threatened or endangered species, a detailed survey is not warranted. In addition, all areas that would be physically impacted (CDFs, ship channels) have been previously disturbed and are not likely to harbor sensitive species.

The SC Department of Natural Resources, Heritage Trust Program indicated that there have been "no known occurrences" of the slender leaved dragon head in these CDFs (Personal Communication, 1 March 2011, Ms. Julie Holling, SC Department of Natural Resources, Heritage Trust Program). This information has been added to EIS-Appendix B.

760APB-MR-76-EV38

Comment: *Section 7.04.25 (c). If the habitat requirement is similar to what is found in the estuary, then surveys should be conducted in impact areas to demonstrate absence from the habitats. It is impossible to determine impact without knowing whether or not it exists in the impact areas.*

Response: All of the CDFs to be used for this project (i.e., 12A, 13A, 13B, 14A, 14B, and Jones/Oysterbed) are located in South Carolina. The hairy fever tree has ecological value, but since it is not federally listed threatened or endangered, a detailed survey is not warranted. In addition, all areas that would be physically impacted (CDFs, ship channels) have been previously disturbed and are not likely to harbor sensitive species.

The SC Department of Natural Resources, Heritage Trust Program indicated there have been "no known occurrences" of the hairy fever tree in these CDFs (Personal Communication, 1 March 2011, Ms. Julie Holling, SC Department of Natural Resources, Heritage Trust Program). This information has been added to EIS-Appendix B.

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760APB-MR-76-EV39

Comment: *Section 7.05.Savannah River. The document states that the overall effect on the river and its fisheries are not expected to be significant. The impact on fisheries was not adequately addressed considering the fact that over 400 acres of habitat is expected to be lost to [he shortnose sturgeon alone. In addition, the lost habitat may have been underrepresented by the modeling. For example, baseline levels of3.5 to 4.0 mg/l of dissolved oxygen was used to determine if habitat was available for adult shortnose sturgeon. This is a minimum level at which the agencies determined shortnose sturgeon can survive, but does not necessarily indicate the dissolved oxygen level that is necessary for foraging, resting, and moving. For example, the Collins et al. (200 l) study of shortnose sturgeon habitat use cited in Section 8.02.7 of this appendix, reported minimum mean dissolved oxygen levels of 6.36 and 6.45 in areas where adults and juveniles were found, respectively.*

Response: The criteria, data, and model outputs presented in the FEIS are sufficient to evaluate the impacts associated with each project alternative. The habitat suitability criteria used in the model runs were defined and agreed upon by the Cooperating Agencies and the Fisheries Interagency Coordination

Team. Recent model runs were performed for juvenile sturgeon with the salinity tolerance adjusted from <= 4 ppt to <=14.9 ppt. These revisions to the original modeling results are incorporated into the Final EIS.

The District conducted its own studies and worked in conjunction with a Fisheries Interagency Coordination Team (of which NOAA Fisheries was a member) to identify critical species and acceptable habitat criteria for each life stage. The results of the extensive analyses and mitigation planning together with structural measures such as the fish passage at New Savannah Bluff Lock and Dam, flow re-routing, and addition of dissolved oxygen, have minimized impacts to Shortnose Sturgeon habitat. All fishery studies/analyses identified by the Fisheries Interagency Coordination Team as necessary to evaluate the impacts of the various project alternatives have been completed.

As noted in DEIS-Section 5.03.2, the Cooperating Agencies and the Fisheries Interagency Coordination Team could not identify measures within the estuary that could completely restore Shortnose Sturgeon habitat. As a result, the team agreed [2007] that passage around the New Savannah Bluff Lock and Dam would compensate for habitat losses by increasing the sturgeon's upstream range an additional 20 miles.

760APB-MR-76-EV40

Comment: *The habitat use information, in conjunction with agency comments reported on page 128 #4, 2nd paragraph in Appendix N, again suggests the habitat modeling overrepresented the available habitat for sturgeon by denoting it all as equally beneficial at the 4.0 mg/l dissolved oxygen threshold and thus failed to quantify the intensity of the impact to the fisheries. In the Appendix N documentation, Prescott Brownell, from NMFS requested that a range of suitable habitat thresholds be used for modeling habitat availability. The agency panel then redacted his comments from the record without providing an adequate basis for the redaction. The panel decided the current methods were "acceptable for now." This comment would suggest that additional work would be necessary in the future in order to adequately asses the impacts. The narrative does not provide adequate discussion as to why the pass/fail approach was more adequate than the range approach suggested by Mr. Brownell.*

Response: The habitat suitability criteria that were used to assess habitat availability for a particular fish species, including Shortnose sturgeon, were developed by the Fisheries Interagency Coordination Team. These criteria were based on its member's professional expertise/experience, pertinent literature, and site specific data for the Savannah River. Comments made during the process remain available for inspection; however, further deliberation sometimes resulted in a change of opinion by ICT members [the NMFS representative in this particular instance].

760APB-MR-76-EV41

Comment: *Additional questions as to the validity of the fisheries assessment are based on the habitat models and their interpretation for impact determination. On page 132 of Appendix N, the memorandum for the record states that other fish were not modeled for habitat suitability because the Corps did not wish to spend the time modifying existing models and they would instead use other species as surrogates. A voidance of spending time developing models is a suspect reason for not pursuing the assessment of some species. This is especially true when no documentation, reference, or justification was given as to the acceptability of using modeled species as surrogates for those species that were not modeled. Furthermore, the completed models were not used to extrapolate the potential impacts to species that were not modeled when determining potential impacts.*

Response: It is a common/accepted practice in modeling development to use a limited number of species. However, the selected species should adequately represent the range of impacts anticipated for the action. The selected species in this instance meet that test.

760APB-MR-76-EV42
Comment: *Section 8.02.1, The section header misspelled Bachman's warbler. Backman's should read Bachman's.*

Response: The Table of Contents, Section 8.02.1 and Section 8.02.1 (a) 3, have been revised from "Backman's warbler" to "Bachman's warbler".

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760APB-MR-76-EV43
Comment: *Section 8.02.1 (c). This sections states that no upland habitats will be adversely affected by the proposed action. This is contradictory to information provided in a note in section*

Response: The comment is incomplete; terrestrial resources are addressed in detail in EIS-Sections 4.07 and 5.08.

760APB-MR-76-EV44
Comment: *Section 7.04. The note on Rafinesque's big-eared bat states that some bottomland hardwood tress could be affected by salinity. Will upland habitats be affected or not?*

Response: Bottomland hardwoods could be affected by salinity changes, but modeling indicates that such impacts are not to be expected. No upland habitats, per se, will be physically impacted by the proposed construction.

760APB-MR-76-EV45
Comment: *Section 8.02.2 (b). What does the term 'the areas' refer to in lines 7, 8, and 9. It is unclear from the text and therefore impossible to determine what the impacts would be.*

Response: The word "areas" refers to the CDFs.

760APB-MR-76-EV46
Comment: *Section 8.02.2 (c). The document does not adequately address the impacts of the project on the wood stork. Impacts to the CDFs, which are currently being used as feeding areas for an endangered species should be quantified and mitigated. More detail should be provided about these impacts, the recovery period, and the habitats that will result from the project.*

Response: The following information has been added to FEIS-Appendix B, Section 7.02. 7(c) and referred to in Section 8.02.2: Management of the CDFs for birds has been and will continue to be in accordance with the Long-Term Management Study [LTMS/1996]. In this instance, the LTMS dictates that when a CDF is in use it will experience an alternating wet and dry phase, of three years respectively. Thus, about half the CDFs are wet and the other half dry at any given time, but there are always CDFs available for breeding, feeding, and loafing.

Based on information developed in Appendix B, the Corps determined that construction of the SHEP "may affect, but is not likely to adversely affect the Wood stork". The USFWS has concurred with this determination. Their report is included in Appendix Z.

760APB-MR-76-EV47

Comment: *Section 8.02.3 (c) 1. The narrative is lacking in providing references that substantiate the factual claims in the document. The data to back up this information should be cited in order to substantiate the claims that impacts will be minimal.*

Additional detail should be provided to indicate the degree to which habitat would be affected during the project and the amount of habitat that will remain unimpacted at anyone point in time. Phrases such as "[O]nly a small portion of the forging habitat is directly affected at any point in time during sediment placement and adjacent habitat is still available ..... does not provide adequate specificity to assess impacts. Additional detail should be provided on benthic recolonization rates to substantiate the as yet unsubstantiated recolonization claims in the document.

Response: After coordination with GA DNR-CRD and the City of Tybee Island, the dredged sediment placement plan has been revised. New work sediments excavated from the entrance channel would now be deposited only in previously-approved areas: Offshore Dredged Material Disposal Site or an upland confined disposal site. The FEIS includes the revised sediment placement plan. Appendix B has been revised accordingly to reflect the exclusion of near shore placement of new work sediments. It should be noted that the USFWS concurred with the the Corps findings that the SHEP "may affect, but is not likely to adversely affect the Piping plover". The report of the USFWS is included in Appendix Z.

760APB-MR-76-EV48

Comment: *Section 8.02.3 (d) l. The word 'we' should be deleted.*

Response: The word "we" has been removed from the text in Section 8.02.3 (d) 1.

760APB-MR-76-EV49

Comment: *Section 8.02.4 (d). The document does not consider the effects that the larger ship traffic, that will result because of this project, may have on manatees. In its current form, the impacts section is inadequate to address potential impacts.*

Response: With deepening, the total number of vessels would decrease (when compared to without project conditions) as vessels would be able to load/unload without the present constraints of draft. Therefore, fewer ships would call on the port. Further, manatees are generally found in shallow water (<20 feet deep), whereas large ships are confined to the much deeper navigation channel. For these reasons, ship traffic is not expected to impact manatees any more than under existing conditions [worst case].

760APB-MR-76-EV50

Comment: *Page 136. The narrative does not discuss how the increase in boat traffic or deposition of material in the nearshore area of Tybee Island will affect loggerhead sea turtles. Failing to discuss all potential impacts suggests this analysis is inadequate.*

Response: With deepening, the total number of vessels would decrease (when compared to without project conditions), as vessels would be able to load/unload without the current constraints of draft.

Therefore, as fewer vessels would be calling on the Port of Savannah, shipping is not expected to impact sea turtles any more than under existing conditions [worst case].

After coordination with GA DNR-CRD, the dredged sediment placement plan has been revised. Material from the entrance channel would only be placed in previously-approved areas: Ocean Dredged Material Disposal Site or an existing upland confined disposal facility. Since no beach disposal will occur, sea turtle nesting activities would be unchanged from the status quo.

760APB-MR-76-EV51

Comment: *Page 148. Conservation Measures (a). 2nd Paragraph line 2. The document credits turtle deflecting dragheads with significantly minimizing the risk of sea turtle take. No references or sources have been cited to substantiate this claim. Since the avoidance of take claims stated later depend upon this assertion, the avoidance claims are not valid unless this claim is substantiated.*

Response: Appendix B has been changed as follows: Since its inception, turtle deflecting drag heads have been used on almost all hopper dredges operating in the South Atlantic. This device has significantly reduced the risk of sea turtle take (Nelson and Shafer 1996; Clausner et al. 2004; Dickerson et al. 2004).

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760APB-MR-76-EV52

Comment: *Page 154. A. 4. Are the dates correct? Will the observer only be onboard in December and March? The first paragraph of Section A states the dredging will occur from December through March. If an observer is only present for 2 of the 4 months, how will compliance with protocol be ensured?*

Response: The dates shown in paragraph A. 4 of Appendix B, Section 8.02.6 have been revised to state -- 1 December through 31 March. The text in the FEIS was corrected.

760APB-MR-76-EV53

Comment: *Page ISS. C. first paragraph, last sentence. An assessment in 1996 is not valid today due to changes in the endangered species list and in the environment. The areas should again be assessed for potential endangered species impacts.*

Response: The impacts of the SHEP on threatened and endangered species are fully addressed in the EIS. The USFWS has submitted a report on their findings with respect to those species for which they have responsibility, and the NMFS has submitted their BO. These documents are included in Appendix Z.

760APB-MR-76-EV54

Comment: *Section 8.02.7. Shortnose sturgeon and Atlantic sturgeon are grouped together for purposes of assessing impacts from the project. The narrative justifies the grouping due to their "similarities in habitat use, distribution throughout the proposed action area, foraging behavior and prey base, and subsequent risk of take relative to dredging and trawling operations ... " No citations or other reference information was provided to substantiate this decision to group the species. Other information provided in the appendix provides information that contradicts the claim that the species are similar enough to group together for impact assessment purposes. For example, on Page 170, last paragraph, the narrative states that Atlantic sturgeon primarily lead a marine existence and are therefore more likely to be impacted by hopper dredges than the more estuarine based shortnose sturgeon. The first sentence of the*

second paragraph on Page 174 also states that the habitat ranges for shortnose and Atlantic sturgeon are slightly different. In addition, the SRT 2007 report states that not all rivers that support Atlantic sturgeon, support shortnose sturgeon. This information again reiterates the differences between the two species, the need to assess them independently, and the shortcomings of an assessment that assesses them together.

Response: The Shortnose and Atlantic sturgeon are sufficiently similar to be considered together. This conclusion is based on their habitat use, distribution throughout the proposed action area, foraging behavior/prey base, and subsequent risk of take relative to dredging/trawling operations. Information on these species can be obtained from the following link and other sources. http://sero.nmfs.noaa.gov/pr/sturgeon.htm. See also other responses on this issue.

760APB-MR-76-EV55

Comment: *Page 157, 1st paragraph, Unsubstantiated claims are made throughout this paragraph without any reference materials, peer-reviewed or otherwise, cited.*

Response: The reference is (NMFS, 1998a) as stated at end of the paragraph. This document has gone through an agency technical review process and an independent external peer review.

760APB-MR-76-EV56

Comment: *Page 157, 2nd paragraph, specifically lines 1-7. Unsubstantiated claims are made throughout this paragraph without any reference materials, peer-reviewed or otherwise, cited.*

Response: References are provided throughout the paragraph, and as stated in the previous comment, the document has undergone the agency technical review process and an independent external peer review.

760APB-MR-76-EV57

Comment: *Page 160, present conditions, l sl paragraph. The use of 4.0 mg/l continues to be used in spite of the information provided by Collins et al. 2001 that mean DO levels in sturgeon habitat use areas were 6.45 and greater. The claim that prolonged exposure to low oxygen levels may not produce acute impacts to fish is unsubstantiated by any outside reference materials. This use of 4.0 mg/l is a minimum level at which the agencies determined shortnose sturgeon can survive, but does not necessarily indicate the dissolved oxygen level that is necessary for foraging, resting, and moving. The agency comments reported on page 128 #4, 2nd paragraph in Appendix N, again suggests the habitat modeling overrepresented the available habitat for sturgeon by denoting it all as equally beneficial at the minimum dissolved oxygen threshold and thus failed to quantify the intensity of the impact to the fisheries. In the Appendix N documentation, Prescott Brownell, from NMFS requested that a range of suitable habitat thresholds be used for modeling habitat availability. The agency panel then redacted his comments from the record without providing an adequate basis for the redaction. The panel decided the current methods were "acceptable for now." This comment would suggest that additional work would be necessary in the future in order to adequately asses the impacts. The narrative does not provide adequate discussion as to why the pass/fail approach was more adequate than the range approach suggested by Mr. Brownell.*

Response: The criteria, data, and model outputs presented in the EIS are sufficient to evaluate the impacts associated with each project alternative. The habitat suitability criteria used in the model runs were defined and agreed upon by the Cooperating Agencies and the Fisheries Interagency Coordination Team.

The second paragraph was based on previous discussions within the Shortnose Sturgeon section. A citation has been added to the 3'[d] paragraph referencing the Case Document/Environmental Assessment Application Number 200801520 for a Department of the Army Permit requested by the Georgia Ports Authority [U.S. Army Corps of Engineers, Savannah District, 2003]. The reference has been added to the literature cited section.

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760APB-MR-76-EV58
Comment: *Page 160, present conditions, paragraphs 2 and 3. Information provided is unsubstantiated by any outside reference materials and are therefore considered baseless for assessing impacts.*

Response: The second paragraph was based on previous discussions within the Shortnose Sturgeon section and the references previously cited (Secor and Gunderson, 1998, Niklitschek and Secor, 2000, and Flournoy et. al. 1992). The references have been cited in the text.

760APB-MR-76-EV59
Comment: *Page 164, threats, paragraph I, line 2. Information provided is unsubstantiated by any outside reference materials and are therefore considered baseless for assessing impacts.*

Response: A reference for information on Threats, Appendix B, Section 8.02.7 was added.

760APB-MR-76-EV60
Comment: *Page 170, Dredging methods and associated impacts, line 7. The SRT 2007 report states that habitat loss due to dredging is not just a short-term impact to foraging and refuge habitat. Atlantic sturgeon rely upon deep holes for refugia and are substrate dependent fish. If the bottom of the river is dredged to create an anoxic, uniform bottom without substrate diversity the effects on Atlantic sturgeon would be detrimental over a long-term period.*

Response: The original and deepened channel would have the same alignment and maintenance frequency. Therefore, the substrate diversity will remain essentially unchanged. Since the deepened channel would follow the existing alignment, no natural deep hole refugia [elsewhere within the estuary] would be physically altered. EIS-Sections 5.02 and Appendix C discuss the oxygenation system which would mitigate for reductions in dissolved oxygen levels.

760APB-MR-76-EV61
Comment: *Page 171, Section B, Line 4. What does fairly low mean? The impacts should be quantified and substantiated. Even a single take is not allowed under the ESA unless a permit has been issued.*

Response: Historically hydraulic [cutterhead] dredging has had very little effect on either adult or juvenile Shortnose sturgeon. In fact, there are only five documented cases [page 171] of this kind of take, and none occurred during dredging operations for Savannah Harbor. The NOAA Biological Opinion provides an acceptable number of takes of Shortnose sturgeon by this project.

760APB-MR-76-EV62

Comment: *Page 171, Section B, Lines 4-6 state that eggs and larval sturgeons 100 miles upstream where hydraulic dredges are proposed? Are hydraulic dredges proposed upstream from the project area? If not and the sentence is inaccurate it should be corrected. If it is intended to state that eggs and larval*

sturgeon are located 100 miles upstream from the project area and therefore are outside of the area where hydraulic dredges are being used it is inaccurate.

Response: It is generally agreed that Shortnose sturgeon larvae are not prevalent in the project effect's area (ATM, 2003). This is evidenced by the fact that no Shortnose sturgeon larvae were found during a 2-year investigation of the Savannah River estuary. A single Atlantic sturgeon larva was found at approximately RKM 41 during an ichthyoplankton study (Reinert et al. 1998), but the harbor is only maintained to RKM 34.3.

760APB-MR-76-EV63

Comment: *Page 160 of this document, first paragraph, last line, states that an Atlantic sturgeon larva was found 6.7 km (4 miles) upstream of the project impact area. This information suggests that some larva may drift into the project area. Additional information should be collected to verify the actual location of Atlantic sturgeon spawning to ensure the project dredging and upstream movement of salinity and decreases in DO will not deleteriously impact Atlantic Sturgeon.*

Response: In addition to existing information, an extensive monitoring study in the southeastern U.S. is being funded by NOAA on the Atlantic and Shortnose sturgeon. This effort began in the spring of 2011 and is scheduled to last for 5 years. The work in the Savannah River is being performed by SCDNR. http://www.nmfs.noaa.gov/pr/conservation/states/funded.htm. See also previous responses on this issue.

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760APB-MR-76-EV64

Comment: *Page 175. Indirect impacts. The impacts to refuge habitat are actually likely to be long-term impacts according to the SRT 2007 report. In addition, the loss of deep holes with sufficient levels of DO are likely to result in unavailable habitat in which sturgeon may be able to survive, but will not utilize due to inadequate levels of DO.*

Response: The proposed oxygen injection system would restore and marginally increase [post-project] dissolved oxygen levels in the estuary. Further, the hydrodynamic and water quality model studies gave no indication that after deepening low dissolved oxygen levels would preclude Shortnose sturgeon use of the Savannah River. In fact, the modeling indicates that Shortnose sturgeon habitat in the critical summer months would be improved.

760APB-MR-76-EV65

Comment: *Page 175. Benthic foraging, First paragraph, Line 7. Unsubstantiated claim about benthic recolonization.*

Response: The citation (EA, 2008) has been added.

760APB-MR-76-EV66

Comment: *Page 175. Benthic foraging, First paragraph, Line 8. Unsubstantiated claim without a reference cited.*

Response: A reference has been added to the subject section (Appendix B, Section 8.02.7.).

760APB-MR-76-EV67
Comment: *Page 175, Second paragraph, Lines 6 and 13. Unsubstantiated claim without a reference cited.*

Response: References are provided throughout the paragraph.

760APB-MR-76-EV68
Comment: *Page 176, Line 2. Unsubstantiated claim without a reference cited.*

Response: References are provided throughout the paragraph.

760APB-MR-76-EV69
Comment: *Page 176, Second paragraph, First sentence. Unsubstantiated claim without a reference cited.*

Response: References are provided throughout the paragraph.

760APB-MR-76-EV70
Comment: *Page 176, Second paragraph, Second and third sentences. A correlation between river flow and season does not equate to a correlation between natural community shifts and river flow rates. The logic is flawed in this assertion and it may not be accurate.*

Response: The referenced report (Ray, 1997) contains ample information regarding the correlation of benthic assemblages with flow- and seasonal variation.

760APB-MR-76-EV71
Comment: *Page 176. Impacts from cadmium-laden sediment. 200 paragraph. The text suggests that exposed clay would prohibit benthic recolonization. This statement contradicts earlier assertions that benthos would recolonize quickly.*

Response: There is nothing in the subject report to suggest that Miocene clays exposed after dredging would prohibit benthic colonization. The referenced paragraph merely states the rationale for evaluating potential impacts to benthic communities in areas with cadmium-containing clays. The report discusses benthic communities located in different substrate types [to include Miocene clays] that occur along length of the project. Benthic communities in the harbor/channel are routinely disturbed during dredging operations, but these opportunistic species quickly re-colonize the eroded sediments that are deposited on top of in situ material.

760APB-MR-76-EV72
Comment: *Page 177. First paragraph, lines 5-7 suggest that 28% of the substrate surface is a minor fraction of the system. 28% of the channel bottom is not minor.*

Response: Concur; a percentage of 28 [channel bottom clay particle fraction] is not minor. The referenced studies show bioaccumulation in organisms residing within high cadmium sediments are well below potential effect's levels.

760APB-MR-76-EV73

Comment: *Page 177. Section B. First line. The line claims extensive studies have been conducted, but cites none. Only two studies are included below and neither appears to deal directly with fishes that may be found in the Savannah River.*

Response: The references for the cited information are: Wilber and Clarke, 2001 and Newcombe and Jensen, 1996.

760APB-MR-76-EV74

Comment: *Page 177. Section B, Second paragraph, second sentence. Unsubstantiated claim without a reference cited.*

Response: The second sentence of the paragraph has been revised to add a reference to the EIS-Section 5.07.1- Dredging Impacts. Additional discussions can be found in Appendix B.

760APB-MR-76-EV75

Comment: *Page 179, second paragraph. Line 11 claims fish could use different habitat upstream in order to avoid increased salinity. The studies cited throughout the text and in literature cited by the text highlight the necessary use of estuarine habitats by shortnose and Atlantic sturgeon. Excluding these fish from the necessary habitats is a substantial impact that cannot be mitigated by the assumption that the fish can simply avoid saline habitats.*

Response: As noted in DEIS-Section 5.03.2, the Cooperating Agencies and the Fisheries Interagency Coordination Team could not identify measures [structural/nonstructural] within the estuary that would adequately restore Shortnose sturgeon habitat lost to SHEP construction impacts. As a result, the Team agreed [2007] that a fish bypass around the New Savannah Bluff Lock and Dam would compensate for losses within the estuary by providing access to 20 additional miles of upstream spawning/foraging habitat.

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760APB-MR-76-EV76

Comment: *Page 180. The document explains that since no additional habitat can be modified to make it suitable for sturgeon, the project can mitigate impacts by adding upstream habitats. The addition of upstream habitats may be beneficial for some of the life stages of sturgeon, but it is not a substitute for the necessary nursery areas that will be lost due to the project. There is no evidence to suggest the sturgeon will utilize or benefit from the upstream areas or that any benefits would mitigate deleterious impacts from the loss of estuarine habitats.*

Response: As noted in DEIS-Section 5.03.2 of the Draft EIS, the Cooperating Agencies and the Fisheries Interagency Coordination Team could not identify measures within the estuary that could completely restore Shortnose sturgeon habitat lost to SHEP construction impacts. As a result, the Team agreed [2007] that a fish bypass around the New Savannah Bluff Lock and Dam would compensate for losses within the estuary by providing access to 20 additional miles of upstream spawning/foraging habitat.

Page Appen. C-1

760APC-MR-25-EV01

Comment: *Section 2, Pages 1-5. Fails to discuss what steps were taken to avoid wetland and many other impacts described within Section 5 of the DEIS.*

Response: As indicated in Appendix C, "Mitigation Planning," the first step in avoiding wetland impacts was selection of the channel design. The project design maintains the existing side slopes and extends them downward, rather than maintaining the existing bottom width and extending the side slopes outward. The major effect of this decision is a reduction in the amount of dredging that would be required on the side slopes and removal of the need for a uniform increase in top width of the dredged channel. This minimizes impacts to adjacent high ground/structures located along the riverbank, including adjacent marsh fringe. The second step in avoiding and minimizing wetland impacts is implementation of flow alteration structures (see Appendix C). Without the flow alteration structures, approximately 1,177 acres of freshwater marsh would be converted [shifted] to a more brackish marsh community type. By implementing flow-altering measure 6A, this shift would be reduced to only 223 acres. Thus, flow rerouting plan 6A satisfies both avoidance and minimization conditions by sustaining 954 acres of freshwater marsh that otherwise would have experienced some degree of vegetative conversion.

760APC-MR-25-EV02

Comment: *Section 3, Page 9, Summary Table. States that salt marsh impacts would be - 15.68 acres. A negative impact suggests that there would be a net gain in salt marsh, which is not the case. In addition to the negative impact issue, the quantity of the impact does not match what is provided in Section 5 of the DEIS.*

Response: The negative value reported in the "Summary of Hydrodynamic Impacts" table reflects an acreage loss (excavation) or impact (vegetative shift) specific to that wetland type. FEIS-Section 5 has been updated to reflect a 15.68 acre loss of brackish marsh associated with direct project impacts [dredging activities].

760APC-MR-25-EV03

Comment: *Section 4, Page 11. This project should not result in a net loss of wetlands of any type. Preserving existing wetlands should not count as part of the mitigation unless a direct threat can be shown for each and every site.*

Response: While SHEP is a large project with national implications, its implementation [with the proposed mitigation] will result in a "no net loss of wetland functions". Indirect impacts associated with the proposed deepening have been minimized to a species shift [change in dominance] for up to 223 acres of freshwater marsh and 740 acres of saltmarsh. The District conducted a functional assessment for these impacted wetlands within the project effect's area based on salinity changes. The results of this evaluation demonstrated that the differentiation between salt- and brackish marsh [recommended by the Wetland Interagency Coordination Team for use in the EIS] was narrowly defined. The salinity range used in the SHEP model to differentiate between brackish marsh (0.6-4 ppt) and salt marsh (> 4ppt) was restrictive, given that brackish marsh salinities have been reported with a range from 0.5-10 ppt (NOAA, 2010) and in other estuarine systems from 0.5-17 ppt (Judd and Lonard, 2004). Thus, the salinity range used to quantify salt marsh in the area of potential effect (i.e., > 4 ppt) may over-estimate the amount of saltmarsh in the system and under-estimate the amount of brackish marsh.

Consequently, the actual shift of salt- to brackish marsh [post-construction] may be negligible, when taking into account observed species tolerances in wetland environments together with salinities commonly associated with a brackish marsh (i.e., range between 5 and 10 ppt).

Given the wide salinity ranges reported in literature for brackish marsh systems, the inherent variability in salinity that exists for all estuarine systems, and the modeling results that report post-deepening salinity concentrations consistent with the aforementioned range, it was concluded the 730-acre value [conversion of salt- to brackish marsh] may represent the worst case. Actual vegetative shifts are unlikely to be identifiable *in situ* within the project effect's area. Regardless, the District elected to use an inclusive [most conservative] approach in its assessment of project-related effects and incorporated the noted salt- and brackish marsh conversion value in its calculation of minor impacts.

The conversion of up to 223 acres of freshwater wetland to brackish marsh represents the only significant wetland conversion that is likely to be noticeable if the harbor is deepened to 47-feet . It is important to reiterate that the 223 acres of impact to freshwater wetlands would be a change rather than a loss. The District's calculation of the number of acres of freshwater wetland that have the potential to convert to brackish marsh is based on a shift in the location of 0.5 ppt salinity, a traditional rule-of-thumb for differentiating between freshwater marsh and brackish marsh. However, data reported in the literature for Savannah Harbor suggest that a shift in vegetation (from freshwater marsh to brackish marsh) in this estuary does not occur until salinity concentrations approach 2.5 ppt (Latham et al., 1994). Even at oligohaline marsh sites with average salinity concentration of 2.1 ppt, a discriminant function (DF) analysis revealed that only in 47% of cases was there a correct pairing of environmental variables with vegetative species composition and dominance. At those same oligohaline sites, 37% of the vegetative species composition and dominance were more closely aligned with a freshwater classification (Latham et al., 1994).

The District's salinity value that denotes a defined shift from freshwater to brackish marsh (i.e., 0.5 ppt) is approximately five times lower than traditionally seen with 100% vegetative shifts *in situ* within the Lower Savannah Watershed (Latham et al., 1994) and other coastal marsh systems in the southeastern United States (NOAA, 2010). Thus, many of the existing freshwater emergent plant species, and associated ecological parameters, would likely be sustained in areas predicted to experience salinity concentrations in the range of 2.5 ppt. For those areas that do transition to more brackish characteristics, traditional ecological functions associated with all emergent wetland systems would continue (see functional assessment response).

To ensure the indirect impacts are well characterized, the District adopted a post-construction monitoring plan to evaluate/quantify the degree of wetland conversion that actually occurs. In its Adaptive Management Program, the District also proposed acquisition/preservation of additional wetlands if monitoring demonstrates that wetland impacts were under-predicted.

The District has provided a functional assessment in the FEIS that objectively and quantitatively evaluates the functional losses due to excavation of wetlands and conversion of wetland types. In addition, Savannah District's Regulatory Standard Operating Procedure [SOP] was used to assess functional losses due to excavation of wetlands, as well as the conversion of wetland types that may occur as a result of the SHEP. The Wetland ICT concurred with use of the SOP to quantify impacts and the associated mitigation.

In summer 2003, a Wetland Interagency Coordination Team (ICT) was assembled to assist in analyzing potential wetland impacts from the SHEP. The team [agency wetland experts from US EPA, USFWS,

NMFS, GA DNR, SC DNR, and SC DHEC] identified an acceptable technical approach to determine wetland impacts. They also identified their information needs to review the EIS. Since creation of the team, the District hosted seven meetings of the ICT. During those meetings, methods for evaluating functional losses and mitigation alternatives for wetland impacts were proposed and discussed at length. After every meeting, the District prepared a Memorandum for Record (MFR), which was provided to all members of the ICT.

The Corps conducted an Agency Technical Review (ATR) to assess the use of Savannah District's SOP as a tool in the development of a mitigation plan for SHEP. The ATR was lead by the National Deep-Draft Navigation Planning Center of Expertise. Actual analysis was performed by experts at the Corps' Engineering Research and Development Center in Vicksburg, MS. The ATR sought to determine if the SOP was an appropriate method to ascertain the preservation acreage needed to compensate for impacts resulting from the SHEP. The ATR also evaluated the assumptions and calculations that the Savannah District used in applying the SOP for the SHEP. The SOP was used to determine the amount of preservation acreage necessary to offset the remaining impacts ONLY after avoidance, minimization, and restoration measures had been applied. After extended deliberation, the ATR concurred with using the SOP to determine the amount of preservation acreage needed. Moreover, it considered the Savannah District's application of the SOP to be reasonable in quantifying impacts together with the associated mitigation that would be required.

A USFWS Fish and Wildlife Coordination Act Report, dated August 2010 concurred with use of the SOP, which calculated a need to preserve 2,245 acres in parcels adjacent to the SNWR . The Service provided updates to the SOP calculations in Appendix A of the report. The District concurred with use of the updated SOP worksheets and adopted the results of those calculations for use in the EIS. In its Adaptive Management Program, the District also proposed acquisition of additional wetlands if monitoring demonstrates that wetland impacts were under-predicted.

As detailed in other response sections and the EIS, deepening the harbor to a 47-foot depth would result in a conversion of the dominant vegetative species typically observed in up to 223 acres of freshwater marsh [freshwater to brackish marsh scenario]. Likewise, the 47-foot depth would convert the dominant vegetative species typically observed in 740 acres of saltmarsh [saltmarsh to brackish marsh scenario]. Nonetheless, dominant saltmarsh species like *Spartina alterniflora* would still be observed in areas which have salinities that define a brackish marsh. However, the basic wetland functions typically associated with these systems would not be materially changed. A comparison of potential changes in elements of wetland function for both conversion scenarios is provided below.

Changes in Wetland Function as a Result of Wetland Conversion

Elements of Wetland Function	Freshwater to Brackish Marsh (Approximately 223 acres)	Saltmarsh to Brackish Marsh (Approximately 740 acres)
Water Purification	Negligible	Negligible
Flood Protection	Negligible	Negligible
Shoreline Stabilization	Negligible	Negligible
Groundwater Recharge	Negligible	Negligible
Streamflow Maintenance	Negligible	Negligible
Retention of Particles	Negligible	Negligible
Surface Water Storage	Negligible	Negligible
Subsurface Storage	Negligible	Negligible
Nutrient Cycling	Negligible	Negligible
Values to Society	Negligible	Negligible
Fish and Wildlife Habitat	Minor Adverse	Negligible

As illustrated above, the only indirect effect the 47-foot project would have on the function of these wetlands systems would be associated with fish and wildlife habitat. All other elements of wetland function associated with predicted shifts in wetlands classification would be negligible as a result of the anticipated increase in salinity. Areas of the Savannah Harbor identified as saltmarsh or brackish marsh support similar fish and wildlife species. Any anticipated conversion of saltmarsh to a brackish marsh system would have a negligible impact on the overall function of the wetland system. The District recognizes that a comparison of fish and wildlife habitat between freshwater and brackish marsh systems yields fewer similarities. However, the conversion in fish and wildlife habitat would still be minor when considering the total wetland function. Post-project there would also be some freshwater vegetation in areas now categorized as brackish marsh.

The proposed preservation of up to 2,245 acres consists of bottomland hardwoods, maritime forest, and uplands dominated by deciduous forest and re-growth. The bottomland hardwoods are classified as palustrine, forested, broad-leaved deciduous systems that are both temporarily and seasonally flooded. Preserving these areas would ensure their wildlife habitat is protected in perpetuity. Moreover, the additional lands would buffer the SNWR from future threats of development, i.e., changes in land use would not occur immediately adjacent to existing areas of the Refuge containing emergent wetlands. Thus, the acquisition and preservation of up to 2,245 acres of wetland and upland buffer provides a functional replacement for the minor conversion of the only wetland function [i.e., fish and wildlife habitat] that would be expected as a result of the 223 acre freshwater to brackish marsh conversion [See Table 1]. In conclusion, the District has determined that the functional assessment conducted for all wetland areas proposed for impact and mitigation satisfies the no-net-loss of function criterion.

The harbor deepening project would require the excavation of 15.68 acres of brackish marsh [after implementation of all possible avoidance and minimization measures]. These marsh areas are subject to periodic flooding as a result of daily tides. Their vegetative communities are a monoculture of smooth cordgrass [Spartina alterniflora] . Approximately 7.3 acres (47%) of the total brackish marsh acreage to be excavated is subject to the wave action of passing ships. As a result of this perturbation, these areas exhibit vegetation densities which are significantly less than typically observed in this community type.

Patches of bare, course-grain sand and mudflat are integrated throughout the patches of *Spartina alterniflora* in these locations. Given the sparse presence of vegetation, it would appear that these areas are challenged, somewhat degraded, and do not possess the same degree of primary productivity as observed in robust, densely-vegetated, saltmarsh systems located elsewhere in coastal Georgia.

Mitigation of the 15.68 acres would be accomplished by restoring approximately 29 acres of brackish marsh. The District used its Regulatory SOP to determine the exact number of acres that would be required for restoration [See Appendix A at the end of the Mitigation Appendix].

Historically, the District's Regulatory Division and members of the Interagency Review Team (IRT), which includes USEPA, USFWS, NMFS, and GADNR representatives, have authorized the creation of saltmarsh as mitigation to offset permitted projects located in this coastal habitat type. The table below identifies five projects in Chatham County where saltmarsh creation was used as mitigation. Typically, a ratio of 2 acres created to 1 acre impacted has been used.

Projects impacting Saltmarsh and the Associated Saltmarsh Mitigation

Project Name	USACE File Number	Saltmarsh Impacts (Acres)	Saltmarsh Creation (Acres)
Slip One- Hutchinson Island	200501453	0.28	0.56
Hardin Canal Drainage	200600393	0.27	0.54
Skidaway Narrows Emergency Access	200600909	0.56	0.56
Skidaway Road Drainage Improvements	200601249	0.52	0.75
SLNG-Slip Construction	200200640	3.24	7.5

The proposed restoration of 28.75 acres of brackish marsh as mitigation for SHEP impacts to 15.68 acres would be a ratio of 1.8:1 [acres restored to acres impacted]. The ratio is roughly the same as for other [previous/similar] authorized projects that impact saltmarsh. The District's SOP confirmed this value, given the area of impact and the subject marsh's current function/integrity.

In support of this site-specific mitigation, it is important to note that the 42 acres of contiguous, restored brackish marsh would include construction of tidal creeks creating edge effect which will have more ecological value than the marsh proposed for excavation. Furthermore, the proposed mitigation site is non-segmented, located "in basin" [north of the Federal Navigation Channel], and incorporates a strip of trees to separate it from the harbor; all factors which makes it an ideal mitigation option for replacing the impacted marsh acreage.

Finally, this mitigation alternative was selected after consideration of the 2008 Final Mitigation Rule. Presently, there are no mitigation banks in coastal Georgia that are approved to sell saltmarsh or brackish marsh credits. Additionally, the In-Lieu Fee program has not been updated or approved by the District and Interagency Review Team (IRT) to provide compensation for impacts to saltmarsh or brackish marsh. Thus, site-specific mitigation represents the only course of action for mitigating impacts to the subject 15.68 acres of brackish marsh. Adaptive management would require planting *Spartina alterniflora* if the site does naturally re-vegetate at colonization rates indicated in Table 5-2 of the FEIS. Annual monitoring reports would be prepared for seven years and provided to a Wetland Interagency Coordination Team (ICT). If the restoration site does not meet the success criteria illustrated in Table 5-

2, the ICT would recommend corrective actions [e.g., new planting requirements, increased sprig densities, etc.] to achieve compliance with the reported values in Table 5-2. The need for corrective action(s) would be determined and/or implemented annually with agency involvement and concurrence. If at the end ofseven years the plant density at the restored marsh is not within 10% of the reference site, the ICT would be consulted for a determination on how to proceed [see updated Appendix C-Mitigation Planning]. The District has determined that the functional assessment [conducted for all brackish marsh areas proposed for direct impact and mitigation] satisfies the no functional net loss criterion.

760APC-MR-25-EV04

Comment: *Section 4, Page 15, 2nd Paragraph. Flow rerouting was proposed as a method to reduce the impacts to freshwater marshes, but what are the direct and indirect impacts associated with the planned alternatives? Deepening existing cuts should be considered an impact to subaqueous bottoms. Filling cuts should be considered a fill of subaqueous bottoms and potentially a fill of intertidal wetlands adjacent to the open water. These impacts should be determined and enumerated. These impacts should be mitigated as part of this project.*

Response: The measures to reduce impacts to freshwater marshes were extensively investigated by the District and subsequently coordinated with its state/federal resource agency partners. The various team representatives from these resource agencies reached consensus regarding the proposed mitigation options. The direct effects of constructing the flow rerouting features was considered in the Section 404(b)(1) Evaluation.

760APC-MR-25-EV05

Comment: *Section 4, Page 30, 7th Paragraph. States "the Contractor shall provide an Environmental Monitoring Plan for the job site, including land, water, air, and noise monitoring. Special emphasis shall be provided for the monitoring of wildlife resources (manatees and marine mammals)." What about other wildlife resources (i.e. shortnose sturgeon)?*

Response: The FEIS and BATES include protective measures for Shortnose sturgeon that the Corps would use if blasting is used to remove the Tidegate structure. If blasting is required to remove the Tidegate end walls, the Corps would coordinate blasting plans with the NMFS and the USFWS.

760APC-MR-25-EV06

Comment: *Section 4, Page 31, 1st Paragraph. Monitoring periods for manatee before after the blast should be lengthened.*

Response: The criteria indicated in Appendix C are sufficient to protect the manatee. However, as stated in the previous response, the Corps would re-coordinate any proposed blasting plans with the NMFS and the USFWS.

760APC-MR-25-EV07

Comment: *Section 4, Page 32, 3rd Paragraph. The paragraph states that if a manatee or marine mammal is injured or killed during blasting, all blasting operations shall be suspended and shall not resume until the contractor obtains written permission from the Contracting Officer. The District will coordinate the take with the NMFS to determine the appropriate course of action." What preparations will be in place to save any manatee or marine mammal wounded during the blast?*

Response: Measures to save injured manatees would be coordinated with NMFS.

760APC-MR-25-EV08

Comment: *Section 4, Page 33, 2nd Paragraph. The paragraph states that the Marsh Succession Models were not ultimately used to evaluate the mitigation proposals. If this model was used to predict the impacts, the same model should be used to predict the benefits of the mitigation proposals. How was the wetland mitigation alternatives evaluated to confirm that the freshwater wetland impacts would be reduced from 1,212 acres to 337 acres without the use of the model?*

Response: The Marsh Succession Model and EFDC models were designed to identify the extent of marsh conversion expected to occur with each SHEP depth alternative. The District also conducted a functional assessment for wetland areas that would be affected [directly/indirectly] by each project alternative, including the magnitude of impact. The proposed mitigation sites were also functionally assessed. The results of all these studies unequivocally concluded that all SHEP impacts have been appropriately mitigated and just as importantly there would be no net loss of wetland function. Appendix C – Mitigation Planning, Section VII has been updated to provide this information.

Page Appen. C-2

760APC-MR-25-EV09

Comment: *Section 5, Page 49, 1st Paragraph. The paragraph states that the proposed restoration site is currently "high ground." Has a wetland delineation been confirmed for the proposed site to determine how much of the site is currently a wetland and how much is non-wetland? Portions of the site which are currently a wetland under normal conditions (the site was last fined at least 20 years ago) should not be included within the proposed restoration acreage. If wetlands exist within the proposed restoration area and were counted as part of the restoration acreage, then the proposed wetland restoration acreage should be reduced accordingly.*

Response: Prior to starting any restoration activities at Disposal Area 1S, the District would survey the entire site [approximately 45 acres overall] to document the extent to which it is currently vegetated with brackish and saltmarsh species. Portions that are dominated by marsh vegetation [fringes] would not be subject to grading. The early site investigations revealed an interior parcel [approximately 42 acres] that can easily be graded/contoured to restore 40.3 acres of saltmarsh habitat - an amount that would more than satisfy the compensatory mitigation needs for direct impacts to the 15.68 acres lost to excavation. The restoration includes a stipulation [part of the adaptive management plan] which would require planting juvenile *Spartina alterniflora* plants if the site does not revegetate naturally at the rate of colonization indicated in Table 5-2 of the FEIS. Annual monitoring reports would be generated over a period of seven years and provided to a Wetland Interagency Coordination Team (ICT). If the restored marsh does not meet the success criteria illustrated in Table 5-2, the ICT would identify and/or recommend corrective actions. These would include modifying planting techniques, equipment requirements, sprig densities, regarding, filing, or other tested measures which would achieve compliance with the mandated percentages [Table 5-2]. If the restored marsh still does not meet the success criteria, then the ICT would continue to identify and/or make recommend corrective actions. The need for corrective action(s) would be determined and/or implemented annually with agency involvement and concurrence. If at the end of seven years the plant density at the restored marsh is not within 10% of the reference site, the ICT would be consulted for a determination on how to proceed (see updated Appendix C-Mitigation Planning).

760APC-MR-25-EV10

Comment: *Section 5, Page 49, 2nd Paragraph. How will the proposed restoration site be protected from invasive species such as Phragmites australis if left to revegetate naturally?*

Response: Table 39 in Appendix Cspecifies the criteria which will be used to determine if wetland growth in Disposal Site 1S is occurring at an acceptable rate. The plan has been revised to include monitoring for invasive species [especially common reed and Chinese tallow tree] together with measures to control such species should they prove problematic.

It is unlikely that invasive species like *Phragmites australis* would extensively colonize the restoration site given the density of *Spartina alterniflora* seed stock in its immediate vicinity. Likewise, the salinity range in the surrounding area is conducive to supporting lush growth of *Spartina alterniflora*. The development of the restored marsh would also include an adaptive management plan, which would require the planting of juvenile *Spartina alterniflora* plants if the site does not naturally revegetate with the rate of colonization indicated in FEIS-Table 5-2. The plan would also include measures for removal of invasive species. Annual monitoring reports would be generated and provided to a Wetland Interagency Coordination Team (ICT). If the restored marsh does not meet the noted success criteria, the ICT would identify corrective actions, including altering planting requirements and associated sprig densities. The need for corrective action(s) would be determined and/or implemented annually with agency involvement and concurrence. If at the end of seven years the plant density at the restored marsh is not within 10% of the reference site, the ICT would be consulted for a determination on how to proceed (Please see updated Appendix C-Mitigation Planning).

760APC-MR-25-EV11

Comment: *Section 5, Page 53, 2nd Table. The table indicates that 730 acres of saltmarsh will be impacted by the project. However, the 3rd paragraph on page 110 indicates that the impacts are to brackish marshes. Both cannot be correct.*

Response: This comment actually references Appendix C rather than Section 5. Appendix C has been modified to reflect that approximately 740 acres of saltmarsh would be converted to a brackish marsh.

760APC-MR-25-EV12

Comment: *Section 5, Page 53, 2nd Table. What method was used to determine the location and quantity of impacts to brackish or saltmarsh (see previous comment)? This method should be discussed in the document and the location and quantity of impacts at each location should be made available for public review.*

Response: The method to determine the quantity of impacts to freshwater and saltmarsh species is described in Section 5 (Section 5.01.2). A figure has been added to show the acres of freshwater tidal marsh expected to undergo species shifts, and detailed information about the location and acres of expected impacts for all habitat types are included in Appendix C of the EIS and the Supplemental Materials of the Engineering Appendix of the GRR.

760APC-MR-25-EV13

Comment: *Section 5, Page 53, 2nd Table. The document clearly states that the natural resource agencies in Georgia require that "acceptable mitigation should consist of at least 50 percent restoration." If the impacts are actually to saltmarsh, then the proposed restoration is out-of-kind restoration. Is this acceptable to the State?*

Response: The SHEP has received Section 401 Water Quality Certification and Coastal Zone Management Consistency from the State of Georgia. Therefore, the proposed mitigation for wetland impacts is acceptable to the State of Georgia. Additionally, the District provided all reviewers a functional assessment to determine the wetland areas directly/indirectly affected by the project together with an analysis of the magnitude of this impact. The proposed mitigation sites have been carefully evaluated. The results of these assessments verify that the proposed impacts are mitigated appropriately and overall there would be no net loss of wetlands function. See also Appendix C, VII Consideration of 2008 USEPA/USACE Mitigation Rule, which addresses the broad definition of in-kind as applied to tidal marsh.

760APC-MR-25-EV14

Comment: *Section 5, Page 53, 1st Paragraph. How are the flow altering methods restoring 1,068 acres of brackish marsh? The mitigation plan details how these methods would reduce the impacts to freshwater wetlands, but makes no mention of how these methods also perform brackish marsh restoration. As mentioned in a previous comment, the proposed flow altering features would actually result in impacts themselves. The plans involve filling subaqueous bottoms, dredging subaqueous bottoms, and potential filling of intertidal wetlands adjacent to plugs and weirs. The document should clearly indicate how it was determined that these flow altering plans actually restore impacted marshland. The location of the proposed restoration areas should be included in the document and made available for public review. The restoration areas should be monitored as part of the mitigation plan.*

Response: Section 5 describes how the District's SOP was used to derive the credit values assigned to both wetland impacts and wetland mitigation scenarios. The wetland restoration value is actually a composite of the vegetative conversion from freshwater marsh to brackish marsh (i.e., 223 acres) and saltmarsh to brackish marsh (740 acres). When these two values are summed together, the resulting acreage of emergent wetland (presented in Appendix C as 964 acres) is more closely aligned with brackish marsh. Post-construction, the District would establish 12 monitoring sites to examine vegetative shifting in the transitional areas.

USACE characterized the emergent wetland areas that are subject to vegetative conversion as a result of the harbor deepening. This information, coupled with the modeling results, were used in quantifying indirect impacts to freshwater and saltmarsh. During the project's pre-construction phase, these areas would be further examined [one year]. Monitoring of marsh vegetation would also occur during the three-six year period of construction and post-construction. For this period of time [up to 15 years], the subject marsh sites would be characterized with respect to vegetation composition. Tidal sample stations installed at these marsh sites would record water surface elevation, specific conductance of surface waters that flood the marsh and its root zone, and water depth on a regular basis. The recorded data would be downloaded monthly. The USGS Florida Fish and Wildlife Cooperative Research Unit is expected to perform this work [via SHEP funding].

760APC-MR-25-EV15

Comment: *Section 5, Page 69, 1St Paragraph. The agencies could not determine any impact that could restore or enhance sturgeon habitats. The proposed project will undoubtedly result in a take of the endangered shortnose sturgeon and the candidate Atlantic sturgeon which is proposed to be listed as endangered. As a part of the Endangered Species Act, the project would likely need to receive an incidental take permit. If an incidental take permit was issued, the USACE would be required to submit a habitat conservation plan. The habitat conservation plan would have to address the likely impacts of the*

project, steps the USACE will take to minimize and mitigate the impact, alternative considered and why the USACE did not pursue them further.

Response: As discussed in a previous response, the NMFS has prepared a BO which includes incidental take statements for both the Shortnose and Atlantic sturgeon including any project requirements. The BO is included in Appendix Z.

Page Appen. C-3

760APC-MR-2S-EV16

Comment: *Section 5, Page 69, 2nd and 3rd Paragraphs. The USACE proposes the installation of a fish passage structure around the New Savannah Bluff Lock and Dam (NSBLD) in order to provide additional available habitat to the shortnose sturgeon. However, the DEIS hasn't provided any assurances that shortnose sturgeon historically used the habitat upstream of the NSBLD, that the shortnose sturgeon can and would navigate the fish passage structure, or that, even if sturgeon had historically used the habitat, the habitat above the NSBLD is currently of the quality that would provide benefits to sturgeon. Of important note, the proposed listing rule for Atlantic sturgeon states that measures "such as fish passage have not proven beneficial to Atlantic sturgeon, as they do not regularly use existing fish passage devices, which are generally designed to pass pelagic fish. To date, only four Atlantic sturgeon have been documented to have passed via a fish lift." Thus, there is no indication that the fish passage structure would adequately mitigate for the inevitable harm caused to shortnose sturgeon.*

Response: The use of the Savannah River above the NSBL&D as spawning habitat for various species of anadromous fish including Shortnose and Atlantic sturgeon prior to mainstream dam construction is well-documented. Additional information has been added to the FEIS concerning the suitability of potential spawning habitat above NSBL&D.

The use of fish passage structures has a long/successful history. In the upper mid-west U.S., the Lake sturgeon has been observed passing both constructed and natural rapids covering an entire river width. Some of these observations were at lesser water depths than are proposed (3.5 to 5.5 feet) for the fish passage at the New Savannah Bluff Lock and Dam (Aadland 2010). The Lake sturgeon is a larger species than the Shortnose so physical transit of the latter should not pose a problem.

The DEIS proposed a horseshoe rock ramp design as the fish passage structure to be constructed at NSBL&D to mitigate for Shortnose sturgeon habitat that would be lost in the lower Savannah River because of construction of the SHEP. However, based on comments received on that design during coordination of the DEIS, the Corps conducted a workshop in April 2011 to further evaluate potential fish passage structures that could be constructed at NSBL&D. As a result of that workshop and further coordination with the resource agencies, the off-channel rock ramp design is the proposed fish passage structure. As stated in the BO, the goal of the fish passage alternative is to achieve at least 75 percent upstream passage effectiveness for both Shortnose and Atlantic sturgeon, at least 85 percent downstream passage effectiveness, and cause no serious injury to sturgeon that come into contact with the passage or dam structures. It should be noted that the NMFS supports construction of this fish passage structure at NSBL&D. It should also be noted that construction of this fish passage structure at the NSBL&D is one of the reasonable and prudent measures outlined in the BO.

Post-project, the District will monitor the passage of Shortnose sturgeon through the structure to ensure it performs successfully (Appendix D). If passage does not meet expectations, fish passage could

be improved by (1) altering flows in the fish bypass to improve attraction/passage, or (2) modifying the fish passage rock ramp.

760APC-MR-25-EV17

Comment: *Section 5, Page 98, 1 st Parab1faph. Neither the DEIS or this document provide any documentation that shortnose sturgeon used habitat above the NSBLD or that the availability of this habitat would adequately compensate for the lost habitat that is used by sturgeon during different seasons and during different life stages than more upstream habitats.*

Response: As noted in DEIS-Section 5.03.2, the Cooperating Agencies and the Fisheries Interagency Coordination Team could not identify measures [structural/nonstructural] within the estuary that would adequately restore Shortnose sturgeon habitat lost to SHEP construction. As a result, the Team agreed [2007] that a fish bypass around the New Savannah Bluff Lock and Dam would compensate for losses within the estuary by providing access to 20 additional miles of upstream spawning/foraging habitat. As stated in a previous response, the NMFS who has responsibility for the protection and recovery of Shortnose sturgeon is supportive of this mitigation feature, and its construction is a requirement of the BO issued for the project.

760APC-MR-25-EV18

Comment: *Section 5, Page 99, I st Paragraph. The appendix states that the agencies noted the fish passage structure was the only method that could effectively compensate for the predicted loss in sturgeon habitats. On the contrary, the agencies didn't appear to state that the fish passage structure would effective compensate for impacts. The agencies seemed to state that they could not think of any other compensation in the estuary and that the fish passage structure was the only mitigation measure that had been proposed that may provide some compensation. In the documentation provided in the agency correspondence appendix, the agencies did not mention that the fish passage structure would effective compensate for the predicted loss in sturgeon habitats.*

Response: After a great deal of deliberation, the fish passage at New Savannah Bluff Lock and Dam was judged to be the best means to mitigate for loss of sturgeon habitat. NOAA concurred that the bypass would provide suitable mitigation for SNS impacts in their Biological Opinion. Post-construction, the District would monitor passage of Shortnose sturgeon through the structure to ensure it performs as intended (Appendix D).

760APC-MR-25-EV19

Comment: *Section 5, Page 99, 2nd Paragraph. What if the fish passage structure is paid for by other funding and cannot be used by this project as mitigation? No other mitigation has been proposed. This constitutes a substantial risk that should be addressed.*

Response: The property on which the fish passage would be constructed is primarily owned by the Corps of Engineers. Use of additional property would be necessary for access. Since it would be essential to SHEP mitigation, the property would not be used for any other purpose.

Page Appen. C-4

760APC-MR-25-EV20

Comment: *Section 5, Page 103, 2nd Paragraph. The calculation of costs needed for the stocking program appears to be flawed and may underrepresent the actual amount of costs needed for the stocking program. The cost determination assumes that the start-up of the hatchery is directly proportional to the amount of fish that would be produced i.e., that only a percentage of the $3.1 million initial expense is required to get the stocking program underway. Has the GA DNR-WRD provided information to verify that the percentage assumption provides an adequate amount of payment for stocking? There are probably economies of scale that would preclude the direct ratio apportionment proposed by the Corps.*

Response: The GA DNR-WRD's DEIS comment letter [January 24, 2011] did not dispute the costs indicated in Appendix C.

760APC-MR-25-EV21

Comment: *Section 9, Page 114, Monitoring shortnose sturgeon distribution. Both shortnose and Atlantic sturgeon should be monitored given their respective status under the Endangered Species Act and the take of these species that will occur as a result of this project. Monitoring should include distribution as well as abundance determinations. Monitoring that does not include abundance information will not provide adequate information to determine if the project is resulting in population decreases.*

Response: Issues/concerns about monitoring the Atlantic sturgeon did not surface during the development of the mitigation plan; however, if it is subsequently listed as a federally endangered species, the District would reevaluate potential project impacts to the species. As discussed in a previous response, monitoring of the passage of Atlantic sturgeon at the fish passage structure at NSBL&D will be conducted as required by the BO.

760APC-MR-25-EV22

Comment: *Section 9, Page 114, Monitoring fish passage at NSBLD. What would result if sturgeon do not use the fish passage structure? Adequate mitigation would not be provided.*

Response: The use of fish passage structures has a long/successful history. In the upper mid-west US, the Lake sturgeon has been observed passing both constructed and natural rapids covering an entire river width. Some of these observations were at lesser water depths than are proposed (3.5 to 5.5 feet) for the fish passage at the New Savannah Bluff Lock and Dam (Aadland 2010). Lake sturgeon is a larger species than the Shortnose so physical transit of the latter should not pose a problem. Adaptive management, attraction flow measures, cost estimates/commitments, and monitoring are described in detail in Appendix D. Post-project, the District would monitor the passage of Shortnose sturgeon through the structure to ensure it performs successfully (Appendix D). If passage does not meet expectations, fish passage could be improved by (1) altering flows in the fish bypass to improve attraction/passage, or (2) modifying the fish passage rock ramp (Appendix D).

760APC-MR-25-EV23

Comment: *Appendix A, Page 149, 2nd Table. The table indicates that a value of 0.3 was used for the threat category for the preservation sites. The document fails to justify the use of this elevated value. The second-to-last paragraph on page 123 indicates that "adjacent lands" are being logged and/or developed for residential use. The document does not indicate that these lands are directly adjacent to the tidal wetlands proposed for preservation or speaks of how these lands (if developed and/or logged) will directly affect the proposed preservation area. The document itself indicates that the threat must be demonstrable and it fails to do so. A value of 0, for no threat, or 0.1, for low threat, should be used in the preservation worksheet or the document should be revised to demonstrate how the proposed preservation areas, are themselves, at a moderate level of threat. A lower threat value would require that additional land be acquired for preservation.*

Response: The District consulted with the USFWS to obtain the latest information on the location of properties that the Refuge seeks to acquire/preserve to expand the SNWR's boundaries. Priority would be given to acquisition of large bottomland hardwood tracts located at higher elevations in the estuary that would not be affected by the proposed harbor deepening. Sites that are presently government-owned or which possess a conservation easement would not be considered. The District evaluated the proposed preservation mitigation [sites] using the five criteria identified in the 2008 Mitigation Rule. Specifically, 33 CFR 332 (h) (1) (i-v) states, *"Preservation may be used to provide compensatory mitigation for activities authorized by DA [permits] when all the following criteria are met: (i) The resources to be preserved provide important physical, chemical or biological functions for the watershed; (ii) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available; (iii) Preservation is determined by the district engineer to be appropriate and practicable; (iv) The resources are under threat of destruction or adverse modifications; and (v) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust)."*

Based on our analysis and coordination with the natural resource agencies that participated in the ICT, the District has:

(i) concluded that the preserved lands must provide important physical, chemical and biological functions for the SNWR , the Savannah Harbor, and the Lower Savannah Watershed [see response to request for Functional Assessment]; and

(ii) the preserved lands must contribute to the sustainability of the watershed by ensuring the functions of bottomland hardwood wetlands on these properties are sustained in perpetuity and the SNWR would be protected with a significant area of land that will function as a buffer in perpetuity. The preservation tracts would also enhance lands already within the SNWR by functioning as a buffer; and

(iii) for the reasons identified in (i) and (ii), the District Engineer has determined that preservation of these 2,245 acres is appropriate and practicable; and

(iv) The District as well as regional planning entities forecast that the Savannah Harbor and areas surrounding the SNWR will continue to experience population growth, industrial/commercial development, and changes in land use. In addition to the industrial developments that have been permitted by the District in recent years, the US Geological Survey, Water Science Center (GaWSC)

commented on the large number of industrial facilities and associated impacts that are anticipated on lands in close proximity to the Georgia Ports Authority and the SNWR. Preservation of the 2,245 acres ensures aquatic resources on the associated properties will be protected in perpetuity. The preserved land would provide additional buffer so that any future development in the vicinity would not result in a secondary and/or indirect impact to existing Refuge lands. There is also a threat that subtle changes in adjacent land use would also have a detrimental impact on the SNWR. For example, a Public Notice published by the Charleston District, Corps of Engineers on September 28, 2009 requested comment on a proposal from a private landowner to alter the hydrology within a relict rice impoundment [485 acres] via diversion of tidal flows. The entire property [693 acres] would then be used as a mitigation bank. Presently, this parcel provides stop-over benefits to migratory waterfowl similar to those provided by Refuge lands. Conversion to saltmarsh lessens its waterfowl potential and potentially results in crowding on adjacent preferred habitat. There is the immediate implication that birds could shorten their stay in the area and result in the populations that the Refuge currently serves resuming their migration with less rest. The expected effects of the proposed regulatory action on the SNWR have not been quantified, but the proposed project is an example of the continued threat that manipulation of adjacent lands poses to the SNWR and the resources it protects/fosters. Acquisition and preservation of the proposed 2245 acres as mitigation for SHEP would provide additional buffer and protection from this type of activities. The mitigation lands will include a restrictive covenant/conservation easement with subsequent conveyance to the USFWS.

When reviewing the preservation worksheet and the "Degree of Threat" factor, it is important to note that the District did not use the highest value [i.e., 0.5] available for this calculation. Use of the "High" Degree of Threat value would have resulted in a greater "Sum of m Factors" calculation, which, in turn, would have ultimately reduced the required preservation acreage that was needed. Alternatively, the District chose to describe the Degree of Threat as "Moderate" which more accurately [but conservatively] reflects the current trends in the vicinity of the SNWR.

Although the "Degree of Threat" factor was defined as "Moderate", the District, USFWS, and other entities anticipate that the Savannah Harbor and areas in the vicinity of the SNWR will continue to experience population growth, industrial/commercial development, and changes in land use. The District evaluated development trends within five miles of the Savannah National Wildlife Refuge for the last 15 years. In those 15 years, authorization of approximately 170 regulatory permits has resulted in more than 230 acres of wetland impacts. In recent years, several industrial developments have been constructed in the vicinity of the SNWR, e.g., a Target distribution facility was constructed three years ago which converted approximately 42 acres of pristine, maritime forest and wetland.

The other Federal and State natural resource agencies did not disagree with the "Degree of Threat" factor used in the SOP calculations when they commented on the Fish and Wildlife Coordination Act Report. The District believes the use of 0.3 as a "Degree of Threat" factor is justified and satisfies the requirements for using preservation as mitigation [as defined in the 2008 Mitigation Rule].

760APC-MR-25-EV24

Comment: *Appendix A, Page 149, 2nd Table. The table indicates that the values for in-kind and out-of-kind replacement are 0.6 and 0.2, respectively. The previous table indicates that these are the only options available for use within the preservation worksheet. However, a value of 0.4 was used within the preservation worksheet. If there are uplands included within the preservation area (as page 123 indicates there are), their acreage should be excluded from the preservation total, or at least included as out-of-kind replacement. The preservation worksheet should be updated and the required acreage purchased as compensation for the project should be adjusted accordingly.*

Response: The District provided a functional assessment in the FEIS that objectively and quantitatively evaluates the functional losses due to excavation of wetlands and conversion of wetland types. Savannah District's Regulatory Standard Operating Procedure [SOP] similarly evaluated the same functional losses and wetland type conversion [post-construction]. The Wetland ICT concurred with use of the functional assessment/SOP to quantify impacts and the associated mitigation.

The following is provided as background: In 2003, the District assembled a Wetland Interagency Coordination Team (ICT) to assist in analyzing SHEP's potential wetland impacts. The team consisted of agency wetland experts from US EPA, USFWS, NMFS, GA DNR, SC DNR, and SC DHEC. The agencies identified an acceptable technical approach to determine wetland impacts, as well as their information needs to review the EIS. Since creation of the team, the District hosted seven meetings of the ICT, during which methods for evaluating functional losses and mitigation alternatives for wetland impacts were proposed and discussed at length. After every meeting, the District prepared a Memorandum for Record (MFR), which was provided to all members of the ICT.

The Corps also conducted an Agency Technical Review (ATR) to assess the utility of the District's Regulatory SOP as a tool in developing a mitigation plan for SHEP. The ATR was lead by the National Deep-Draft Navigation Planning Center of Expertise. Actual analysis was performed by experts at the Corps' Engineering Research and Development Center in Vicksburg, MS. The ATR sought to determine if the SOP was an appropriate method to ascertain the preservation acreage needed to compensate for impacts resulting from the SHEP. The ATR also evaluated the assumptions and calculations that the District used in applying the SOP for SHEP. The SOP was used to determine the amount of preservation acreage necessary to offset the remaining impacts ONLY after avoidance, minimization, and restoration measures had been applied. After these deliberations, the ATR concurred with using the SOP to determine the amount of preservation acreage needed. Moreover, it considered the Savannah District's application of the SOP to be reasonable in quantifying impacts together with the associated mitigation that would be required.

A Fish and Wildlife Coordination Act Report, dated August 2010 concurred with use of the SOP. Final calculations determined the need to preserve 2,245 acres in parcels adjacent to the SNWR . The USFWS provided updates to the SOP calculations in Appendix A of the report. The District concurred with use of the updated SOP worksheets and adopted the results of those calculations for use in the DEIS. In its Adaptive Management Program, the District also proposed acquisition of additional wetlands if monitoring demonstrates that wetland impacts are under-predicted.

Page Appen. C-5

760APC-MR-25-EV25

Comment: *Numerous figures within Appendix C do not have essential components like north arrows, scales or legends.*

Response: Figures in the FEIS are revised to make them more readable and more clearly convey the intended information.

Page Appen. D-1

760APD-MR-28-EV01

Comment: *Section 3.Goals of an Adaptive Management Plan, p. 7, 2nd Paragraph: The document indicates that the first goal of the adaptive management plan is evaluating the accuracy of the predicted environmental impacts. Post-construction, the goal should be to determine if the mitigation features are adequate to compensate for the impacts. This should be achieved with field results and not with predictive models. In situ conditions indicate whether the mitigation features are adequate or inadequate.*

Response: Please refer to the Post-Construction Monitoring and Acceptability Criteria Sections in Appendix D. The field data collected, ranges of predicted values at water quality monitoring stations determined during pre-construction, and the hydrodynamic and water quality models using observed river flows would be the main tools which would be used to determine how the project is performing and if the impacts are generally as expected. Even though the potential impacts of the project were evaluated under a likely range of conditions, the actual circumstances experienced after construction will be somewhat different from those used for evaluation in the project's feasibility phase. Consequently, the monitoring data will be used to evaluate the response of the system to the mitigation features. In addition, the hydrodynamic and water quality models would be used to examine post-project performance under actual conditions, e.g. high/low flows, drought, or some combination of these. The Corps and the resource agencies would use the modeling data (after any necessary post-construction recalibration of the models) and compare those data to actual field results to determine whether the Savannah Harbor estuary is responding to SHEP as expected. The hydrodynamic and water models would be used to evaluate project performance once a year for ten years as part of the post-construction monitoring.

760APD-MR-28-EV02

Comment: *Section S.B.Physical, p. 7, 1st Paragraph: The document indicates that the preconstruction monitoring "will better define the complex interactions between the estuarine ecosystem and the quantity and quality of water available." If these interactions are unknown, how were the potential impacts determined in the Tier 2 EIS? These interactions should be understood prior to permit issuance as the potential impacts may still remain undetermined.*

Response: Statements in Appendix D did not mean to indicate the complex interactions occurring in estuarine ecosystems are unknown. Rather, it sought to explain that the Hydrologic Monitoring Plan serves as the framework to define these complex interactions more definitively. The Plan's formulation was benefitted by long-term hydraulic data collected in the Savannah Harbor estuary.

760APD-MR-28-EV03

Comment: *Section S.B.Physical, p. 7, 2nd Paragraph: The document indicates that the hydrologic and water quality monitoring data will be used to update the models, pre-construction. Who would determine if the model warrants an update?*

Response: The performance of the hydrodynamic and water quality models would be assessed/recalibrated [once during pre-construction and twice during post-construction monitoring] to maximize their accuracy. All model work [modifications/updates] is subject to review by the Cooperating Agencies and the state natural resource partners.

760APD-MR-28-EV04

Comment: *Section S.B.Physical, p. 7, 2nd Paragraph: If a calibration is warranted of the predictive models, prior to construction, and the models predict greater impacts then permitted, would a permit modification be acquired prior to the beginning of impacts?*

Response: The models are not being updated/assessed to provide additional pre-project impact predictions. Rather, the main purpose of this exercise is to narrow the range of model uncertainty. As inherent risk decreases, predictions become more accurate in term of evaluating the project's performance and how its mitigation measures are functioning [both during and after construction]. To accomplish this end, model runs would be conducted comparing field measurements to model predictions for the various parameters being evaluated. As discussed in a previous response, the performance of the hydrodynamic and water quality models would be assessed/recalibrated [once during pre-construction and twice during post-construction monitoring] to maximize accuracy. At the end of this assessment, the uncertainty range would be lessened to the maximum practical extent.

760APD-MR-28-EV05

Comment: *Section S.B.Physical, p. 7, 3m Paragraph: Would the State of South Carolina have a chance to determine the location of proposed groundwater monitoring wells, as the Floridan aquifer extends into southern South Carolina.*

Response: Chloride levels would be monitored by four groundwater wells [of which two are already installed]. The SC DNR has reviewed all of the plans for this aspect of the project and has made no specific requests regarding the location/design of these wells.

760APD-MR-28-EV06

Comment: *Section S.B.Physical, p. 7, 3m Paragraph: The document indicates that chloride levels will be monitored in "up to four" groundwater monitoring wells annually in the preconstruction phase. However, in section S.C.5 on page 13, the document indicates that no fewer than "four" wells will be monitored. Also, section S.C.5 indicates that the wells will be monitored four times a year, the text in section S.B should indicate this fact.*

Response: The text mentioned in Appendix D has been revised to indicate that the SHEP groundwater monitoring would involve the installation of four wells.

760APD-MR-28-EV07

Comment: *Section S.B.Physical, p. 8, 1 st Paragraph: Do the applicants plan to monitor the distribution of Atlantic sturgeon as well? The Atlantic sturgeon has been confirmed in the Savannah River and has been proposed to be listed as endangered in the South Atlantic DPS which contains the project area.*

Response: Please see previous response regarding monitoring of Atlantic sturgeon.

760APD-MR-28-EV08

Comment: *Section S.C.Biological, p. 13, 1st Paragraph: Do the applicants plan to monitor the distribution of Atlantic sturgeon as well? The Atlantic sturgeon has been confirmed in the Savannah River and has been proposed to be listed as endangered in the South Atlantic DPS which contains the project area.*

Response: Please see previous response regarding monitoring of Atlantic sturgeon.

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760APD-MR-28-EV09
Comment: *Section 5.C.Biologica1.2, p. 13, 15t Paragraph: The monitoring should also include drift larval surveys for larva entering the project area. With the proposed salinity increases, the larva entering the project area from upstream may not survive, and their loss should be considered an impact.*

Response: The work described in Appendix D is designed to evaluate the movement/distribution of adult and juvenile Shortnose sturgeon in the Savannah Harbor estuary. This work did not include larval surveys for sturgeon, since its traditional spawning grounds are located over 100 miles upriver, outside the project's area of effects.

760APC-MR-28-EV10
Comment: *Section 5.C.Biologica1.2, p. 13, 1st Paragraph: Please indicate the amount implied when it is determine that sturgeon "intensively" use an area. If the substrate is not "intensively" used is it not recorded? The substrate type should be recorded for each observation.*

Response: The study would involve capturing and tagging Shortnose sturgeon [adults and juveniles] followed by tracking the released fish. The exact number of tagged fish has not yet been determined. The subject term, "intensively", refers to those estuarine locations where sturgeon carry out most of their activities throughout the year. Since the purpose of the study is to identify the primary use areas of adult and juvenile Shortnose sturgeon, there is no need to sample substrate for every tracking observance.

760APD-MR-28-EV11
Comment: *Section 5.C.Biologica1.3, p. 14, l st Paragraph: The document indicates that up to 25 shortnose sturgeon would be collected and implanted with transmitters. Is there a minimum number proposed? There should be imposed minimum used to provide validity to the data.*

Response: The final details of the scope of work would be determined based on coordination between the District, the entity actually performing the work, and the US Fish and Wildlife Service to maximize the validity/value of the data collected.

760APD-MR-28-EV12
Comment: *Section 5.C.Siologica1.3, p. 14, 2nd Paragraph: Substrate type should also be recorded for each observation.*

Response: The goal of this particular study is to evaluate fish movement in the environs of the New Savannah Bluff Lock and Dam, as well as migration patterns during the spawning season. Substrate sampling is not required to achieve this objective.

760APD-MR-28-EV13
Comment: *Section 5.D.Reporting, p. 14, 1st Paragraph: The text should be revised to replace the word "which" for the word "where" and the word "become" for the word "becomes."*

Response: The requested changes have been made to the text in Appendix D.

760APD-MR-28-EV14

Comment: *Section 6.C. Details of the Monitoring, p. 17, 15t Paragraph: The document indicates that "not all monitoring that was included in the Pre-Construction monitoring will be duplicated each year during the construction period." Please indicate which monitoring will not be included during the construction phase.*

Response: Monitoring during SHEP's pre- and construction phases is essentially similar, with the notable exception that the former includes intensive examination of selected parameters over a lunar cycle during the summer. This sampling would be repeated during years one and four of the post-construction monitoring.

760APD-MR-28-EV15

Comment: *Section 6.C. Details of the Monitoring, p. 18. 2nd Paragraph: Please explain what constitutes a "large/unforeseen increase."*

Response: The term "large/unforeseen increases" has been removed from the FEIS. The latest model results conclude SHEP would increase chloride levels at the City Of Savannah's water intake on Abercorn Creek during low flows and high tides. The District intends to monitor chloride levels at the intake both during and after construction.

760APD-MR-28-EV16

Comment: *Section 6.D.Reporting, p. 19, 2nd Paragraph: If the monitoring indicates that unforeseen or unpermitted exceedences are occurring, this data should be made available for review by all applicable State and Federal agencies when the exceedences are observed and should not be held until the annual or final reports.*

Response: As stated in Appendix D, real-time data from the eight continuous water quality monitors would be available to resource managers and the public through the USGS National Water Information System Web (NWIS Web) software. The District would also post monitoring information on its public website as it becomes available.

760APD-MR-28-EV17

Comment: *Section 7.A.Goals, p. 20, 5th and 6th Paragraphs: Does the monitoring at the nearshore sediment placement sites include monitoring of benthic repopulation for two or three years?*

Response: The use of the Tybee Island nearshore placement sites for placement of new work sediments has been removed from the project. All new work sediment removed from the entrance channel would be deposited in the Jones/Oysterbed CDF or the Offshore Dredged Material Disposal Site. As stated in previous responses, maintenance material from the first part of the inner harbor channel and the entrance channel could be placed in the nearshore off Tybee Island in the future provided a separate cost-sharing sponsor is willing to pay the additional costs to have the material placed there. The Corps is committed to conducting cultural resource and hard bottom surveys in these areas prior to initially placing dredged material in these sites. Benthic surveys would not be conducted.

760APD-MR-28-EV18

Comment: *Section 7.D.Reporting, p. 25, 1st Paragraph: If the monitoring indicates that unforeseen or unpermitted exceedences are occurring, this data should be made available for review by all applicable State and Federal agencies when the exceedences are observed and should not be held until the annual or final reports.*

Response: Please see previous response concerning the availability of real time data from the continuous water quality monitors.

Page Appen. D-3

760APD-MR-28-EV19

Comment: *Section S.B.Monitoring During Construction, p. 28, 2nd Paragraph: Please define "well outside." If the impacts are exceeding those permitted then these exceedences should be reported to all applicable State and Federal agencies when the exceedences are observed.*

Response: There are no "permits" required for the SHEP which contain specific criteria relative to parameters of concern. Water quality certification and coastal zone consistency have been received from both the States of Georgia and South Carolina. Generally, water quality certifications from both states require the Corps to proceed with a project in a manner so as to not violate applicable water quality standards.

The federal/state resource agencies would be furnished the results of the monitoring effort conducted during the pre-construction, construction, and post-construction phases. Additionally, continuous real-time data would be available to resource managers and the general public through the USGS National Water Information System Web. As described in the Monitoring Plan, the Cooperating Agencies and the state resource agencies can consult with the District at any time the results become a concern. Consequently the phrase "impacts that are well outside the range of those expected" has been replaced by "impacts that cause concern".

760APD-MR-28-EV20

Comment: *Section 8.B.Post-Construction Monitoring, p. 28, 2nd Paragraph: Establishing a threshold values during and post-construction would better protect natural resources and preserve water quality. They should be a goal or standard and they would provide all applicable State and Federal agencies with an "action" threshold and may reduce cumulative impacts.*

Response: The District intends to use the methods described in the Monitoring Plan, Adaptive Management Plan, and Long-Term Management Plan [see Appendix D]. Please refer to Section 8 of Appendix D which describes Performance Measures and Acceptability Criteria and Section 9 of Appendix D which details how Adaptive Management decisions will be made.

760APD-MR-28-EV21

Comment: *Section 8.B.Post-Construction Monitoring, p. 29, 3rd Paragraph: Additional mitigation should be required if losses are greater than those described in the EIS, and not dependent on the observed flow conditions.*

Response: The hydrodynamic and water quality models would be used in conjunction with the field data to evaluate how the project is performing and in determining the adequacy of the mitigation features. Data from model runs, per se, would be compared with same using conditions measured in the field for various parameters. If the model results are within its established uncertainty range, both the project and the model would be deemed to be performing as expected, and no modifications would be warranted.

To date, the Monitoring and Adaptive Management plan has provided the necessary framework to address SHEP's impacts and is sufficiently flexible to allow for future adjustments to its associated mitigation features.

760APD-MR-28-EV22

Comment: *Section 9.B.Decision Process, p. 30, 1st Paragraph: The paragraph states that if through monitoring it is determined that impacts are "well outside the range of those expected" then the Corps would consult with the Cooperating Agencies to identify what actions may be appropriate. What amount constitutes "well outside?" If the permitted impacts are exceeded then addition mitigation should be proposed. The threshold amount should be the permitted amount and not the "expected" amount. Finally, the Corps should revaluate the impacts if they are exceeding the permitted amount and not wait for the Cooperating Agencies to begin the process. The Cooperating Agencies should be notified if exceedences are observed after each monitoring period.*

Response: The first paragraph on Page 30 refers to adaptive management decisions that could occur during the construction phase of the project. This paragraph has been revised to reflect that meetings between the District, Cooperating Agencies and state natural resource agencies are not restricted to the annual meeting [usually] held at the anniversary of the monitoring period. If concerns surface, a coordination meeting could be held at any mutually agreeable date. This paragraph has also been revised to explain the full range of options that would be available if impacts or concerns are observed during the construction monitoring period. These options include a change in the monitoring plan to address a particular concern, evaluations of a particular concern using the updated hydrodynamic and water quality models, a modification to a mitigation feature of the project, and cessation of construction until the concern is resolved [if necessary]. Additional information has been added to detail the specifics of the decision process [for the post-construction monitoring period].

760APD-MR-28-EV23

Comment: *Section 9.B.Decision Process, p. 30, 2nd Paragraph: Response should not be delayed until the post-construction monitoring period is completed if impacts exceed those permitted. If the mitigation features are not meeting their goals during the monitoring period action should be taken when deficiencies are observed. The applicants should not delay 4 years to act for exceedences which are observed in year 1.*

Response: Information has been added to Appendix D to explain the adaptive management process for the post-construction monitoring period.

760APD-MR-28-EV24

Comment: *Section 9.B.Decision Process, p. 31, 2nd Paragraph: Expecting complete agreement by the Cooperating Agencies for an adaptive measure to be implemented is unrealistic. The text indicates that an additional year of monitoring is possible but that it would reduce the funds to implement the adaptive measures. If the project has impacts which exceed those permitted, or if the final impacts remain unclear, then monitoring should continue. If the cost of the monitoring or adaptive measures exceeds the funds reserved then additional funds should be secured by the applicant. Monitoring or mitigation should not be reduced if permitted impacts have been exceeded or a determination on exceedences is reasonably attainable.*

Response: Appendix D has been revised to indicate that monitoring of an adaptive management measure would be conducted for two years, or longer if the agencies determine that to be prudent. If

the expected costs of monitoring and/or adaptive management measures increase substantially, the District would seek the additional funds through its normal budget process.

760APD-MR-28-EV25

Comment: *Section 9.B.Decision Criteria, p. 31, 1st Paragraph: This section should be changed to section 9.C Decision Criteria. The section titled Decision Process is section 9.B.*

Response: Appendix D has been revised to better describe the decision processes that will occur during the construction and post-construction monitoring.

Page Appen. D-4

760APD-MR-28-EV26

Comment: *Section 10.B.Components of Approved Adaptive Management Plan, p. 33, 2nd Paragraph: The fish passage improvements at the NSBL&D does not provide greater habitat for the sturgeon as compensation for the impacts. It provides a means to which the sturgeon could access potential habitat if they navigate the NSBL&D correctly.*

Response: As noted in DEIS-Section 5.03.2, the Cooperating Agencies and the Fisheries Interagency Coordination Team could not identify measures within the estuary that would reasonably restore/enhance Shortnose Sturgeon habitat. Therefore, the team agreed [2007] construction of a fish passage around the New Savannah Bluff Lock and Dam would compensate for losses in the estuary by providing access to an additional 20 miles of upstream foraging/spawning habitat.

760APD-MR-28-EV27

Comment: *Section 10.B.Components of Approved Adaptive Management Plan, p. 33, 2nd Paragraph: The text indicates that "acquisition of additional bottomland hardwoods/freshwater wetlands would compensate for additional impacts to freshwater marshes beyond those that are predicted in the EIS." This is "out-of-kind" mitigation and does not constitute replacement. This form of mitigation does not satisfy "no net loss" as the preservation of non-threatened wetlands does not compensate for those impacted by the project.*

Response: The acquisition of up to 2,245 acres of land adjacent to the SNWR would provide sufficient compensatory mitigation for the expected impacts to wetlands. In its Adaptive Management Program, the District proposed acquisition of additional wetlands if monitoring demonstrates that the conversion acreage is under-predicted. To support this approach, the District conducted a functional assessment for wetland areas that would be subject to vegetative conversion; the assessment also provides an analysis of the magnitude of impacts that would occur. The District has provided a functional assessment for the proposed mitigation sites. The results of these assessments conclude that the proposed impacts are mitigated appropriately and overall there would be no net loss of wetland functions [to include fish/wildlife habitat values]. Regardless, all habitat impacts are adequately compensated by the proposed mitigation. This analysis was used in conjunction with the 2008 Mitigation Rule and confirms that that the District was justified in its use of preservation mitigation in this particular instance.

760APD-MR-28-EV28

Comment: *Section 10.B.Components of Approved Adaptive Management Plan, p. 34, 2nd Paragraph: If the impacts from the project have exceeded those permitted, and the adaptive management funds listed on page 34 have been exhausted, then additional funds should be made available by the applicant to provide additional mitigation. The funds listed on page 34 should not limit the response if impacts exceed those permitted.*

Response: The table includes reasonable estimates for adaptive management costs. If unforeseen impacts result in a need for more adaptive management, the funding level does not preclude requesting additional funds. Additional funds would be required to be justified and requested from both the local sponsor and the federal government. As mentioned in the paragraph, there will be some flexibility to shift the available funds to the mitigation area with greater need.

Page Appen. H-1

760APH-MR-16-EV01

Comment: *This Appendix was formatted following 40 CFR 230, the 404(b)l Guidelines. It generally contains all the necessary components of this regulation except for a mitigation component, which may be contained elsewhere in the Project's documentation.*

Response: The mitigation component of the project can be found in Appendix C – Mitigation Planning.

760APH-MR-16-EV02

Comment: *Page 15, para. 6 - Refers to other fill activities on the project ..... are associated with the various mitigation features of the project." "which is designed to minimize the increase in upstream salinity levels resulting from harbor deepening." Thus, espousing the value of the discharges as mitigative measures. The negative impacts of these fill activities are not considered. Is there mitigation proposed for impacts caused by the mitigation?*

Response: The District does not plan to provide mitigation for all fill-related activities associated with construction of the SHEP's mitigation features, viz., sediments used to construct the plug in Rifle Cut, construction of the diversion structure at McCoys Cut, construction of the broad berm in the Sediment Basin, and construction of the boat ramp in Back River. These fill-related activities result in material being placed on unconsolidated water bottoms. For mitigation features which remain submerged, mitigation would not be required since the functions associated with water bottoms would remain the same [just at lesser depth]. Conversely, the plug in Rifle Cut would result (over the long term) in a mudflat/marsh which would constitute a net gain in aquatic function/values associated with essential fish habitat. Finally, the boat ramp will be constructed within the footprint of the Tidegate [after its removal]. Demolition and subsequent construction activities would result in the loss of 8.48 acres of brackish marsh / saltmarsh, but these impacts will be among those mitigated by constructing brackish marsh habitat within sediment disposal site 1S. After deliberation, the District determined that the loss/benefit associated with the activities is essentially a zero sum.

760APH-MR-16-EV03

Comment: *Page 17, para. 3 - Again, measures proposed to minimize impacts of increased salinity up the river, i.e., discharged of dredged material, are lauded as largely beneficial ....*

"The discharge of dredged and fill sediments associated with the Savannah Harbor Expansion Project will actually be an integral part of minimizing these impacts."

Response: The District determined that placement of fill to construct the mitigation features would be an integral part of minimizing impacts associated with changes in salinity levels [post-construction].

760APH-MR-16-EV04

Comment: *Page 20, para. 3 - A number of references are made to significant changes in substrate elevation in the nine nearshore areas. Have these depth modifications been modeled regarding hydrodynamics and sediment transport at the mouth of the river?*

Response: After publication of the DEIS, a decision was made to eliminate the use of nearshore sediment placement sites for new work material. Hence, with the exception of the ODMDS, all excavated material will be placed in existing CDFs. As stated previously, the nearshore sites shown in Figue 3-3 could be used for maintenance material in the future. The location of these sites has been developed over time based on input received from the LTMS study, the 2003 ERDC modeling studies, and subsequent coordination with various agencies and the City of Tybee Island during the SHEP study process.

760APH-MR-16-EV05

Comment: *Page 20, para. 6 - "Net loss of environmental value is expected to be minimal."Regard the discharge of dredged material back into waters as part of the mitigation, this has not been shown.*

Response: The District does not plan to provide mitigation for all fill-related activities associated with construction of the SHEP's mitigation features, viz., sediments used to construct the plug in Rifle Cut, construction of the diversion structure at McCoys Cut, construction of the broad berm in the sediment basin, and construction of the boat ramp in Back River. These fill-related activities result in material being placed on unconsolidated water bottoms. For mitigation features which remain submerged, mitigation would not be required since the functions associated with water bottoms would remain the same [just at lesser depth]. Conversely, the plug in Rifle Cut would result (long term) in a mudflat/marsh which would constitute a net gain in aquatic function/values associated with essential fish habitat. Finally, the boat ramp will be constructed within the footprint of the Tidegate [after its removal]. Demolition and subsequent construction activities would result in the loss of 8.48 acres of brackish / saltmarsh, but these impacts will be among those mitigated by constructing a brackish marsh habitat within sediment disposal site 1S. After deliberation, the District determined that the loss/benefit associated with these activities is essentially a zero sum.

760APH-MR-16-EV06

Comment: *Page 21 , para. I - Refers to conducting benthic studies on the Tybee shelf prior to performing proposed discharges associated with habitat modifications here as part of the proposed mitigation. This is the first mention of conducting a site specific study on an area proposed for impact as part of the mitigation plan and should be a practice carried out on all other discharge locations.*

Response: Placement of new work sediment in the nearshore sites near Tybee Island is no longer an element of the SHEP project. All sediment excavated from Station 4+000 to 0+000, and from the entrance channel would now be placed in the Offshore Dredged Material Disposal Site (ODMDS) or an existing upland confined disposal facility. A Section 103 Evaluation of the sediment has been conducted to ensure compliance with the EPA Ocean Dumping Regulations. Prior to the start of dredging the entrance channel extension, which was redesigned to be a 37,680- foot-long by 600-foot-wide channel located on a different alignment, the District would determine if any hard bottoms are located within the footprint of this channel extension. Locations identified for placement of mitigation features at the upper reaches of the harbor are unconsolidated water bottoms, an environment that is uniform and ubiquitous in that area. No additional benthic studies are proposed on water bottoms in discharge locations.

760APH-MR-16-EV07

Comment: *Page 21, para. 5 - Discussion ofbenn construction off Tybee Island and "no significant changes in current patterns and water circulation are expected". Have adequate studies been done to support this statement? Are these berms resources that where historically located here but have eroded because of anthropogenic or storm activity?*

Response: The project no longer proposes to construct berms in the Tybee Island nearshore area using new work material. The dredged sediment placement plan has been revised and placement of all sediments excavated from the entrance channel would be deposited in previously-approved areas: either in the Offshore Dredged Material Disposal Site or an upland confined disposal site. Please see previous response (760APH-MR-16-EV04) regarding how the locations of the berms were determined. The FEIS has the details of the revised sediment placement plan. Figure 3-3 shows the sites where maintenance material could be placed into the nearshore off Tybee Island.

Page Appen. H-2

760APH-MR-16-EV08

Comment: *Page 22, para. 2 and 3 - Again, statements such as, "No net loss of environmental value" and "The discharge of dredged and fill material into waters of the United States associated with the Mitigation Plan would minimize the upstream salinity increases ... " appear to be unsubstantiated and do not adequate address impacts caused by the mitigation itself, respectively.*

Response: This comment has already been addressed in previous responses.

760APH-MR-16-EV09

Comment: *Page 23, para. 7 - CONTAMINATION DETERMINATION - Sec comments in the Appendix M (Sediment Quality Evaluation).*

Response: This comment refers to another comment provided by the author. The Corps' response is with the other comment.

760APH-MR-16-EV10

Comment: *Page 24, para. 1- CONTAMINATION DETERMINATION - References three rounds of sediment sampling but starts out summarizing the second round that was conducted in 2005 with no summary of the first round. Please summarize the first round (i.e., 1997) here as well for comprehension/organization purposes.*

Response: The following information from the Executive Summary of Appendix M has been added to Appendix H. "In 1997, sediment core samples were collected and examined for sediment physical and chemical properties. The sampling area covered the entire area proposed for harbor deepening, extending from deep water in the ocean to the Kings Island Turning Basin (Station 103+000). Parameters investigated included metals, PCBs, PAHs, petroleum hydrocarbons, phenols, pesticides, dioxin congeners, cyanide, organotins, and nutrients.

The evaluation found that most of the sediments provided no reason for concern over potential contaminant-related impacts associated with the proposed dredging and dredged sediment placement. However, three potential issues were identified.

One issue involved sediments near the old RACON Tower site. Subsequent sampling conducted in 2005 revealed that sediments at that location do not pose a potential for potential contaminant-related environmental impacts."

760APH-MR-16-EV11

Comment: *Page 32, para. 7 - AQUATIC ECOSYSTEM AND ORGANISM DETERMINATIONS - See comments on T&E and fisheries/sturgeon from Travis and JPD.*

Response: This comment refers to other comments provided by the author. The Corps' response is with the other comments.

760APH-MR-16-EV12

Comment: *Page 33, para. 1 - AQUATIC ECOSYSTEM AND ORGANISM DETERMINATIONS, Fish, Crustaceans, Mollusks and Other Aquatic Organisms in Food Web - "The project would not involve any discharge of dredged or fill material into areas with high concentrations of shellfish." "Side scan sonar and benthic surveys would be conducted during the design phase to confirm this initial conclusion." These measures seem adequately protective. How and who will review the results of the additional studies and determine if impacts to benthics will be minimal?*

Response: Side scan sonar and benthic surveys were originally proposed for the nine nearshore sites proposed for sediment placement. However, as noted previously, those sites will no longer be used for placement of new work sediments. All sediments from Station 4+000 to Station -97+680 would be placed in the ODMDS or an upland confined disposal site. The Corps would conduct side scan sonar and hard bottom surveys in the areas shown in Figure 3-3 if the nearshore sites off Tybee Island are ever used for placement of maintenance material.

760APH-MR-16-EV13

Comment: *Page 33, para. 4 - AQUATIC ECOSYSTEM AND ORGANISM DETERMINATIONS, Special Aquatic Sites - What alternatives were evaluated regarding replacement of the 337 acres of tidal freshwater marsh besides other than preservation?*

Response: A watershed assessment was conducted in the Lower Savannah River Harbor to evaluate specific mitigation measures which could compensate for the conversion of freshwater wetlands 223 acres] to its brackish marsh counterpart. This assessment concluded the only element of wetland function that would be materially affected by this conversion was its fish and wildlife habitat component. To rectify these losses, the District reviewed approved mitigation banks in the Lower Savannah River Watershed, but determined there were none with the appropriate tidal, freshwater

wetland characteristics. The District and Interagency Coordination Team decided that the "In-Lieu Fee" program is functionally unable to provide the requisite compensation. Creation of freshwater, tidal wetlands was considered; however, it was ultimately concluded by the study group this was not a long-term solution given the high risk of failure.

A Wetland Interagency Coordination Team (ICT) [consisting of technical expert representatives from USACE and federal/state natural resource agencies] sought to identify acceptable mitigation for SHEP. At the outset, USFWS stated that mitigation actions must be performed within the basin for impacts to wetlands located within the SNWR. The Service suggested preservation of lands as a possible solution and recommended sites that are part of its long-term lands acquisition strategy to compliment the SNWR. The Stakeholder Evaluation Group, including its Non-governmental Organizations (NGOs) members was consulted to determine if they could identify any suitable mitigation options. Over the 10-year study period, no agency/organization could identify another feasible alternative as mitigation for impacts that would occur as a result of the wetland species shifts. Therefore, the District proceeded with identifying preservation sites.

The Corps' Agency Technical Review (ATR) assessed the use of the Savannah District's Regulatory SOP to develop a mitigation plan for SHEP. The ATR was lead by the National Deep-Draft Navigation Planning Center of Expertise; technical work was performed by Corps experts at the Engineering Research and Development Center in Vicksburg, MS. The ATR evaluated the SOP to determine if it had the capabilities to ascertain the preservation acreage needed to compensate for SHEP impacts. The ATR also commented on whether the assumptions/calculations used in its application were reasonable in determining mitigation needs. The SOP was only used to determine the amount of preservation acreage necessary to offset the remaining impacts AFTER development of avoidance, minimization, and restoration features. The ATR concurred with use of the SOP to determine the amount of preservation acreage needed and considered the District's application of the SOP to be reasonable in quantifying impacts and required mitigation.

The USFWS provided a Fish and Wildlife Coordination Act Report [August 2010]. In that report, the USFWS concurred with use of the SOP, which calculated a need to preserve 2,245 acres of land adjacent to the SNWR for the 47-foot alternative. The Service provided updates to the SOP calculations in Appendix A of the report. The District concurred with use of the updated SOP worksheets and adopted their results for use in the EIS. In its Adaptive Management Program, the District proposed acquisition of additional wetlands if monitoring demonstrates impacts are under-predicted.

After a great deal of deliberation, a consensus was reached that the most appropriate and practicable means of mitigating the resultant species shift is the preservation of approximately 2,245 acres of bottomland hardwoods and upland buffer. USFWS and the Savannah National Wildlife Refuge (SNWR) have prepared a prioritized acquisition list of ecologically valuable properties available within the estuary which can further Refuge's goals and enhance the area's fish and wildlife resources.

760APH-MR-16-EV14

Comment: *Page 34, para. 4 - Potential Effects of Human Use Characteristics - This section should address the relocation of the municipal water intake and effects of the project on commercial and recreational fisheries. Alternatively, refer to sections where these issues are addressed.*

Response: Additional modeling efforts were conducted to confirm/refine the chloride impact predictions. A raw water storage impoundment would be constructed in lieu of relocating the City of Savannah's water intake on Abercorn Creek. The results of that work are included in the FEIS. EIS-Section 5.17 discusses the effects on recreational and commercial and fisheries.

760APH-MR-16-EV15

Comment: *Page 35, para. I - 8.0 DETERMINATION OF CUMULATIVE EFFECTS ON THE AQUATIC ECOSYSTEM - This section defers to Appendix L for the write up on cumulative impacts. This presentation is inconsistent with other sections in this Appendix that makes following the flow (and thus comprehension) of the data very difficult. Contamination Determination (6.4), for example, provides significant discussion on the ecorisk assessment performed as well as referencing Appendix M "Sediment Quality Evaluation."*

Response: The statement that "There are no known adverse cumulative impacts associated with any of the placement sites designated to be used for dredged or fill material" is based on the findings/determinations in Sections 5,6, and 7 of Appendix H as well as Appendix L. Most of the dredged material associated with SHEP would be discharged into existing CDFs or the ODMDS. A relatively small amount [dredged material] would be used to construct some of the project's mitigation features, e.g., the sill in Back River, etc. Some fill material (clean sand and rock) would be used to construct the structure to divert river flow at McCoys Cut and provide closure for the western arm of McCoys and Rifle Cuts. Material (concrete) removed from the Tidegate abutments may also be used to create fish habitat in Back River, Little Back River, etc.

Page Appen. H-3

760APH-MR-16-EV16

Comment: *The 404(b)I Appendix does not contain the following information, as applicable, nor does it refer to other DEIS documentation that address the following material required under 40 CFR Part 230, Subpart J "Compensatory Mitigation for Losses of Aquatic Resources"*

§ 230.91 Purpose and general considerations.
§ 230.92 Definitions.
§ 230.93 General compensatory mitigation requirements.
§ 230.94 Planning and documentation.
§ 230.95 Ecological performance standards.
§ 230.96 Monitoring.
§ 230.97 Management
§ 230.98 Mitigation banks and in-lieu fee programs.

The Water Quality Monitoring Plan Attachment in the Appendix fulfills part of the Monitoring requirement under 230.97, above. Practically speaking, however, this plan should be contained within Appendix D, "Monitoring & Adaptive Management Plan".

Response: As long as the Section 404(b)(1) Evaluation contains all the information required pursuant to 40 CFR 230, the District views its format as being of lesser importance, i.e., organization has no particular relevance to the analysis of the data. However, to avoid any confusion, the Section 404(b)(1) Evaluation will be thoroughly reviewed to ensure that it contains all the required information and revised as appropriate in the FEIS. A reference to the Water Quality Monitoring Plan that is included as an attachment to the Section 404(b)(1) Evaluation (Appendix H) will also be added to Section 1 of the Monitoring and Adaptive Management Plan appendix.

Page Appen. K-1

760APK-MR-15-EV01

Comment: *On pages 14 - 32, the reviewer was not able to calculate the emissions reported in many of the emission summary tables using the information provided in the descriptions preceding the emission summary tables. To facilitate a review of the emission estimates, an example calculation should be provided for Tables 5-10, 5-11, 5-12, 5-13, 5-19, 5-20, 5-21, 5-26, 5-29, 5-31 and 5-38.*

Response: The EIS did include example calculations. Section 5.4 of Appendix K details the formula provided by EPA [2009] for calculating emissions generated by ocean going vessels. This was followed by a step by step demonstration of how the District calculated the emissions' values found in the noted Tables.

760APK-MR-15-EV02

Comment: *Nitrogen oxides are referred to as "NOX", "NOx", "NOli" and "N02" throughout the appendix in various text sections, tables, and figures. A single acronym (e.g., "NOx") should be used throughout the appendix.*

Response: The District revised the FEIS to use a single acronym for nitrogen oxides [NOx].

760APK-MR-15-EV03

Comment: *The word "volume" is used numerous times starting on page 36 and through the end of the appendix to refer to the amount or quantity of mass emissions estimated (e.g., second sentence in the last paragraph on page 36, first and second paragraphs on page 45, and second sentence of the second paragraph on page 72, etc.). Because mass emission rates are being referred to in these instances, "amount" or "quantity" should be used in lieu of "volume".*

Response: The District removed the word "volume" in Appendix K and replaced it with either "amount" or "quantity".

760APK-MR-15-EV04

Comment: *Page 13 - the "Slow / Dead Slow" mode presented in Table 5-8 does not correspond with any of the mode categories presented in Table 5-6. The same mode terminology or designations should be used throughout both tables.*

Response: The District included the "Slow/Dead Slow" mode category in Table 5-6.

760APK-MR-15-EV05

Comment: *Pages 14 - 16 - the emission estimates shown in Tables 5-10 through 5-13 are presented as "tons per transit" or "tons per vessel". Also, the term "vessel call" is used in the preceding sections (e.g., Tables 4-1 through 4-4) and tug emissions are presented on a " ton/call" basis in Tables 5-19, 5-20 and 5-21. The use of consistent terminology is recommended to avoid confusion.*

Response: The different terminologies (tons per transit, tons per vessel, and ton/call) are necessary to describe how the calculation [total tonnage/year] is derived. The "tons per transit" designation deals with those vessel emissions [shown in Table 5-8] generated during travel time. The "tons per vessel" term is only used when the vessel is berthed or "hotelled" at the terminal. The "ton/call" is the total of

all OGV vessels emissions produced traveling to the terminal, docking, hotelling, undocking, and then leaving the port.

760APK-MR-15-EV06
Comment: *Page 18 - the emission formula presented on this page to calculate tug emissions is not clear and should be reformatted or revised.*

Response: The formula used to calculate tug emissions [in the harbor] has been revised/clarified.

760APK-MR-15-EV07
Comment: *Page 38 - CHE emissions for 2010 are presented in Table 5-48 and 5-49; however, the estimates for the Toplifts and the Empty Container Handlers indicate FY07 estimates. Most likely the reference to FY07 is incorrect and should be deleted.*

Response: The reference to FY07 is incorrect [Appendix K-Tables 5-48 and 5-49] and has been removed in the FEIS.

Page Appen. K-2

760APK-MR-15-EV08
Comment: *Page 43 - a unit designation for the emission estimates provided in Table 5-60 is not provided as part of the table heading.*

Response: Unit designations are now provided for the emission estimates found in Table 5-60.

760APK-MR-15-EV09
Comment: *Page 44 - GPA vehicle fleet emissions are summarized in Table 5-62 for Calendar Year 2007. The tons of emissions indicated for the vehicle fleet are very low. It is recommended that the vehicle fleet emission calculations be checked to ensure they are not in error.*

Response: The emissions values for the port's vehicle fleet [Table 5-62] have been verified.

760APK-MR-15-EV10
Comment: *Page 45 - in the first paragraph, Table 5-61 is incorrectly referenced as showing the relationship of air toxic pollutants to other pollutants. Table 5-61 is presented on Page 44 and summarizes GPA's vehicle fleet by vehicle category.*

Response: The District revised the text in the first paragraph on page 45 to indicate that Tables 5-63A and 5-63B show the relationship of the port's air toxics data [2008] to that of the NEI [2002 and 2005].

760APK-MR-15-EV11
Comment: *Page 46 - 58 - the emission tables presented as Table 5-64 through 5-76 summarize emissions of28 individual pollutants designated as air toxic pollutants. In the last row of these tables, the air toxic emissions are summed and reported as totals for each equipment category. This last row should be deleted since air toxic pollutants are normally viewed on an individual basis and not collectively with respect to air quality considerations. However, it would be appropriate (if desired), to sum the rows to show the totals for each individual air toxic pollutant.*

Response: The District revised Tables 5-64 through 5-76 to show the total for each of the 28 individual air toxics.

760APK-MR-15-EV12

Comment: *Page 59, Section 5.18 - in the third paragraph, the method used to generate emission estimates are described for methane (CH4) and nitrous oxide (N20), which are greenhouse gases (GHGs). Emissions of these GHGs arc incorrectly calculated from the CO2 estimates by applying their respective global warming potential factors of21 and 310. Theses global warming factors are used to quantify CO2 equivalent (CO2e) emissions when emission rates of CH4 and N20 are known. Considering that CH4 and N20 emissions are not quantified in the preceding sections and are expected to be only 2 percent of the total GHG emissions, it is suggested to revise and simplify this section (Section 5.18) by including only the CO2 emission estimates in the discussion and in Table 5-77 shown on pages 60-61.*

Response: Section 5.18 Greenhouse Gases (CHGs) in Appendix K and Table 5-77 has been revised in the FEIS.

760APK-MR-15-EV13

Comment: *Page 66, Section 6.0 - the last sentence of the first paragraph indicates a total of 10 emission sources were evaluated. However, the table which follows this sentence shows a total of 14 entries and one of these entries, "air toxics," should be removed because air toxics are pollutants and not an emission source nor an emission generating activity. This sentence should be revised to indicate 13 emission sources and the "air toxics" entry should be deleted from the table.*

Response: The last sentence in the first paragraph has been revised to indicate that "air toxics" are not an emission source. There are only 13 emission sources at the port. The term, "air toxics", has been removed from the table following the first paragraph.

760APK-MR-15-EV14

Comment: *Page 70 and Page 71 - Figure 6-4 and Figure 6-5 appear to be identical yet they are supposed to present emissions under different conditions (i.e ,• with and without the 4 7/48-foot harbor deepening).*

Response: Appendix K-Figures 6-4 and 6-5 [pages 70 and 71] have been reviewed/clarified to ensure that these figures accurately represent the baseline condition of a -42 foot depth channel [no-action] compared to the -47/-48 foot depth alternatives.

Page Appen. K-3

760APK-MR-15-EV15

Comment: *Page 96 - the first paragraph below Table 6-7 provides the total CO2 emissions for a steam electric plant in Savannah. However, no direct comparison is made between the CO2 emissions associated with this facility and the Port.*

Response: The CO2 emissions produced by the coal-fired Kraft Steam Electric Plant have been compared to those generated by the port.

Page Appen. L-1

760APL-MR-51-EV01

Comment: *With the projected large scale port expansion that may be implemented, it would be advisable to assess the effects on induced growth within the Savannah area. The area will likely require enhanced transportation but also will require increased community service support plus a growth of local industrial and commercial activity. A cumulative analysis of how growth was stimulated by port development in the past, currently and will be in the future could affect upcoming planning decisions.*

Response: Increases in container volumes are expected regardless of whether harbor deepening occurs. The proposed project is not expected to result in an increase in the number of containers that pass through Savannah Harbor in a given year. Because the same number of containers are expected to be transported under both with- and without- project conditions, a traffic study is not warranted.

760APL-MR-51-EV02

Comment: *The cumulative impacts of the Confined Disposal Facilities may be warranted. The specific concern is that if the CDFs in Jasper County are continued in use there may be a point in time when these sites would become unsuitable or infeasible for other uses. In particular, future development at one of these sites for a marine terminal as an environmentally preferable option could be obviated by onerous reclamation requirements owing to a need to remove or treat very large amounts of disposed dredge materials.*

Response: The continued deposition of dredged sediments in existing Sites 14A and 14B is the least-cost, environmentally-acceptable alternative for the proposed SHEP. However, use of these sites would not preclude construction of the Jasper Terminal. In fact, the JPO's consultant observed that placing new work sediments on Areas 14A/14B would save the sponsors of a terminal development project over $200 million by raising its elevation to a workable height. Therefore, if SHEP is constructed, it could benefit the development of a terminal at a Jasper site by significantly reducing its initial construction costs.

Page Appen. L-2

760APL-MR-51-EV03

Comment: *Historic Basis - Pg 10, 2nd para - "Federal and State natural resource agencies agreed that 1999 would provide the baseline condition for wetlands under which this harbor deepening should be considered." What is the basis for establishing 1999 as the base year? Large acreages of wetlands within the project area experienced substantial impacts from a variety of actions prior to 1999, and they need to be considered in the cumulative affects analysis.*

Response: The Wetlands Interagency Coordination Team recognized the importance of establishing baseline conditions [amount and types of marsh remaining in the Savannah Harbor estuary between the I-95 crossing and Back River] for the Corps to identify and analyze potential project impacts to wetlands. The Wetlands ICT recommended the Corps use 1999 as the baseline for wetland impact analyses.

760APL-MR-51-EV04

Comment: *Past Actions/Stresses - Pg 10, 3rd para - "All of these deepening projects allowed the freshwater interface to migrate farther upstream." Given this statement, why would the cumulative loss of wetlands due to channel deepening not he included in the Cumulative Affects analysis?*

Response: Much of the historic "marsh loss" associated with the Savannah Harbor Navigation Project can be attributed to the construction and long-term use of its confined disposal facilities. Movement of the saltwater wedge upstream [because of previous harbor improvements [deepening] did not necessarily result in marsh loss, but rather conversion of freshwater marsh to its brackish/salt marsh counterparts. According to estimates from the US Fish and Wildlife Service (Page 21-Appendix L), there were approximately 12,000 acres of tidal freshwater marsh in the Savannah Harbor estuary in 1875, of which half were gone by 1974. Using the present long term average rate of sea level rise in Savannah (3 mm/yr), the estuary has experienced a 1.3 foot increase in sea level since 1875. Although there were other factors involved (development, etc.), harbor improvements and sea level rise were responsible for much of the noted species shifts [change in dominance from freshwater to more saline community types].

760APL-MR-51-EV05

Comment: *Present Actions/Stresses - Pg 13, 4th para - "The District expects to begin the rehabilitation in the summer 0[2010 and complete it in FY 2012." The rehabilitation refers to the water control structures in the Freshwater Control System. Has that work begun yet?*

Response: Yes, the work within the SNWR has been completed.

760APL-MR-51-EV06

Comment: *Future Actions/Stresses - Pg 14, 3rd para - "Another potential impact to upstream salinity levels and thus the SNWR is the proposed Jasper County Marine Terminal." If this proposed project is considered to be feasible enough for inclusion in the cumulative impacts analysis, then why is it not feasible enough to be considered an alternative to the SHEP?*

Response: A container terminal located in Jasper County was included in the alternatives' analysis [port options]. Please see the following sections in the GRR: Section 6.7, Evaluation of Alternative Structural Measures; Section 12.1.1, Jasper County Terminal Sensitivity Analysis; and EIS-Appendix O, Formulation of Alternatives Appendix.

760APL-MR-51-EV07

Comment: *Incremental Impact - Pg 14, 4th para - This discussion on the effects of past harbor deepening projects and their resultant increases in upstream salinity levels should include statements regarding the magnitude and significance of those cumulative impacts.*

Response: Indirect Impacts to tidal freshwater marsh from past harbor improvements can be determined by reviewing the US Fish and Wildlife estimates of historical freshwater tidal marsh acreages in Savannah Harbor on page 21. According to estimates from the US Fish and Wildlife Service (Page 21-Appendix L), there were approximately 12,000 acres of tidal freshwater marsh in the Savannah Harbor estuary in 1875, of which half were gone by 1974. Using the present long term average rate of sea level rise in Savannah (3 mm/yr), the estuary has experienced a 1.3 foot increase in sea level since 1875. Although there were other factors involved (development, etc.), harbor improvements and sea level rise were responsible for much of the noted species shifts [change in dominance from freshwater to more saline community types].

760APL-MR-51-EV08

Comment: *Past Actions/Stresses - Pg 23, 2nd para - "Over time some tidal freshwater marsh has been converted to either brackish or saltmarsh because of increased upstream salinity levels caused by deepening of the harbor." The use of the word "some" to quantify the historic losses of tidal freshwater*

marsh within Savannah Harbor that actually numbers in the hundreds of acres understates the magnitude and significance of the cumulative impacts.

Response: Appendix L readily acknowledges that previous harbor improvements have moved the saltwater/freshwater interface upstream and are a major factor in conversion of tidal freshwater marsh to brackish marsh or saltmarsh in Savannah Harbor. In this case the use of the word, "some", means not all.

760APL-MR-51-EV09

Comment: *Present Actions/Stresses - Pg 26, 4th para - "Those areas of tidal freshwater marsh outside of the SNWR could be filled after obtaining a Department of the Army Permit; such a permit would require mitigation for these impacts but not replacement of tidal marsh." Why would the Corps of Engineers issue permits for filling remaining tidal freshwater marsh within the Savannah River estuary knowing the history of that resources ' considerable destruction and the value of the remaining resource to the ecology of the watershed? Also, given the Corps' tenant of "no net loss of function or value" for wetland losses, why would wetlands replacement not be required?*

Response: Section 404 of the Clean Water Act regulates the discharge of dredged or fill material into waters of the United States [including wetlands]. USACE is the agency delegated the regulatory authority to evaluate these land disturbing activities. A USACE permit can be issued which authorizes the permitee to impact wetlands and/or other aquatic resources. This has occurred in the vicinity of the SNWR and there is the potential that additional permits could be issued. However, the number of future permit applications which will be submitted for consideration is unknown. Moreover, the District cannot speculate on the number of permit actions or type(s) of impact that would be authorized. Issuance of a USACE permit is not guaranteed. Savannah District evaluates a permit application/associated mitigation plan on its individual merits and then renders a decision.

Page Appen. L-3

760APL-MR-51-EV10

Comment: *Capacity to Withstand Stress - Pg 27, 2nd para - "Tidal freshwater marshes exist in a very specific environment and are greatly controlled by ground elevation, river and tidal flows, and salinity levels. Maintaining salinity levels that are 0.5 ppt or less is critical to their survival" Please explain how the above statement relates to the subject heading of Capacity to Withstand Stress.*

Response: The ability of a resource to withstand stress can be a function of its capability to live under a broad range of environmental conditions, or whether its survival is dependent on maintenance of a narrow set of conditions. The discussion of the requirement of tidal freshwater marshes for narrow ranges in ground elevation, river and tidal flows, and salinity levels is quite pertinent.

760APL-MR-51-EV11

Comment: *Present Actions/Stresses - Pg 33, 4th para - "All marsh in the Savannah estuary is protected from development by the provisions of Section 404 of the Clean Water Act." This statement appears contradictory to the assertion that preservation of freshwater wetlands is appropriate mitigation for expected wetland losses within SNWR because they (the wetlands that would be preserved) are under threat of development. Please explain.*

Response: All wetland and marshes are protected by the provisions of Section 404 of the Clean Water Act. The lands that would be purchased and preserved as mitigation for impacts to tidal freshwater

marsh are not marsh community types, but these sites are predominantly freshwater wetlands which fall under the purview of Section 404 regulations. An evaluation of the elements of wetland function affected by the shift of freshwater to brackish marsh revealed that the fish and wildlife habitat component would experience a minor impact [remainder are unchanged]. The proposed preservation lands consist of bottomland hardwoods, maritime forest and uplands dominated by deciduous forest and re-growth. The bottomland hardwoods are classified as palustrine, forested, broad-leaved deciduous systems that are both temporarily and seasonally flooded. Although bottomland hardwoods [in private ownership] are considered wetlands from a regulatory standpoint, they could be subject to such activities as timber harvest.

Preserving these areas would ensure their wildlife habitat values are protected in perpetuity. The acquisition and preservation of these lands would provide a functional replacement for the minor loss of wildlife habitat that occurs with the species shift from a freshwater- to brackish marsh.

The District and resource agencies have documented that land use changes are occurring in the immediate vicinity of the Savannah National Wildlife Refuge (SNWR). The areas proposed for preservation are susceptible to the same developmental threat. USACE is the agency delegated the regulatory authority to evaluate these land disturbing activities. A USACE permit can be issued which authorizes the permitee to impact wetlands and/or other aquatic resources. This has occurred in the vicinity of the SNWR and there is the potential that additional permits could be issued.

The District as well as regional planning entities expect Savannah Harbor and areas surrounding the SNWR will continue to experience population growth, industrial/commercial development, and changes in land use. In addition to the industrial developments that have been permitted by the District in recent years, the US Geological Survey, Water Science Center (GaWSC) commented on the large number of industrial facilities and associated impacts that are projected on lands in close proximity to the Georgia Ports Authority and the SNWR. Preservation of 245 acres ensures aquatic resources on the associated properties will be protected in perpetuity. The preserved land would provide additional buffer so that any future development in the vicinity will not result in a secondary and/or indirect impact to existing Refuge lands. There is also a threat that subtle changes in adjacent land use will also have a detrimental impact on the SNWR. For example, a Public Notice published by the Charleston District, Corps of Engineers on September 28, 2009 requested comment on a proposal from a private landowner to alter the hydrology within a relict rice impoundment [485 acres] via diversion of tidal flows. The entire property [693 acres] would then be used as a mitigation bank. Presently, this parcel provides stop-over benefits to migratory waterfowl similar to those provided by Refuge lands. Conversion to saltmarsh lessens its waterfowl potential and potentially results in crowding on adjacent preferred habitat. There is the immediate implication that birds could shorten their stay in the area and result in the populations that the Refuge currently serves resuming their migration with less rest. The expected effects of the proposed regulatory action on the SNWR have not been quantified, but the proposed action is an example of the continued threat that manipulation of adjacent lands poses to the SNWR and the resources it protects/fosters. Acquisition and preservation of the proposed 2,245 acres as mitigation for SHEP would provide additional buffer and protection from this type of activities. The mitigation lands would include a restrictive covenant/conservation easement with subsequent conveyance to the USFWS.

760APL-MR-51-EV12

Comment: *Present Actions/Stresses - Pg 34, 1st para - "Those who have obtained permits have been required to avoid wetland impacts where practicable and to provide in-kind mitigation where wetland losses are unavoidable." For its unavoidable wetland impacts from SHEP, the Corps is proposing to*

purchase existing wetlands that are under no threat of development and preserve them by having the acreage incorporated into SNWR. Why would the Corps consider that to be in-kind mitigation?

Response: The mitigation for direct wetland impacts associated with the SHEP is referenced on page 34 [not species shifting from tidal freshwater to brackish/salt marsh]. Specifically, the direct wetland impacts of the SHEP consist of the loss of 15.68 acres of marsh resulting from excavation required for the Kings Island Turning Basin improvements, construction of the meeting lanes, and removal of the Tidegate structure abutments. In-kind mitigation for these impacts would be provided by restoring 40+ acres of marsh in Disposal Area 1-S.

The 2008 Final Mitigation Rule describes the need for a functional assessment of impacted waters of the US as well as the aquatic resources proposed for mitigation. The Rule also stresses the need for a watershed assessment and provides mitigation selection criteria. The District Engineer considered all these elements during the deliberative process to determine appropriate mitigation for SHEP.

The functional assessment concluded that the differentiation between salt marsh and brackish marsh recommended by the Wetland Interagency Coordination Team was restrictive. Specifically, the salinity range used in the SHEP model to differentiate between brackish marsh (0.6-4 ppt) and salt marsh (> 4ppt) was narrow. Brackish marsh salinities in the vicinity have been reported with a range from 0.5-10 ppt (NOAA, 2010) and in other estuarine systems from 0.5-17 ppt (Judd and Lonard, 2004). An earlier assessment of wetland vegetation in the Savannah estuary reported a salinity range of 5-10 ppt for brackish marsh systems (ATM, 2003). Thus, the salinity range used to quantify salt marsh in the area of potential effect (i.e., > 4 ppt) may over-estimate the amount of saltmarsh in the system and under-estimate the amount of brackish marsh. As such, the described conversion of salt marsh to brackish marsh, which would occur as a result of harbor deepening, may be minimal when taking into account vegetative characteristics for wetland environments with associated salinities commonly associated with a brackish marsh (i.e., range between 5 and 10 ppt).

Given the wide range of salinity reported in literature for brackish marsh systems, the inherent variability in salinity that exists for all estuarine systems, and the modeling results that report post-deepening salinity concentrations consistent with the aforementioned range, it was concluded that conversion of 740 acres of saltmarsh to brackish marsh [47-feet option] is unlikely. Actual vegetative shifts may not be identifiable *in situ*. That said, the District elected to be conservative in its assessment of the potential for project-related effects and considered the entire saltmarsh and brackish marsh conversion in its calculation of minor impacts.

The conversion of 223 acres of freshwater wetland to brackish marsh represents the only significant wetland effect that is likely to be noticeable if the harbor is deepened to 47-feet . As noted previously, the ecological values of the impacted 223 acres of freshwater wetlands would not be completely lost. Instead, those acres would be converted to brackish marsh. The District's calculation of the number of acres of freshwater wetland that have the potential to be converted to brackish marsh is based on a shift at a given location of 0.5 ppt salinity, a traditional rule-of-thumb for differentiating between freshwater marsh and brackish marsh. However, data reported in the literature for Savannah Harbor suggest that a shift in vegetation (from freshwater marsh to brackish marsh) in this estuary does not occur until salinity concentrations approach 2.5 ppt (Latham et al., 1994). Even at oligohaline marsh sites with average salinity concentration of 2.1 ppt, a discriminant function (DF) analysis revealed that only 47% of cases resulted in the correct pairing of environmental variables with vegetative species composition and dominance. At those same oligohaline sites, 37% of the vegetative species

composition and dominance were more closely aligned with a freshwater classification (Latham et al., 1994).

The District's salinity value that denotes a defined shift from freshwater to brackish marsh (i.e., 0.5 ppt) is approximately 5 times lower than has traditionally been observed with 100% vegetative shifts *in situ* within the Lower Savannah Watershed (Latham et al., 1994) and other coastal marsh systems in the southeastern United States (NOAA, 2010). Thus, many of the existing freshwater emergent plant species, and associated ecological parameters, will likely be sustained in areas predicted to experience salinity concentrations in the range of 2.5 ppt. For those areas that transition to more brackish characteristics, they would continue to provide the traditional ecological functions associated with all emergent wetland systems (please see functional assessment response and Appendix C-Mitigation Planning; Section VII).

The District conducted a watershed assessment in the Lower Savannah River Harbor to evaluate specific mitigation measures which could compensate for the conversion of freshwater wetlands to its brackish marsh counterpart. This functional assessment concluded the only element of wetland function that would be affected by this conversion was the fish and wildlife habitat component. To rectify these losses, the District reviewed approved mitigation banks in the Lower Savannah River Watershed, but determined there were none with the appropriate tidal, freshwater wetland characteristics. The District determined that the "In-Lieu Fee" program is functionally unable to provide the requisite compensation. The District considered the creation of freshwater, tidal wetlands. However, it was ultimately concluded by the study group that this was not a long-term solution given the high risk of failure.

33 CFR 332.2 (h)(2) of the Final Mitigation Rule States, *"Where preservation is used to provide compensatory mitigation, to the extent appropriate and practicable, the preservation shall be done in conjunction with aquatic resource, restoration, establishment and/or enhancement activities. This requirement may be waived by the district engineer where preservation has been identified as a high priority using a watershed approached described in paragraph (c) of this section, but compensation ratios will be higher."* After a great deal of deliberation, a consensus was reached that the most appropriate and practicable means of mitigating the resultant species shift is the preservation of approximately 2,245 acres of bottomland hardwoods and upland buffer. USFWS and the Savannah National Wildlife Refuge (SNWR) have a prioritized acquisition list of ecologically valuable properties available within the estuary which can further Refuge's goals and enhance the area's fish and wildlife resources.

The latest version of the Refuge's Acquisition Plan is dated July 2007 and is included in the document titled "Final Environmental Assessment and Land Protection Plan; Proposed Expansion of Savannah National Wildlife Refuge". The document characterizes the lands proposed for preservation in the areas identified as Mill Creek and Abercorn Island. The properties comprising the Mill Creek, Abercorn Island, and Eastern Boundary areas are characterized as wetlands and upland. The wetlands are classified as bottomland hardwood forest, dominated by old-growth oaks, cypress, sycamore and sweetgum. The sites are both temporarily and seasonally flooded and/or forested wetland. Thus, the proposed preservation of 2,245 acres of wetlands and upland buffer adjacent to the SNWR constitutes "in basin" mitigation. USFWS previously identified the ecological value of those properties and believes they would be valuable additions to, and advance the goals of, the Savannah Refuge.

Although elements of the properties proposed for preservation are "out-of-kind," the Final Mitigation Rule provides for use of "out-of-kind" mitigation in certain circumstances where the mitigation is determined to be ecologically important. 33 CFR 332.3 (e)(2) of the Final Mitigation Rule states, "*In*

general, in-kind mitigation is preferable to out-of-kind mitigation because it is most likely to compensate for functions and services lost at the impact site. If the district engineer determines, using the watershed approach in accordance with paragraph (c) of this section that out-of-kind compensatory mitigation will serve the aquatic resource needs of the watershed, the district engineer may authorize the use of such out-of-kind compensatory mitigation. The basis for authorization of such out-of-kind mitigation must be documented in the administrative record for the [permit] action." Areas proposed for preservation constitute the last virgin mixed, bottomland hardwoods remaining in the State of Georgia and one of few such areas remaining in the southeastern United States (Refuge Acquisition Plan-2009). The USFWS advocated for the acquisition and preservation of these properties as acceptable mitigation for impacts associated with the SHEP. The Fish and Wildlife Coordination Act Report states that proposed preservation would provide suitable mitigation for the project's impacts to wetlands.

760APL-MR-51-EV13

Comment: *Capacity to Withstand Stress - Pg 34, 3rd para - "The philosophy of the Corps of Engineers and state wetland protection programs is a "no net loss" of wetlands policy. Please explain how the Corps' use of wetland preservation in its proposed mitigation plan for SHEP is consistent with its philosophy of "no net loss".*

Response: Please review the previous response to see how the SHEP mitigation plan associated with indirect impacts to wetlands satisfies the 2008 Mitigation Rule and is consistent with the "no net loss" philosophy.

The harbor deepening project would also result in direct impacts to 15.68 acres of saltmarsh. These impacts would ONLY result after all possible avoidance and minimization measures have been applied. In brief, these marsh areas are subject to periodic flooding as a result of daily tides and are a monoculture of smooth coordgrass [*Spartina alterniflora]*. Approximately 7.3 acres (47%) of the total saltmarsh acreage that would be excavated is subject to the perturbations of wave action from passing ships. Thus, these areas exhibit vegetation densities significantly less than typically observed in a pristine marsh. Patches of bare, course-grain sand and mudflat are integrated throughout the areas of *Spartina alterniflora* in these locations. Given the sparse presence of vegetation, it would appear that these areas are challenged, somewhat degraded, and do not possess the same degree of primary productivity as observed in robust, densely-vegetated, saltmarsh systems located elsewhere in coastal Georgia.

Mitigation of the 15.68 acres would be accomplished by restoring approximately40+ acres of saltmarsh. The District used the Regulatory SOP to determine the exact number of acres (28.8) that would be required for restoration (See Appendix A-Mitigation Appendix). Historically, the USACE-Regulatory Division and members of the Interagency Review Team (IRT) [USEPA, USFWS, NMFS, and GADNR representatives] have agreed to saltmarsh creation as mitigation. Data obtained from the Savannah District-Regulatory Division identified five projects in the Lower Savannah Watershed where saltmarsh creation served as mitigation [typically on a ratio of 2 to 1= acres created/acres impacted, see following Table].

Projects impacting Saltmarsh and the Associated Saltmarsh Mitigation

Project Name	USACE File Number	Saltmarsh Impacts (Acres)	Saltmarsh Creation (Acres)
Slip One- Hutchinson Island	200501453	0.28	0.56
Hardin Canal Drainage	200600393	0.27	0.54
Skidaway Narrows Emergency Access	200600909	0.56	0.56
Skidaway Road Drainage Improvements	200601249	0.52	0.75
SLNG-Slip Construction	200200640	3.24	7.5

The proposed restoration of 28.75 acres [subset of the 40+ total] of brackish marsh as mitigation for impacts to 15.68 acres would be a ratio of 1.8:1 (acres restored to acres impacted). The ratio derived for the SHEP project provides roughly the same mitigation ratios as the other noted projects. Savannah District's use of the SOP confirmed that the amount of proposed mitigation was appropriate given the areal extent of impact and the current function/integrity of the impacted marsh.

Site specific mitigation would be ill-advised given the impacted area's exposed location. It is important to note that any comparably sized subset of the 40+ acres of contiguous, restored saltmarsh [which includes development of tidal creeks] would have more ecological value than the degraded, poorly functioning marsh along the navigation channel. Thus, the large, non-segmented size of the mitigation area, coupled with its "in basin" location along with incorporation of a strip of trees to separate it from the harbor, make it an ideal mitigation option for replacing the impacted marsh acreage. After considering all of the facts, the District concluded that there would be no net loss of wetland function.

760APL-MR-51-EV14

Comment: *Incremental Impact - Pg 34, 5th para - "The SHEP would result in the loss of 3.0 acres of brackish marsh and 12.68 acres of saltmarsh. When compared to the total amount of brackish marsh and saltmarsh in the Savannah Harbor estuary, this loss might seem insignificant. However~ it is the incremental impact of many small losses over time that can lead to significant adverse impacts to a resource." Please include a statement of the magnitude and significance of this incremental impact.*

Response: While the States of Georgia and South Carolina have large expanses of salt/ brackish marsh, any loss of these community types is considered important because of the long-term threat of cumulative impacts. The SHEP mitigation plan involves the restoration of 28.8 acres of marsh in former Disposal Site 1S to satisfy the mitigation requirements of the SHEP (15.68 acres of impact). See Appendix L for further discussion regarding the significance of the incremental impact.

760APL-MR-51-EV15

Comment: *Mitigation - Salt Marsh and Brackish Marsh - Pg 35, 1 st para - "Over time this site would be expected to re-vegetate with estuarine emergent wetlands (brackish marsh). Not planting the site with appropriate marsh vegetation leaves open the distinct possibility that the site will be colonized by Common Reed (Phragmites sp) or other undesirable plants. Please explain why planting with appropriate vegetation is not being proposed.*

Response: Previous reconnaissance of the restoration area suggests that *Spartina alterniflora* is abundant in the surrounding area [ample seed stock]. Thus, it would be prudent [cost-effective] to allow this native species an initial opportunity to naturally colonize the site. However, in the event the restoration site does not naturally vegetate at the rate stipulated in the Adaptive Management Plan, sprigging with juvenile plants would be performed (see previous responses and Appendix C-Mitigation Plan of the FEIS). The plan also includes measures for removal of invasive species. Annual monitoring reports would be generated. Corrective actions would be implemented with agency involvement/concurrence in the unlikely event of problems.

760APL-MR-51-EV16

Comment: *Pre-construction Monitoring - Pg 35, 5th para - "Monitoring of wetland vegetation for one year". Please explain the purpose and expected value of monitoring for one year.*

Response: The one-year of pre-construction monitoring would provide baseline wetland data in the 12 wetland sites to be monitored before inner harbor dredging commences, and the salinity regime begins to change.

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760APL-MR-51-EV17

Comment: *Monitoring During Construction - Pg 35, 6th para - "The same monitoring activities described above would be continued throughout the construction process, which is estimated to take 3-4 years". The Corps has indicated in other sections of this OEIS that construction of the SHEP is dependent upon receipt of funding from Congress. Given the uncertainty of a continuous funding stream that would allow the project to be completed in 3-4 years, how would the monitoring plan and costs be adjusted if construction were to stretch over a longer period of time?*

Response: Monitoring would continue throughout the period of construction, even if the projected 3-4 year period is exceeded. However, monitoring activities are linked to construction and would cease if construction was halted for a significant period of time due to a lack of funding.

760APL-MR-51-EV18

Comment: *Past Actions/Stresses - Pg 39, 2nd para - "In addition to loss of riverine habitat, much of the fishery habitat in the Savannah River estuary has also been lost or adversely affected". This statement is in stark contrast to the last paragraph on Pg 41 where results of a UGA study on the temporal and spatial distribution of estuarine fishes in the Savannah River estuary showed that the estuary supports a diverse and abundant fish community. Please clarify the apparent discrepancy.*

Response: There is no conflict between these two statements. Fishery habitat in the Savannah Harbor has suffered from historical development, including the clearing of large expanses of bottomland hardwoods for rice production together with more recent filling of wetlands for harbor/industrial development. However, despite these long-term perturbations, the remaining habitat supports a diverse and abundant fishery.

760APL-MR-51-EV19

Comment: *Present Condition - Pg 41, 1st para - "The shortnose sturgeon is the only endangered fish in the Savannah Harbor estuary". While that is a true statement at the moment, the National Marine Fisheries Service proposed in November 2010 that the Atlantic Sturgeon be listed as an endangered species under the Endangered Species Act. The Public Comment Period on the proposed listing closes in*

early January 2011, and the Atlantic Sturgeon may well be added to the Endangered Species List before the SHEP completes the NEPA and permitting processes. The potential impacts on Atlantic Sturgeon from the SHEP should be addressed in this DE IS (the Atlantic Sturgeon is acknowledged as an imperiled species in the I Sl paragraph of page 43 in this appendix), or in a supplemental EIS at a later date when the species is listed.

Response: The EIS does address impacts to Atlantic Sturgeon. Although the Atlantic sturgeon has not been listed as endangered, this species was included in the BATES prepared on the project. The NMFS determinations in regards to potential SHEP impacts on the Atlantic Sturgeon can be found in their BO which is in Appendix Z.

760APL-MR-51-EV20

Comment: *Future Actions/Stresses - Pg 46, 3rd para - "A marine terminal has been proposed for Jasper County, South Carolina". Including the proposed Jasper Terminal in the discussion of cumulative impacts acknowledges that it is a* reasonably *foreseeable activity. Why then is it not also appropriate to evaluate the Jasper Terminal as a reasonable and feasible alternative to the SHEP?*

Response: A new container terminal in Jasper County was an alternative considered during the SHEP NEPA and CWA alternatives analysis. See previous responses on this issue. The District considered three locations in Jasper County, SC for a "Jasper Terminal". Appendix O is one part of the EIS/GRR that describes this work and the conclusions. It should be noted that Appendix O was completed in 2005, before the term "Jasper" was used to describe the new terminal, so Appendix O makes no named reference to the "Jasper Terminal."

760APL-MR-51-EV21

Comment: *Incremental Impact - Pg 47, 2nd para - "Average river flows were determined to be the most representative of conditions that would be expected over the longterm". Why would a modeling analysis of predicted impacts not be more meaningful based on low flow rather than on average flow?*

Response: The modeling approach [as detailed in the report] provided meaningful data; hence, a change is not warranted. Details regarding the hydrodynamic and water quality model development process, its extensive reviews, and the uncertainty analysis can be found in the report titled "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project" [2006]. It is included in the Supplemental Materials to the Engineering Appendix. This report also includes language describing model accuracy for various parameters including salinity and dissolved oxygen throughout the Savannah River estuary [including Middle and Back Rivers]. The model met the expectations of the modeling technical review group and is applicable over a wide range of conditions, including low/high freshwater flows.

760APL-MR-51-EV22

Comment: *Incremental Impact - Pg 47, 2nd para - "Fish habitat modeling was used to identify areas in the harbor where suitable habitat exists as well as how that habitat would change under various harbor deepening alternatives". Was any ground-truthing of areas in the harbor predicted by the model to be suitable fish habitat to confirm the model's accuracy?*

Response: The habitat suitability criteria used to assess available habitat for the chosen fish species [including Shortnose sturgeon] were developed by the Fisheries Interagency Coordination Team. These criteria were based on professional expertise/experience, pertinent literature, and site specific data for

the Savannah River. The Team compared the predicted locations of suitable habitats within the harbor to literature that describes the locations where the various species were recently found. As a result of such an analysis, NOAA Fisheries recommended a specific change in the salinity criteria for juvenile Shortnose sturgeon so the model would better reflect known occurrences. The ICT concurred in the revision and the Corps revised its modeling to use the new criteria.

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760APL-MR-51-EV23

Comment: *Incremental Impact - Pg 48, 1st para - "Without mitigation, model studies indicate that there would be no effect on American shad habitat". What was done to confirm the accuracy of model predictions?*

Response: The habitat suitability criteria used to assess available habitat for the chosen fish species [including American shad] were developed by the Fisheries Interagency Coordination Team. These criteria were based on professional expertise/experience, pertinent literature, and site specific data for the Savannah River. The Team compared the predicted locations of suitable habitats within the harbor to literature that describes the locations where the various species were recently found. As a result of such an analysis, NOAA Fisheries recommended a specific change in the salinity criteria for juvenile Shortnose sturgeon so the model would better reflect known occurrences. The ICT concurred in the revision and the Corps revised its modeling to use the new criteria.

760APL-MR-51-EV24

Comment: *Incremental Impact - Pg 48 - The discussion on Incremental Impact ends on this page with no conclusion offered on the magnitude and significance of the cumulative impacts of the river's fisheries. Please add a discussion on this.*

Response: The importance of the various marsh types in the Savannah Estuary and the cumulative impacts of past harbor improvements on these resources are fully disclosed in Appendix L. The last sentence in the first paragraph on Page 48 of the DEIS, Appendix L merely emphasizes this point. The importance of marsh as fishery habitat is further evidenced by the restoration of 28.8 acres of marsh in Disposal Area 1S which will provide the required mitigation for the 15.68 acres of marsh that would be directly impacted by SHEP.

760APL-MR-51-EV25

Comment: *Alternatives to Mitigate for Cumulative Impacts - Pg 48, 2nd para, 5th bullet " Restoring conditions in the estuary that are favorable to spawning of Striped bass to support the recovery of that species". How does stocking of striped bass achieve this objective, since the incremental loss of striped bass spawning habitat is unaffected by stocking?*

Response: As explained, the seven mitigation objectives provide the means to compensate for anticipated fishery impacts on the Savannah River. The Fisheries Interagency Coordination Team could not identify ways to improve, restore, or create spawning habitat for Striped bass in the estuary. Consequently, stocking of Striped bass fingerlings was determined to be the best means of replacing fish that might be lost in the younger stages of life because of increased salinity levels in their spawning area. Fingerlings are capable of moving to areas with desired habitat conditions. It should also be noted that construction of the proposed fish bypass structure at New Savannah Bluff may also benefit the species by providing access to additional spawning habitat.

760APL-MR-51-EV26

Comment: *Alternatives to Mitigate for Cumulative Impacts - Pg 51, 6th para " Consequently, implementation ofa stocking program was deemed to be the most effective means of mitigating for the remaining loss of Striped bass habitat associated with each alternative deepening plan". Its unclear how adding striped bass to a river with reduced Striped bass habitat will be able to sustain the fishery, and how that is considered to be acceptable mitigation. Please explain.*

Response: Striped bass are a component of the recreational sport fishery in the lower Savannah River. Stocking of fingerlings would replace fish otherwise lost because of a project-related reduction in spawning, egg, and/or larvae habitat.

760APL-MR-51-EV27

Comment: *Alternatives to Mitigate for Cumulative Impacts - Pg 52, 2nd para - "Determining the appropriate level of stocking was accomplished by the SHEP study team in coordination with the Georgia DNR-WRD". Fishery resources in a river that is the common boundary between two states are shared resources of both states. Was the SC DNR involved in Striped bass mitigation development?*

Response: The South Carolina DNR was involved in discussions involving mitigation for loss of Striped bass habitat.

760APL-MR-51-EV28

Comment: *Issue - Pg 54, 3rd para - "These issues are addressed in Section 5 of the EIS, and while they are major issues, the SHEP study team did not believe they warranted a cumulative impact type of analysis". Both NEPA and CEQ guidelines on cumulative impacts analysis requires that issues identified during Project Scoping as being major need to be included in the cumulative impacts analysis. Temperature gradients in the estuary and chloride levels in Abercorn Creek were identified as major issues during Scoping. Therefore they need to be included in the discussion of cumulative impacts.*

Response: While formation of temperature gradients in the Savannah Harbor is a concern from the standpoint of estuarine functioning, it is not an important issue in terms of the SHEP analysis. The SHEP would have a negligible effect on the temperature regime in Savannah Harbor.

Identification of potential significant cumulative impacts was accomplished through preparation of the Cumulative Impact Analysis (EIS-Appendix L). As directed by the CEQ Guidelines, the cumulative impact analysis should "focus on truly meaningful effects". The impacts included in the cumulative impact analysis were limited to those which met this test. Based on the District's knowledge of the type and level of likely project effects, temperature gradients and chloride levels in Abercorn Creek were not included. Temperature gradients were not an issue of concern because the SHEP would have only the most minimal impact on same. A cumulative impact analysis of chloride levels at the City of Savannah's water intake on Abercorn Creek would produce no new information. Namely, increased chloride levels in the upper Savannah Harbor can be attributed to just a few causative factors: previous harbor improvements, upstream point source discharges, droughts, and spring tides.

760APL-MR-51-EV29

Comment: *Issue - Pg 54, 5th para - "Dissolved oxygen concerns relating to harbor deepening can be divided into three issues: (1) as the channel depth increases, the ability of oxygen to reach the river bottom decreases, causing lower average concentrations of dissolved oxygen at the bottom, (2) as the channel prism .... throughout the water column". The decrease in DO levels at the river bottom has the potential to change both the benthic and plankton communities, which in turn may negatively impact the fish community. These impacts and their linkage should be discussed.*

Response: The proposed dissolved oxygen systems would restore and marginally increase dissolved oxygen levels [post-construction] in the estuary. The restoration of dissolved oxygen levels [to at least the status quo] should eliminate potential changes in benthic or plankton communities otherwise attributable to SHEP.

760APL-MR-51-EV30

Comment: *Issue - Pg 54, 5th para - "Lower dissolved oxygen concentrations also reduce the ability of the estuary to handle the point and non-point source loads of pollutants entering the estuary". The SHEP's lowering of dissolved oxygen levels in the harbor effectively reduces the harbor's ability to sustain a higher aggregate TMDL. That could result in higher costs to point-source dischargers who would have their TMDL lowered because of SHEP's impact on the harbor DO levels. This point should be discussed.*

Response: The project includes an oxygen injection system to mitigate for incremental reductions in dissolved oxygen attributable to the various alternative channel depths. Since adverse impacts associated with reduced dissolved oxygen have been addressed, any concerns about the Savannah Harbor Draft TMDL mitigation are eliminated. The project's proposed oxygen injection system would restore dissolved oxygen levels to what they would be without the project. Because of the wide spacing of the oxygen injection systems, much of the estuary would experience a minor increase in dissolved oxygen levels as a result of the project.

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760APL-MR-51-EV31

Comment: *Geographic Scope - Pg 55, 1st para - "Evaluation of impacts to the dissolved oxygen regime is critical because this segment of the river is on the State of Georgia's Section 303(d) list as impaired for dissolved oxygen". What is the status of that river segment under SC water quality criteria for dissolved oxygen?*

Response: SCDHEC identifies portions of the Savannah River estuary (Savannah River at US 17) as not meeting state standards for Fecal Coliform and Zinc (2010 Section 303(d) list). It does not identify the area as not meeting the dissolved oxygen standard.

760APL-MR-51-EV32

Comment: *Historic - Pg 55, 5th para - "In addition, since water quality in the harbor is - at a minimum not degrading - but likely to be stable or improving as tighter discharge standards are instituted and new industrial controls implemented, the present day conditions will be used as the baseline for this analysis". This does not follow NEP A nor CEQ guidelines on how impacts to specific resources are to be evaluated for cumulative impacts.*

Response: As part of the cumulative impact assessment, the past, present, and reasonably foreseeable future impacts were examined. A historical, qualitative account of water quality is provided in Appendix

L. However, this descriptive information cannot be evaluated to the same degree/confidence as the quantitative, analytical data that has been acquired in recent years. Therefore, the use of present day conditions as a baseline is justified since any attempt to comparatively analyze qualitative and quantitative data sets could not be done objectively. These baseline data were used with predictive models to describe reasonably foreseeable future impacts [degree/kind] more accurately; this in turn provides a more rigorous analysis of cumulative impacts.

760APL-MR-S1-EV33

Comment: *Past Actioons/Stresses - Pg 57, 1st para - "Monitoring indicates that the effects of this resuspension on dissolved oxygen levels are small, temporary, and localized". What monitoring? What is the reference for this statement?*

Response: Operation of a hydraulic dredge results in re-suspension of sediments which may, in turn, reduce dissolved oxygen levels in the harbor. However, this perturbation is relatively small in magnitude, transient, and localized. This is an objective characterization based on actual monitoring data, i.e., the District is required to monitor oxygen levels in the vicinity of dredge during the summer months when D.O. levels are normally lower.

760APL-MR-S1-EV34

Comment: *Past Actions/Stresses - Pg 57, 4th para - "Overall, the studies revealed that this procedure does not degrade the quality of the river to unacceptable levels". The studies need to be referenced. Are state water quality standards (either Georgia or SC) violated?*

Response: The following are references for the subject studies: 1. Final Report: Evaluation of Agitation Dredging, Savannah Harbor Ecosystem Restoration Study; Prepared by Applied Technology and Management; March 29, 2002. 2. Environmental Impact of Agitation Dredging at Southern Bulk Industries Terminal, East Coast Terminals and Wood Chip Exporting Facility, Savannah Harbor; Prepared by Skidaway Institute of Oceanography, May 1, 1993.

760APL-MR-S1-EV35

Comment: *Past Actions/Stresses - Pg 57, 4th para - "This procedure is not performed when background dissolved oxygen levels in the river are at or below Georgia water quality standards". Is the procedure performed when dissolved oxygen levels in the river are at or below SC water quality standards?*

Response: Agitation dredging in the Savannah Harbor is only conducted in Georgia state waters.

760APL-MR-S1-EV36

Comment: *Present Condition - Pg 57, 5th para - "Water quality in the harbor is generally good". This statement is inconsistent with the another sentence in that paragraph that says "The dissolved oxygen levels can drop to concentrations that do not adequately support aquatic life". This discrepancy should be rectified.*

Response: Water quality in the Savannah Harbor is generally good for most [approximately nine months] of the year. However, summer temperatures often depress dissolved oxygen levels to concentrations which stress aquatic life. This perturbation varies throughout the harbor and is a recurrent rather a constant problem during the summer months.

760APL-MR-51-EV37

Comment: *Present Condition - Pg 58, 1st para - "'This segment of the river failed to meet the dissolved oxygen use designation based on data collected in the summers of 1997 and 1999 (EPA 2006)." If there is recent data on summertime DO levels in that segment of the river, it should be referenced.*

Response: These reference data were used by EPA in 2006 to establish the Savannah Harbor TMDL. There should have been no inference that this information is inclusive of all water quality data available for the Savannah Harbor.

760APL-MR-51-EV38

Comment: *Present Actions/Stresses - Pg 59, 3rd para - "Model results from the EPA TMDL study for Savannah Harbor indicate that the Savannah Harbor Navigation Project has resulted in a 1 mg/l depression of dissolved oxygen in the upper water column". What is the magnitude of DO depression in the lower water column?*

Response: The referenced EPA document [2006] did not provide information concerning depression of oxygen concentrations [in the lower portion of the water column] attributable to the Savannah Harbor Navigation Project. A complete discussion of dissolved oxygen impacts and associated mitigation measures can be found in FEIS-Section 5.02.

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760APL-MR-51-EV39

Comment: *Present Actions/Stresses - Pg 59, 4th para - "If the background levels are at or below Georgia water quality standards, the dredging is not performed. This ensures that activities will not be conducted which would further exacerbate stressful conditions for wildlife". There seems to be an inconsistency here. Maintenance dredging is not performed if the DO is near or below water quality standards, but the Corps proposes to construct a project that (without mitigation, and maybe even with mitigation) would permanently worsen the DO problem.*

Response: Mitigation for the project includes operation of an oxygen injection system that would remove the incremental impacts of the deepening alternatives on the dissolved oxygen regime in Savannah Harbor. Dissolved oxygen conditions during future maintenance dredging activities would be the same or improved from those currently observed [irrespective of season].

760APL-MR-51-EV40

Comment: *Incremental Impact - Pg 66 - The discussion on incremental impact ends on this page with no conclusion offered on the magnitude and significance of cumulative impacts to the river's dissolved oxygen from past, present and future projects. Please add a discussion on this.*

Response: The discussion of SHEP's incremental impacts on dissolved oxygen presented in this section is adequate.

760APL-MR-51-EV41

Comment: *Alternatives to Mitigate for Cumulative Impacts - Pg 66, 3rd para - "Basically, these plans reduce the anticipated increase in salinity levels by reducing salt water flows into Back, Little Back, and Middle Rivers, while providing more freshwater inflow to these streams". Was consideration given to the likelihood that the freshwater inflow could include high oxygen-demanding organic materials from the large acreages of wetlands in the upstream part of the basin?*

Response: The predominant source of high oxygen-demanding substances in the harbor is the marshes that surround the rivers in the estuary. Point source discharges in upriver areas do contribute to D.O. problems in the estuary (EPA TMDL), but the major factor is the organics that are flushed from the marshes as part of the daily tidal exchange. The water quality studies performed for the SHEP and the analyses performed by EPA for its Dissolved Oxygen TMDL provided enlightening information on this subject.

760APL-MR-51-EV42

Comment: *Alternatives to Mitigate for Cumulative Impacts - Pg 67, 2nd para - "This device was originally used to add oxygen to the bottom of lakes to enhance downstream fisheries". Where has this technology been successfully used on a scale commensurate with the SHEP? If it hasn't, then reliability is a significant issue, and the mitigation plan, which relies so heavily on the speece-cone technology for the success of other mitigation plan elements, is also significant issue.*

Response: While the injection of oxygen into an estuary [to improve dissolved oxygen levels] is a relatively new concept, the technology has been used in industrial applications for decades. There is little objective doubt that oxygen injection can add oxygen to Savannah's estuarine waters. This position is verified by the results from the 2007 field demonstration of the subject oxygen injection equipment and subsequent water quality modeling of the effects of injection on dissolved oxygen levels [throughout the water column]. While effective, the oxygen injection system used in the 2007 Demonstration Project did not raise dissolved oxygen levels a great deal over a large portion of the harbor. A major remaining issue is whether the injected oxygen would spread sufficiently throughout the estuary to compensate for the effects of a deeper channel. The same models that predict the adverse impacts of a deeper harbor are the ones that the Corps used to design the dissolved oxygen systems to remove those impacts.

The monitoring plan includes a comparison of the model's predictions with what actually occurs in the harbor with respect to dissolved oxygen levels. The Transfer Efficiency Study would determine how well the oxygen injection systems add oxygen to the water column. The Adaptive Management Plan contains provisions to modify the oxygen injection system [as necessary]. These changes could include increasing the amount of injected oxygen, use of different equipment, altering the locations/number of the oxygen injections sites, etc.

760APL-MR-51-EV43

Comment: *Alternatives to Mitigate for Cumulative Impacts - Pg 67, 4th para - "The costs for operating the oxygen injection systems are based on their continued operation for a period of 4 months per year". However, the modeling results show that DO levels are expected to be below standards for more than 4 months a year. Why wouldn't the oxygen injection system be operated during each month that oxygen is expected to be below state standards?*

Response: As discussed in EIS-Appendix C, the oxygen injection system would be operated from 15 June through September to provide the identified pounds of oxygen per day needed to meet the mitigation requirement of the channel depth implemented.

760APL-MR-51-EV44

Comment: *Alternatives to Mitigate for Cumulative Impacts - Pg 68, Table 11 - Under the column labeled Scenario Description, the various incremental depth projects are listed, from a deepening project of2 feet (44-foot depth in the channel), to a deepening project of6 feet (48-foot depth in the channel). However, the DE IS acknowledges that under any of the channel deepening alternatives being considered, there would be 2 feet of allowable over-depth dredging and 4 feet of advanced maintenance added to each alternative. This means that the 44-foot channel alternative is actually a 50-foot channel, and the 48-foot alternative is actually a 54-foot channel. None of these depths were modeled with respect to their anticipated impacts on 001 fisheries, sediment disposal, etc. This should be done to accurately assess the project's true impacts to the Savannah Harbor.*

Response: Advanced maintenance dredging is used throughout much of the harbor because the channel experiences fairly rapid shoaling. Savannah Harbor's existing depth measurements and its expected bathymetry were used in the development of the predictive models.

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760APL-MR-51-EV45

Comment: *Incremental Impact - Pg 78 - The discussion on Incremental Impact ends on this page with no conclusion offered on the magnitude and significance of cumulative impacts to the groundwater resources from past, present and future projects. Please add a discussion on this.*

Response: The impacts of previous Savannah Harbor dredging on the rate of saltwater intrusion into the Upper Floridan aquifer are discussed on page 76 of Appendix L, whereas the dredging effects that would occur if the SHEP is implemented are noted on page 78. Study results predict that the timing of chloride breakthrough into the Upper Floridan aquifer will not be significantly affected by reducing the thickness between its confining layer and the deepened channel bottom. Similarly, the proposed dredging is projected to have only minimal impacts on water quality in production wells that tap the Upper Floridan aquifer in and around the City of Savannah.

760APL-MR-51-EV46

Comment: *Issue - Pg 79, 1st para - "Right whales, sea turtles, West Indian manatee and Shortnose sturgeon are species that are protected by Federal law that are commonly thought of as being at risk from harbor operations". Atlantic sturgeon should also be acknowledged here since NMFS has proposed listing the species as Endangered under the Endangered Species Act.*

Response Although Atlantic sturgeon are not yet listed as an endangered species, the impacts of the SHEP on this species was addressed in the BATES. The BATES was submitted to the NMFS, and they have provided a BO which addresses SHEP impacts to Atlantic surgeon.

760APL-MR-51-EV47

Comment: *Present Condition - Pg 82, 3rd para - "Although the Savannah River Shortnose population is considered to be improving since the species was placed on the endangered species list in 1967, the apparent low level of recruitment remains a major concern". What is the reference for the shortnose sturgeon population being considered to be improving?*

Response: The statements in this section were based on information in the Shortnose Sturgeon Habitat Suitability Model Review (Callahan 2003), which includes the statement "However, high adult to juvenile

ratios indicate low recruitment and an artificially elevated adult population from stocking (Collins and Smith 1993, Collins et al. 2002)."

760APL-MR-51-EV48
Comment: *Present Actions/Stresses - Pg 86, 211d para - "Maintenance of the Savannah Harbor Project is believed to have only minimal impacts on the Shortnose sturgeon in Savannah Harbor". What is the reference for this statement?*

Response: This conclusion is based on the information in Appendix B.

760APL-MR-51-EV49
Comment: *Capacity to Withstand Stress - Pg 86, 3rd para - Given the uncertainties expressed in this paragraph on the proposed project's multiple potential impacts on the Shortnose sturgeon, why would the project not have a high likelihood of violating the Endangered Species Act? Where is the discussion of SHEP compliance with the Endangered Species Act?*

Response: Appendix B addresses SHEP compliance with the Endangered Species Act. Information concerning project impacts on Shortnose sturgeon has been added to Appendix L with respect to the findings of the BO prepared by the NMFS

760APL-MR-51-EV50
Comment: *Incremental Impact - Pg 88, 8th para - "A, Conceptual plans have been developed to construct a major container terminal in Jasper County, South Carolina". Since the Jasper Terminal has been developed to the conceptual level, why is it not considered a reasonable and feasible alternative to the SHEP?*

Response: The District considered multiple sites in Jasper County as alternatives to the proposed project. Please see GRR-Section 6 and 12, GRR-Appendix D, EIS-Section 3, and EIS-Appendix O. Please also see other responses on this issue.

760APL-MR-51-EV51
Comment: *Incremental Impact - Pg 89 - The discussion on Incremental Impact ends on this page with no conclusion offered on the magnitude and significance of cumulative impacts to endangered species resources from past, present and future projects. Please add a discussion on this.*

Response: The decline of Shortnose sturgeon is attributable to many factors, but none is more important that the loss of its upstream habitat. Appendix L provides an historic account of this and other endangered species in Savannah Harbor and details the reason[s] for their decline. Harbor deepening would not affect the Shortnose sturgeon's spawning habitat, since that habitat is located over 100 miles upstream from the SHEP's area of effect. The excavation would adversely impact sturgeon winter habitat in the lower Savannah River and benefit adult sturgeon summer habitat. The project-induced impact is caused by an increase in upstream salinity levels. While no critical habitat for Shortnose sturgeon has been designated in the Savannah River, the importance of protecting [and even improving] the habitat for all resident species in the lower Savannah River is obvious.

The text on Page 91 of Appendix L, Incremental Impacts, has been revised. "Although no portion of the Savannah River estuary has not been declared official critical habitat under the Endangered Species Act..." has been changed to "Although no portion of the Savannah River estuary has been declared official critical habitat under the Endangered Species Act..."

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760APM-DC-03-EV01

Comment: *The risk evaluation of residual cadmium in the bottom of the water way after dredging required several "tiers" of evaluation to get to an acceptable risk conclusion. They needed to advance their risk assessment approach to a Tier III bioavailability study in benthic organisms to detennine the site-specific uptake of cadmium from sediments. The reported body burdens of cadmium and nickel increased in a dose-response type relationship. Table 37 provides summary of the toxicity reference value (TRY) derivation to identify a. No Observable Adverse Effect Level (NOAEL) concentration to support a 1.12 mg/kg concentrations in benthos as protective. The TRY derivation presented in the document does not present a strong case for selection of the species used to basis for TRV selection. A detailed description of the results of the benthic survey supporting the selection of representative species would strengthen this section. The NOAEL TRY selection currently appears to be the weakest portion of the evaluation. The ecological risk assessment used standard methodology to estimate potential adverse effects to the surrounding ecosystem. Estimates of potential exposure to fish and upper-trophic aquatic receptors were calculated from concentrations in benthic tissue. The risk assessment concluded that cadmium in benthos do not pose a risk to upper trophic receptors.*

Response: Aquatic bioaccumulation studies were performed by EA Engineering, Science, and Technology and are found in the EIS [Appendix M]. EPA protocols recommended using Sand worms (*Nereis virens*) and the Blunt-nosed clam (*Macoma nasuta*) [both borrowing animals] in this instance. At the end of these bioaccumulation studies, both species were placed in distilled water and allowed to purge. After preparation [freezing/grinding], tissue samples were analyzed for contaminant uptake.

The results of this sediment quality evaluation are found in FEIS [Appendix M]. The conclusions of the aquatic bioaccumulation study are found in Tables 36 and 37 as well as in Sections 4.2.4, 4.2.5, and 5.4. In summary, they are, "***bioaccumulation in high cadmium sediments were found to be well below potential levels of effect. Therefore, potential environmental impacts through bioaccumulation of cadmium by benthic organisms are expected to be minimal***".

Table 37 shows NOAELs for cadmium and nickel to demonstrate that the worms used for the bioaccumulation study would not be expected to have their growth affected by the metal levels in the sediments in which they were grown. The 1.12 mg/kg concentration in benthos was meant to be protective in that it demonstrated that metal uptake by the worm should not be affected by the observed tissue levels in the worm. Since the low level of metal uptake observed in the worm was below NOAEL values, uptake inhibition by sediment metal levels would not be expected. Therefore, the worms would be considered to be growing normally and the observed low uptake values would be considered valid for predicting uptake by benthos in general.

Because few invertebrate species are available with which to conduct bioaccumulation predictions, the actual benthos residing in the DMCAs was not considered of major importance and no benthic surveys were performed. EPA/Corps procedures recommend the use of standard benthic organisms for sediment testing to allow better interpretation of the data and comparison between locations. The results from the laboratory worm bioaccumulation are used in the project impact prediction, no matter what species reside in the DMCAs. An NOAEL toxicity reference value is of little value for benthic bioaccumulation predictions if used to predict whether particular benthics can survive and grow in an area. The issue is whether the benthics expected to be present in an area can uptake metals and pass those metals on to bird that consume the benthics. Examination of bioaccumulation in standard representative benthic species allows those predictions to be made.

Page Appen. M-2

760APM-DC-03-EV02

Comment: *"The last major eco-risk assessment evaluation was on dry sediments used for levee and flood control construction. Cadmium in dried sediments appear much more bio available to plants and animals. Capping is the approach for control for "wet" sediments and keeping cadmium sediments out of the rotation management plan for use in levee and food control structure construction and repair is the mitigation. The plan proposes monitoring to evaluate the potential uptake of cadmium into plants, the monitoring plan should be carefully planned with respect to decision triggers. EA and the Corps of Engineers has differences in the calculation and interpretation of Ecological Quotients (EQs). The Corps (CENOW-HX-S) defines their approach to interpreting the EQ based on USEPA Interim Superfund Guidance in Section 4.2.3.7. of the report, however, a detailed description of the EA interpretation of the EQ is not provided. A detailed review of the approach applied by EA would need to be made to offer an opinion on the difference in interpretations between the approaches used by CENOW-HX-S and EA."*

Response: EA Engineering, Inc. [EA] was not asked to evaluate the ecological quotients (EQ) approach used by CENOW-HX-S; hence, no detailed assessment exists. Rather, EA was tasked to perform a risk assessment [using site-specific data] of the consequences [short- and long-term] to avian species that feed on organisms living in soils having elevated cadmium levels [bioaccumulation concerns].

760APM-DC-03-EV03

Comment: *Overall the evaluation is comprehensive, but does not appear to be overly in depth in the toxicity assessment for benthics.*

Response: There was no need for the sediment quality evaluation to examine toxicity levels, per se, for benthic organisms residing in the DMCAs. The salient issue is bioaccumulation in these species and, more importantly, how this phenomenon would similarly affect the birds which prey on them.

Page Appen. N-1

760APN-DC-01-EV01

Comment: *An email between Heinz Mueller and Brenda Willet at the Corps on 3/29/2010 (page 32-33) suggests that the model to marsh proposal may not have been approved by the Water Division, but simply approved based on the lack of a response. Is this the case? Was the proposal ever approved or formally disapproved? The final approval status should be part of the public record.*

Response: The subject comment refers to an email dated 3/29/10; this contradicts page 32-33 of Appendix L which shows the email was dated 3/29/07. The 3/29/07 email date is the correct reference. The approval is documented in the same email chain on page 31 of Appendix L in an email from Mr. Heinz Mueller (EPA) to Mr. Bill Bailey (District). In his email, Mr. Mueller states that EPA-Region 4 concurs with the proposed approach.

Page Appen. Q-1

760APQ-DC-13-EV01

Comment: *Page I. Section 2A. The DEIS did not include field studies to gather more information on Atlantic sturgeon even though the DEIS admitted there was a paucity of information about the sturgeon and it is a candidate species that has a proposed listing of endangered.*

Response: In addition to existing information, an extensive monitoring study in the southeastern US is being funded by NOAA on the Atlantic and Shortnose sturgeon. This effort began in the spring of 2011 and is scheduled to last for five years. The work in the Savannah River is being conducted by SCDNR. http://www.nmfs.noaa.gov/pr/conservation/states/funded.htm. As information becomes available, NOAA and the Corps will consider it. The NMFS BO collects and analyzes the relevant known information about the Atlantic sturgeon.

760APQ-DC-13-EV02

Comment: *Page 2, 1st Paragraph. The appendix states that abundance information was satisfied by the studies. On the contrary, no solid estimates of short nose sturgeon abundance was determined by the studies in the Savannah River even though varying abundance estimates have been proposed. In addition, no abundance information is known for Atlantic sturgeon in the Savannah River.*

Response: See previous response.

760APQ-DC-13-EV03

Comment: *Page 2. Section B, 1st Paragraph. The appendix states that the agencies approved all of the models as acceptable for determining environmental impacts. However, the NMFS did express concern about the use of "acceptable vs. unacceptable" for determining available habitat for fish in the river and in the alternative proposed a gradient of scores in order to indicate the varying level of impact and available habitats. After much discussion NMFS conceded that the use of "acceptable vs. unacceptable" was okay for now. This would indicate that NMFS deemed it to be insufficient for a final determination of impacts to the fisheries resources in the river.*

Response: The habitat suitability criteria used in the model runs were developed, and refined by the Fisheries Interagency Coordination Team [NMFS was a participating member]. NMFS did not indicate in its EIS comments [in reference to habitat suitability] that the use of the metric – "acceptable/unacceptable" was too vague.

760APQ-DC-13-EV04

Comment: *Page 3, Last paragraph. The appendix states that the use of multiple species will eliminate reliance on a narrow view of the ecosystem, thereby reducing the risk of not identifying a critical impact. The use of multiple species for impact assessment does provide breadth and depth of impact analysis. However, if the biological variables used in the impact assessment are flawed, the impact assessment is not an accurate representation of the total impacts. For example, the DO levels used to assess the acceptable habitat for shortnose sturgeon were determined as those levels at which shortnosc sturgeon could survive in a laboratory setting. The DO values were much lower than DO values collected in a shortnose sturgeon habitat association study conducted in the Savannah River. Thus, the use of lower DO values than what the shortnose sturgeon would utilize would overestimate the acceptable habitat in the river after the project is constructed.*

Response: The habitat suitability criteria that were used to assess available habitat for the chosen fish species were developed by the Fisheries Interagency Coordination Team. These criteria were based on professional expertise/experience, pertinent literature, and site specific data available for the Savannah River. In the absence of specific information to the contrary, the amount of available habitat cited in the EIS is deemed to be correct.

760APQ-DC-13-EV05

Comment: *In Section 3 page 6. With the exception USFWS none of the resource agencies provided specific comments on the uncertainties associated with the salinity model. Why? The USFWS stated, " ... we believe that salinity prediction performance is adequate to use in project planning. However, we must reiterate that there continues to be a limited understanding and modeling ability of the velocity and flow dynamics in the Middle River, Little Back River and Back River. This limitation will cause some uncertainty regarding salinity and water quality predictions for mitigation alternatives that involve channel modifications in the Savannah River system." We concur with the USFWS statement and believe this opinion is likely shared by other resource agencies. The Corps should consider refining the model, collecting additional data and developing a more specific contingency plan.*

Response: SRMC's concurrence with USFWS statements presented in EIS-Appendix Q EIS is acknowledged. See previous responses on this issue.

Page Appen. Q-2

760APQ-DC-13-EV06

Comment: *Page 4, 2nd Paragraph, line 17. The appendix states that criteria used to determine the acceptability of fish habitat were on the conservative side. As stated in the comment above, the use of lower DO values than were documented in known fish use areas is not a conservative estimate, but instead provides an overrepresentation of available fish habitat.*

Response: The habitat suitability criteria that were used to assess available habitat for the chosen fish species were developed by the Fisheries Interagency Coordination Team. These criteria were based on professional expertise/experience, pertinent literature, and site specific data available for the Savannah River. In the absence of specific information to the contrary, the amount of available habitat cited in the EIS is deemed to be correct.

760APQ-DC-13-EV07

Comment: *Page 4, Section 3, 1'\ Paragraph. This will provide information that tells you how bad one dredging alternative is compared to other dredging alternatives, but it doesn't tell you how bad a dredging alternative is compared to a different non-dredging project. The DEIS doesn't consider other true alternatives that would allow shipping, but with less impacts. For example, there is no mention of any other ports that could be used without the need for the extensive upriver dredging.*

Response: See previous responses regarding alternatives.

760APQ-DC-13-EV08

Comment: *Page 6. USFWS quote. The USFWS has accepted the use of the salinity model in project planning. Note: project planning should not include the detailed impact determination and mitigation modeling and monitoring that will need to be completed for endangered species consultation and incidental take permitting process, which is likely to be necessary due to the likelihood that the project will impact instream habitat to the degree that it will result in the take of a threatened or endangered species.*

Response: Appropriate endangered species consultation for this stage of the SHEP has been completed. The US Fish and Wildlife Service concurred in the project's expected impacts to endangered species under its oversight under the ESA. Their letter report is included in Appendix Z. The BO prepared by the NMFS for the SHEP is also included in Appendix Z.

760APQ-DC-13-EV09

Comment: *Page II , 1st Paragraph. Did the USGS review the supplemental report to ensure the report addressed the concerns the USGS expressed about the previous draft. No mention is made that the USGS received the supplemental report or agreed with the findings.*

Response: The USGS reviewed the MACTEC supplemental report and provided comments in a letter dated April 13, 2009. MACTEC provided responses to the comments in the final version of the supplemental report, dated August, 2009.

760APQ-DC-13-EV10

Comment: *Page II, Section B, 3rd Paragraph. How much was the DO improved? Did the DO improvement corroborate the levels proffered in the DEIS? No mention is made as to how the DO improvement compared to that which has been provided as a basis for adequate mitigation.*

Response: The results of the 2007 demonstration project are summarized in the *SAVANNAH HARBOR REOXYGENATION DEMONSTRATION PROJECT* [2008]. The report, [prepared for GPA by MACTEC] is included as part of the GRR-Engineering Appendix supplemental materials. Both the design analyses and the demonstration project verify that the Speece Cones would be an effective means to restore [incremental amounts of] dissolved oxygen in the estuary.

760APQ-DC-13-EV11

Comment: *Page II, Section B, 4th Paragraph. The text claims that monitoring will reduce the risks associated with the effectiveness of the DO improvement system. Monitoring will not reduce the risk of the effectiveness of the DO improvement system. It will reduce the risk of not noticing a non-functional DO improvement system. A reduction in risk associated with effectiveness would be reduced via a proposal of alternative technologies that would also be effective. None have been discussed here as a fallback.*

Response: The risks and uncertainties of the proposed dissolved oxygen system for Savannah Harbor are fully discussed in the Risk and Uncertainty Analysis [Appendix Q, pages 9-11]. Specifically, a risk analysis of the water quality model was prepared to predict post-project dissolved oxygen levels. An oxygen demonstration trial verified the efficacy of the Speece Cones to add oxygen to Savannah's estuarine waters. Extensive post-construction monitoring would determine whether initial predictions regarding oxygen levels are correct. Post-project, the adaptive management plan includes a means to make any required changes to the oxygen injection system. This could range from increasing the amount of injected oxygen, modifying the oxygen injection equipment, or adding injection sites.

760APQ-DC-13-EV12

Comment: *Page 12, Section 7A, 2nd Paragraph. Second to last sentence re: acceptable vs. unacceptable. In the case of shortnose sturgeon, the team ignored the field data collected on shortnose sturgeon habitat use in the Savannah River when determining acceptable DO levels. Ignoring the data from the river resulted in a DO threshold level far below that in which sturgeon are typically found thus creating undue risk that the models underestimated the impacts to fish, specifically demersal sturgeon that are potentially the most at risk to depressed DO levels.*

Response: The habitat suitability criteria that were used to assess available habitat for the chosen fish species, including Shortnose sturgeon, were developed by the Fisheries Interagency Coordination Team.

These criteria were based on professional expertise/experience, pertinent literature, and site specific data for the Savannah River. Data were neither ignored nor impacts underestimated.

Page Appen. Q-3

760APQ-DC-13-EV13

Comment: *In the last sentence of Section 4A, The Corps states that they consider the wetland impact acreages to be valid within +/- 50 acres. This is too large of a margin of error. The models should be refined and or additional data needs to be collected to reduce the margin of error.*

Response: The margin of error is within acceptable limits, i.e., there is no need to refine the models further or collect additional data. The rationale for selection of the EFDC model is described in EIS-Section 5.01.2. In brief, the EFDC hydrodynamic model captures more wetland impacts [at all depth alternatives] than its Marsh Succession counterpart. Given the SHEP's high interest profile, potential long-term environmental consequences to the Savannah estuary, and its national economic importance, the District elected to choose the more inclusive/conservative estimating tool.

Similarly, a conservative approach was taken regarding the functional assessment to address the likelihood of vegetative shifting resulting from salinity changes in salinity. The functional assessment concluded that the differentiation between salt marsh and brackish marsh recommended by the Wetland Interagency Coordination Team was restrictive. Specifically, the salinity range used in the SHEP model to differentiate between brackish marsh (0.6-4 ppt) and salt marsh (> 4ppt) was narrow. Brackish marsh salinities in the vicinity have been reported with a range from 0.5-10 ppt (NOAA, 2010) and in other estuarine systems from 0.5-17 ppt (Judd and Lonard, 2004). An earlier assessment of wetland vegetation in the Savannah estuary reported a salinity range of 5-10 ppt for brackish marsh systems (ATM, 2003). Thus, the salinity range used to quantify salt marsh in the area of potential effect (i.e., > 4 ppt) may over-estimate the amount of saltmarsh in the system and under-estimate the amount of brackish marsh. As such, the described conversion of salt marsh to brackish marsh, which would occur as a result of harbor deepening, may be minimal when taking into account vegetative characteristics for wetland environments with associated salinities commonly associated with a brackish marsh (i.e., range between 5 and 10 ppt).

Given the wide range of salinity reported in literature for brackish marsh systems, the inherent variability in salinity that exists for all estuarine systems, and the modeling results that report post-deepening salinity concentrations consistent with the aforementioned range, it was concluded that conversion of 740 acres of saltmarsh to brackish marsh [47-feet option] is unlikely. In fact, actual vegetative shifts may not be identifiable *in situ*. That said, the District elected to be conservative in its assessment of the potential for project-related effects and considered the entire saltmarsh and brackish marsh conversion in its calculation of minor impacts.

The conversion of 223 acres of freshwater wetland to brackish marsh represents the only wetland effect that is likely to be noticeable if the harbor is deepened to 47-feet . As noted previously, the ecological values of the impacted 223 acres of freshwater wetlands would not be completely lost. Instead, those acres would convert to brackish marsh. The District's calculation of the number of acres of freshwater wetland that have the potential to convert to brackish marsh is based on a shift in the location of 0.5 ppt salinity, a traditional rule-of-thumb for differentiating between freshwater marsh and brackish marsh. However, data reported in the literature for Savannah Harbor suggest that a shift in vegetation (from freshwater marsh to brackish marsh) in this estuary does not occur until salinity concentrations approach 2.5 ppt (Latham et al., 1994). Even at oligohaline marsh sites with average salinity

concentration of 2.1 ppt, a discriminant function (DF) analysis revealed that only 47% of cases resulted in the correct pairing of environmental variables with vegetative species composition and dominance. At those same oligohaline sites, 37% of the vegetative species composition and dominance were more closely aligned with a freshwater classification (Latham et al., 1994).

The District's salinity value that denotes a defined shift from freshwater to brackish marsh (i.e., 0.5 ppt) is approximately 5 times lower than what has traditionally been observed with 100% vegetative shifts *in situ* within the Lower Savannah Watershed (Latham et al., 1994) and other coastal marsh systems in the southeastern United States (NOAA, 2010). Thus, many of the existing freshwater emergent plant species, and associated ecological parameters, would likely be sustained in areas predicted to experience salinity concentrations in the range of 2.5 ppt. Those areas that transition to more brackish characteristics would continue to provide the traditional ecological functions associated with all emergent wetland systems (please see functional assessment response).

To ensure the indirect impacts are well characterized, the District would implement a post-construction monitoring plan to evaluate/quantify observed wetland conversion. The Adaptive Management Program proposes acquisition of additional wetlands if monitoring demonstrates that wetland impacts were under-predicted.

Page Appen. R-1

760APR-DC-02-EV01
Comment: *Section 8, Page 18, 1st Paragraph. The document states that the District believes there will be no significant environmental impact; however, the use of the disposal area was not reviewed in the DEIS. The DE IS simply states that the area was approved in 1996 and therefore environmental review of the disposal area was not necessary. Dependence upon an environmental review completed in 1996 is not adequate given the probability of changed circumstances as well as the new listing of a substantial number of threatened and endangered species since 1996.*

Response: DEIS-Appendix B has a detailed description of the proposed use of the ODMDS. The FEIS was revised to reflect input from GA DNR-CRD and the City of Tybee Island. That is, the dredged sediment placement plan has been updated to reflect placement of new work material solely in the ODMDS/CDFs.

The Corps' determination that there would be no significant environmental impacts associated with use of the ODMDS is based on a review of information concerning both the material to be dredged and the ODMDS. Based on this review, the Corps concluded that the new work material proposed to be placed in the ODMDS is substantially the same as the substrate at the ODMDS and that the new work dredged material is far removed from existing and historical sources of pollution to provide reasonable assurance that the material has not been contaminated by pollution. Although the Corps has developed information indicating that the material meets the exclusionary criteria from further testing, all evaluations are being conducted to fully satisfy the requirements of Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA). Sampling and evaluation requirements will be completed prior to the start of construction.

760APR-DC-02-EV02
Comment: *Page 19, Subsection b(i). See above comment.*

Response: See previous response.

Page Appen. S-1

760APS-DC-33-EV01
Comment: *Page 5, Section 2. Unsubstantiated claims about the absence of habitats in the project impact area. References or field work should be cited to corroborate this claim.*

Response: Additional EFH assessment information on oyster reefs, shell banks, and intertidal flats has been added to Appendix S.

760APS-DC-33-EV02

Comment: *Table 3-1 . The column headings are unclear. Column 2 appear to be total acres affected. Column 3 appears to be non-wetland acres affected. However, it is not readily discernible based on the information.*

Response: The Table has been revised for clarity.

760APS-DC-33-EV03
Comment: *Page 6. First line. The narrative states that 14.08 acres could be considered wetlands. Are they or aren't they wetlands? Has a study been completed to verify any of the information? How do you know that the remaining 15.92 acres is high ground 1fno wetland delineation has been performed.*

Response: As shown in the revised Table 3-1 in Appendix S, the amount of brackish marsh that would be impacted by SHEP excavation requirements is 15.68 acres. The District used an inclusive, elevation-based GIS analysis together with a site reconnaissance to determine the SHEP's direct wetland impacts [via excavation]. Prior to construction, the District will verify the reported acreage [15.68 acres] of brackish marsh by conducting site-specific wetland delineations. Given the subject area's topography [and multiple field inspections], there is little reason to expect that this figure will change substantially. If there is a minor adjustment in the impact acreage, the sum of r Factors remains unchanged (See Appendix A of Appendix C- Mitigation Planning) and the corresponding acreage of required brackish marsh restoration would be recalculated. The available acreage for marsh restoration at the restoration site (i.e., 40+ acres) would be more than sufficient to compensate for any slight adjustment.

760APS-DC-33-EV04
Comment: *Figure 3-1. The image is of such poor quality that it is not legible for review.*

Response: Figure 3-1 has been replaced to clearly show the areas that would be excavated as a result of the Kings Island Turning Basin expansion.

760APS-DC-33-EV05
Comment: *Figure 3-2. Most of the image is missing precluding review.*

Response: Figure 3-2 has been revised to clearly show the excavation requirements between Stations 85+000 and 87+000.

760APS-DC-33-EV06

Comment: *Figure 3-3 is not cited in the text and does not include a legend. It is impossible to tell what this figure is trying to convey.*

Response: Figure 3-3 has been revised and labeled to clearly show the excavation requirements associated with removal of the Tidegate endwalls.

760APS-DC-33-EV07

Comment: *Page 10. Section 3.2- The document skips any discussion of avoidance or minimization of impacts. It does not discuss how the project was assessed for modifications to avoid or minimize impacts. Rather it assumes the project will move forward and begins a discussion of how it will be mitigated.*

Response: Discussions concerning avoidance and minimization are included in Appendix C titled "Mitigation Planning." The first step in avoiding wetland and EFH impacts was selection of the channel design. The project design would maintain the existing side slopes and extend them downward, rather than maintaining the existing bottom width and extending the side slopes outward. The major effect of this decision is a reduction in the amount of dredging that would be required on the side slopes and removing the need for a uniform increase in top width of the dredged channel. This minimizes impacts to adjacent high ground, structures located along the riverbank, and the marsh fringe.

The second step in avoiding and minimizing wetland impacts is the implementation of flow alteration structures (see Appendix C). Without the flow alteration structures, approximately 1,177 acres (47-foot channel) of freshwater marsh could shift to more a more brackish marsh species assemblage. By implementing flow-altering measure 6A, only 223 acres (maximum) of freshwater marsh is at risk. Thus, the flow altering measure 6A satisfies both avoidance and minimization elements by maintaining 954 acres of freshwater marsh that would otherwise experience some degree of vegetative conversion.

760APS-DC-33-EV08

Comment: *Typically, part of the NEPA process involves an alternative project that does not involve that which is proposed, but still accomplishes some or all of the project purpose. In this DEIS, the only options that are presented are variants of the same project. The presentation of a single project does not allow for sufficient evaluation of the environmental impact of a project under NEPA.*

Response: See previous responses regarding alternatives.

760APS-DC-33-EV09

Comment: *Page 11. Will the mitigation area provide fish access at an adequate level to replace the value of the essential fish habitat lost due to project impacts?*

Response: The marsh restoration would replace the wetlands which would be lost to various construction activities attendant to harbor deepening. The "feeder" creek is an added enhancement feature to this restoration design. The feeder creek would allow fish ready access to the interior portions of the site.

760APS-DC-33-EV10

Comment: *A common thread throughout this document is the failure to relate the project impacts and mitigation to the actual effects on fish and fish access to these areas.*

Response: The document continually relates project impacts in the estuary to the natural resources associated with those locations, including fish habitat and water quality.

760APS-DC-33-EV11
Comment: *Figure 3-4. poor quality figure, no key. No discussion of water elevations in ditch versus the wetland. Difficult to determine exactly where this area is located without an inset map.*

Response: Figure 3-4 has been replaced to clearly show the restoration site at Disposal Area 1S.

Page Appen. S-2

760APS-DC-33-EV12
Comment: *Page 13, Section 4.1 - This section actually only provides one full sentence and one table discussion of project impacts. The narrative avoids discussion of the degree to which salinity will move upstream, any avoidance or minimization efforts, or methods of determining the amount of impact. The narrative's focus on mitigation measures without discussing impacts, avoidance, and minimization suggests the Corps has not adequately addressed ways to reduce impacts and it simply using the DE IS to justify the project that it has been authorized to construct.*

Response: The statement is taken out of context. Immediately following the cited Section (4.1), the following Section (4.2) details the project's impacts together with the minimization and avoidance measures which were examined. Section 4.1, as indicated by the title of the table, is a summary of the findings based on the discussion immediately following.

760APS-DC-33-EV13
Comment: *Page 15. Table 4-3 is not referenced in the text.*

Response: Table 4-3 is not specifically referenced in the paragraph that precedes it. However, the paragraph does contain a sentence (lines 4-5) that states "...the Corps developed the dual approach shown below". A revision has been made in the FEIS to clarify this issue.

760APS-DC-33-EV14
Comment: *Page 16. Under what flow scenarios was the model conducted? Did it account for field-truthed conditions? Did it account for boat wake effects?*

Response: Marsh acreage [net] which would be adversely impacted by the project is shown under several flow-altering mitigation plans [EIS- Appendix S [Table 4-4]. The assumptions used in the run period [March - November 1997] for this model analysis were average/typical river flows with no sea level rise. For more information regarding model run scenarios and mitigation plan development, see Section 7.0 of the Engineering Appendix. The model was verified using a variety of techniques, including comparing predicted outputs to observed field conditions. The model development and calibration report include both the hydrodynamic and water quality modeling results along with calibration and confirmation periods. The model was calibrated using the period with the most comprehensive data set [Summer of 1999]. The model confirmation used data from 1997 [Summer] and USGS long-term data [January 1, 1997 through December 31, 2003]. The model calibration report prepared by Tetra Tech is titled "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project" and is included in the Supplemental Materials to the Engineering Appendix of the GRR.

The model applications met the expectations of the model review team [consisting of members from state/federal agencies]. The model code, modeling results [in both time series and statistical formats], and a database [containing model comparison data] were made available for peer review/comment. Acceptance letters from agencies involved in the model review group can be found in the document titled "Correspondence Regarding Hydrodynamic & Water Quality Model Acceptability" which is included the Supplemental Materials to the Engineering Appendix of the GRR. Ultimately, the hydrodynamic and water quality models produced defensible, accurate, and transferable information which state/federal agencies used to make reasoned decision[s] regarding the acceptability of the SHEP proposal. In a related matter, onshore impacts of shipping traffic were evaluated in a separate report titled, "Ship Forces on the Shoreline of the Savannah Harbor Project" which is included in the Supplemental Materials to the Engineering Appendix of the GRR .

760APS-DC-33-EV15

Comment: *Page 17. The bullet points intermix impact and mitigation discussions. Much of this text actually describes the impact, but the unclear delineation of the two makes this document difficult to read and understand.*

Response: This section has been revised for clarity purposes.

**APS, pg. 18, 2nd paragraph, 5th line: "which would likely adverse wetlands located there" has been revised to "which would adversely affect wetlands located there".

760APS-DC-33-EV16

Comment: *Pages 28-30. Table 4-5 through 4-11 are labeled as x-foot deepening alternative. This is misleading and difficult to follow given the balance of the appendix and the DEIS refers to the alternatives as 4x-foot alternative.*

Response: Tables 4-5 through 4-9 show the effectiveness of the various flow rerouting plans for each of the five channel deepening alternatives evaluated. Tables 4-10 and 4-11 provide a comparison of the costs for the various flow rerouting plans for the 44-foot and 48-foot projects, respectively.

760APS-DC-33-EV17

Comment: *Page 32. Paragraph 2, line 8. The mitigation includes enlarging a creek. The document should include this as an impact that should be mitigated by the mitigation plan. No discussion of mitigation for impacts due to mitigation is offered.*

Response: The comment references a section of Appendix S – EFH (p. 32, paragraph 2) that describes a potential mitigation site the District evaluated. Its preliminary design included extending a tidal creek through the parcel to create a freshwater wetland system. It was concluded that the concept did not have a good chance of success, so this site/concept was ultimately rejected.

760APS-DC-33-EV18

Comment: *Page 34, Paragraph 1, lines 11-13. The text discusses using the Corps standard operating procedures (SOP) in order to quantify the ecological impacts including the type, duration, and preventability. Very little detail, if any, is provided in the document to show the type, duration, and preventability of any impacts proposed by this project.*

Response: The EFH assessment in Appendix S was prepared in accordance with the procedures established by NOAA to meet the requirements of The Magnuson-Stevens Fishery Conservation and

Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267). In addition to the EFH assessment, impacts on fishery resources as a result of the proposed action are discussed in EIS-Section 5.03.

The SOP referred to in your comment is the Savannah District Regulatory Standard Operating Procedure for determining compensatory mitigation for wetland losses. Although Appendix S has a discussion of how that SOP was used for the SHEP, a more detailed discussion can be found in Appendix C.

760APS-DC-33-EV19

Comment: *Page 35. The text discusses how the SOP was used to assess the impact to wetlands and the acres of mitigation realized in the mode1. It does not, however, at any time put the loss of wetland or the replacement of wetland in the context of fisheries. The entire purpose of this section is to address essential fish habitat and at no time does the document discuss how fish populations will be affected by the destruction of essential fish habitat or the accessibility of the newly created essential fish habitat.*

Response: The EFH assessment in Appendix S was prepared in accordance with the procedures established by NOAA to meet the requirements of The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267). In addition to the EFH assessment, impacts on fishery resources as a result of the proposed action are discussed in EIS-Section 5.03.

760APS-DC-33-EV20

Comment: *Page 37, 2nd to last line. The text should reference Figure 4-12. It is difficult to follow the text and figures without proper citations.*

Response: Figure 4-12 (now Figure 4-11) has been revised to more clearly show possible lands that could be acquired, and the Table is referenced in the text.

760APS-DC-33-EV21

Comment: *Page 39. Section 5.1*

Response: The references cited are Wilber and Clarke, 2001 and Newcombe and Jensen, 1996.

Page Appen. S-3

760APS-DC-33-EV22

Comment: *The lack of information on sturgeon is a critical information gap that precludes adequate assessment of the potential for impact.*

Response: The EIS contains data on both the Shortnose and Atlantic sturgeon. Both of these species were considered in the BATES prepared on the project. The BO prepared by the NMFS contains a complete discussion of anticipated project impacts on the Shortnose and Atlantic sturgeon and reasonable and prudent measures to minimize those impacts.

In addition to existing information, an extensive monitoring study on the Atlantic and Shortnose Sturgeon is being funded by NOAA within the southeastern US. The effort began in the spring of 2011 and is scheduled to last for five years. The work in the Savannah River is being conducted by SCDNR. http://www.nmfs.noaa.gov/pr/conservation/states/funded.htm. As information becomes available, NOAA and the Corps will consider it.

760APS-DC-33-EV23

Comment: *Section 5.1, 2nd paragraph, lines 9 - 13. The information included in this sentence are unsubstantiated by any other study or reference material. Citations should be included. For example, how can the inference be made that the suspended sediment loads would likely be uniform without having data to corroborate that information? How would the sediment interact with the salt wedge that otherwise restricts mixing?*

Response: Additional information has been added to FEIS-Section 5.1, regarding how the sediments interact with the advancing salt wedge together with other factors which affect mixing.

760APS-DC-33-EV24

Comment: *Page 40, 1st full paragraph. How far upstream will the salinity increase? This is crucial information for assessing impacts on essential fish habitat, but it is impossible to determine this information from the text.*

Response: The salinity increases experienced by specific upstream reach would vary by the proposed depth alternative. The hydrodynamic model outputs detailed these results, and the EFH Evaluation Appendix presents a summary. For detailed information on salinity increases within the estuary, please see the GRR, Appendix C, Attachment 3.

760APS-DC-33-EV25

Comment: *Page 41, 1 st full paragraph. The dates listed in lines 7 and 10 do not appear to be accurate. It is difficult to know which dates were actually modeled and what the respective dates are intended to represent.*

Response: The basic dissolved oxygen impact analyses used typical summer drought river flow conditions (those observed in August 1999). A normal river flow condition (those observed in August 1997) was also evaluated as well as several other scenarios described in the paragraph.

760APS-DC-33-EV26

Comment: *Page 45. The Corps used a 0.25 mg/l decrease in DO as the determination of DO violations. However, this document is intended to asses essential fish habitat. The Corps has not shown how a 0.25 mg/l decrease relates to essential fish habitat and the fish that the habitat is intended to harbor. This is an example of the continual disconnect between use of the model to calculate a result with little discussion as to the meaning of the inputs or outputs as they relate to fish in the harbor.*

Response: The criteria for these model runs were developed by the Water Quality Interagency Coordination Team to assess incremental changes in dissolved oxygen resulting from implementing different channel depths. The water quality modeling data were also used to determine the need for and location[s] of dissolved oxygen systems to mitigate project effects. These modeling data were just one of the multiple components used in developing the essential fish habitat assessment.

760APS-DC-33-EV27

Comment: *Tables 5-3 through 5-7 do not appear to be referenced correctly in the corresponding text. The disorganization of the document makes review difficult.*

Response: The text has been revised to clearly describe the information in Tables 5-3 through 5-7

760APS-DC-33-EV28

Comment: *Page 51, Section 5.3, 3rd paragraph. Line 7. - The screens should also be size to minimize impingement of fish. No sources have been cited to substantiate the velocity of flow being proposed. No estimates have been made of the species that may be entrained or impinged by the system and the mitigation that would be required for that mortality.*

Response: Additional studies are not needed to provide estimates of entrainment or impingement of aquatic organisms. Screen size will keep flow velocities from exceeding 0.5 foot per second which is the standard measure used to minimize entrainment of aquatic larvae.

760APS-DC-33-EV29

Comment: *Page 52. Line 1. The text references Table 5-4 for the desirable oxygen levels. Table 5-4 does not include oxygen levels. It is impossible to asses this information with incorrect citations.*

Response: The text has been revised to reflect that this information is in Table 5-8.760APS-DC-33-EV30

Comment: *Page 54, 1st paragraph, last line. Table appears to be incorrectly cited in the text.*

Response: The text in Appendix S has been revised to indicate that Table 9 should be referred to.

760APS-DC-33-EV31

Comment: *Page 57. Section 9.0. The text dismisses the mapped hardbottom areas without completing any assessments prior to doing so and does not provide any remedial actions that will be taken if a hardbottom area is found. Will the channel be moved? A voidance should be considered prior to mitigation.*

Response: The likelihood of live hard bottoms located in the alignment [fairway] of the channel extension is minimal given the scarcity of this community type off the coast of Georgia. However, the District would complete a benthic survey of the channel extension area (Stations -60+000 to -97+680) prior to the start of construction. In turn, the survey results will be coordinated with NMFS for its review/comment. In the unlikely event live hard bottoms are located in the subject area, the District would consult with NMFS to develop an appropriate course of action.

Page Appen. S-4

760APS-DC-33-EV32

Comment: *Page 60. Section I. - The text dismisses the mapped hardbottom areas without completing any assessments prior to doing so and does not provide any remedial actions that will be taken if a hardbottom area is found. Will the channel be moved? A voidance should be considered prior to mitigation.*

Response: The likelihood of live hard bottoms located in the alignment [fairway] of the channel extension is minimal given the scarcity of this community type off the coast of Georgia. However, the District will complete a benthic survey of the channel extension area (Stations -60+000 to -97+680) prior to the start of construction. In turn, the survey results will be coordinated with NMFS for its review/comment. In the unlikely event live hard bottoms are located in the project area, the District will consult with NMFS to develop an appropriate course of action.

760APS-DC-33-EV33

Comment: *Page 63. Section 11 .0 - The impact summary states that the proposed action would have adverse impacts on an endangered species, an important game fish species, and two types of marshes, presumably upon which many species of fish depend. Nonetheless, the text dismisses the adverse impacts as non-significant without providing sufficient detail as to how the non-significant status had been applied. Furthermore, the assessment provided little information as to how the project will impact essential fish habitat from an accessibility perspective. The mitigation of essential fish habitat through the restoration of inaccessible marsh habitats or the purchase of woodland does not provide adequate replacement for the essential fish habitats that will be lost due to this project.*

Response: This section is only a summary and is not intended to provide details. The details are provided in the body of Section 5.0 of the FEIS and Appendices C and S and are referenced in the summary statement.

Comments from the Savannah River Maritime Commission on the Savannah River Expansion Project DEIS and GRR

Costs and Economic Benefits

January 21, 2011

Report Prepared By:
Savannah River Maritime Commission
Columbia, South Carolina

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1. Introduction

Review comments are contained herein on Draft General Re-Evaluation Report (GRR), Economics Appendix and portions of the DEIS. The review was undertaken with guidance from the USACE ER 1105-2-100 as well as the IWR NED Deep Draft Navigation Manual 10-R-4. The primary focus of the review was analyzing elements comprising the asserted NED benefits of the project.

In addition to the above, the review benchmarked other port operations, both within the USA and globally, to evaluate whether the forecasts and procedures used in the GRRand DEIS gave a realistic depiction of current and expected future conditions at Savannah Harbor.

The major areas addressed in the comments were the container cargo forecasts for Savannah Harbor during the project's 50 year life span; the without project capacity at Savannah for such cargo; vessel utilization rates expected as a result of the forecasts; and the forecasted vessel fleet during the project life.

Several elements that were essential to the study were not made available as part of the review process. In particular, the specifications used in the HarborSym model to generate overall vessel flows within Savannah Harbor were not available. This makes it difficult to evaluate potential capacity limitations to shipping lanes within the project boundaries used to project tidal delay and meeting area benefits. The vessel capacity utilization analysis offered in the Economics Appendix appears incomplete, and does not look at utilization over time to account for the large percentages of empty containers expected in the future at Savannah, especially for the export transits within the Harbor.

The main findings of the review were the following:

- Garden City Container Terminal under current and proposed configurations does not have the capacity to handle 6.5 million TEUs as claimed under the without project condition.
- There is no multi-port analysis offered in the report. It is a given that 6.5 million TEUs will come to Savannah by 2032. There is minimal consideration of competing ports.
- Transportation cost savings includes all costs per entire trade route. There is no consideration as to whether cargo to/from Savannah may have origins or

destinations at interim ports along the trade route, or be transshipped along the way.

- There is the without project condition, and a series of incremental deepening alternatives offered. There is no non-structural or channel segment alternatives offered. There is no consideration for future facilities at other than Garden City Terminal.

2. Draft General Re-evaluation Report Comments

2.1. Inventorying and Forecasting Conditions

Commodity forecasts have increased significantly between the Corps 2004, 2007 and 2010 SHEP studies. While the Panama Canal improvements being undertaken may allow larger vessels to be deployed on certain services calling on Savannah, this should not affect the volumes of cargo handled at Savannah. To assume this is the case would mean an inducement to transfer cargo allocations from other ports, such as LA/LB. Cargo forecasts should be measured against broader forecasts of economic activity, such as population growth, income levels and GDP growth for reasonableness. China is unlikely to be the lowest cost provider of goods 20 to 30 years hence. Their K/L ratio will be too high (forcing wages to rise) and their consumption will rise from less than 40% of their GDP toward the US rate of 70%. So, there is uncertainty about the importer of tomorrow. A general assumption that Garden City Terminal can handle 6.5 million TEUs as the baseline for without project condition is not substantiated. A specific analysis of this terminal's capacity needs to be completed to determine appropriate volumes of cargo that can be handled without project.

The assumption that Garden City will be expanded seems appropriate, however that without condition can change if another major facility opens downstream. Then, the expansion could be scaled back and those savings would be benefits to the new downstream facility. As the Garden City Terminal may not be able handle the forecasted future cargo, the report misses an opportunity to evaluate additional terminal locations. A terminal located well downstream of the Garden City might optimize at a depth deeper than Garden City which would reduce the need for environmental impacts and expensive mitigation.

2.2. Formulating Alternative Plans

The multi-port analysis does not account for competing Gulf ports of Houston, New Orleans and Mobile in defining the Savannah hinterland market area.

There is an acknowledgement of S. Atlantic ports planning for 12 million TEUs additional capacity in coming years. There is no comparison of impacts by utilizing other ports over Savannah to meet the plan objectives.

There is minimal effort to identify a non-structural solution. The Corps should consider the non-structural alternative of reducing the LNG radius given the current. Vessels moving downstream may approach an LNG vessel faster than those moving upstream. So it may be more efficient to shrink the downstream no-sail zone. The ready acceptance

of the need for a 4 ft underkeel clearance is inconsistent with the required analysis described in ER 1105-2-100 E-5.e(3).

2.3. Evaluating Alternative Plans

HarborSym is referenced as a basis in determining not only project design, but channel capacity estimates to allow for realization of the project objectives. This model and calculations derived from its use should be part of the report, and presented at a level of detail for review.

Table 2-1:
Specific Comments

Page	Section/Para.	Comment
14	Main Report	1200 acres of terminal space includes ICTF/rail facilities. CY facilities limited to about 650 acres.
14		6.5 million TEU capacity is a given without any justification in the GRR. This capacity needs to be justified to insure the without project condition can accommodate future cargo forecasts.
17	1.1	Is the AIWW an impediment to navigation?
20		82% of container ships have design drafts restricting access. Container weights vary considerably. *Ref: Table 105 P. 141 Econ App.* This shows the vast majority of vessel calls are at or below -38' draft. In 2008, Waterborne Commerce Statistics show that of 4,320 inbound self propelled dry cargo vessel calls, 23 were at 42 ft, 32 at 41 ft. and 124 were between 39 and 40 ft. On the export side, 55 were at 42 ft, 73 at 41 ft. and 169 were between 39 and 40 ft. Table 29 of the Econ appendix shows that only 66 (4%) of the total container ships calling at Savannah are post-Panamax.
22	Figure 1-3	What does "Required depth (for 6' project)" mean?
24	Table 1-2	Currently dredge to 46 to 50 ft up to Station 102. Advance maintenance is major, up to 8 feet. Yet, it is not accounted for in the HarborSym analysis and calculation of transportation cost savings and vessel fleet allocation over time.
25-28		Sediment and fresh water controls didn't work or not maintained. This does not bode well for any mitigation maintenance measures in the future.
43	4.1	A shipper is trucking export containers to Charleston because they can't find room on outgoing vessels. Why does MSC see Charleston with 8500 TEU ships as beneficial over Savannah under current conditions? Light loads imply not enough volume for both CHS and SAV calls.
45	Table 4-1	"Planned Depth is meaningless. P&G says use authorized depth
45	Footnote	The correct web address is www.ci-online.co.uk
47	Table 4-2	The definition of Panamax is a vessel that can transit the Canal. The Greater than Panamax Draft are defined in the footnote as including Panamax vessel, which seem incorrect.
47	Table 4-2	Total Panamax or larger ships is 2075, not 2805. The 43% seems to be correct.

50	4.4	How does econ analysis account for arrival of LNG vessels delaying other vessels? Is LNG traffic and one mile safety zone figured into the HarborSym analysis? There is also a 90,000' or 1.5 hour restriction for loaded LNG vessels (Econ appendix P. 23, Sec. 2.6) On page 56, the report states that the clear radius is only 1 mile
51		Surprising that only 20% moves by rail. GPA forecast accounts for rail movements at 25%. Bottom of page, at some point $1 billion capital improvement plan should be defined, what does it entail?
52	4.5	Wastepaper weighs more than consumer goods so outgoing drafts sometime exceed incoming drafts. (When?) But the value of the cargo is extremely low. What is the ratio of empty/total in & out? Imports and exports should be treated separately throughout the study.
53	Table 4-7	Export TEU's always > import TEU's
53	Figure 4-2	Loaded Export TEU's < Import TEU's since about 2000. So, more and more room to put wastepaper and export drafts should not be controlling in the future.
53	4.5.1	Should discuss distribution centers in this section. Hinterland definition from Norfolk south; what about CHS as well? Prior reports had addressed CHS vs. Savannah.
54	4.6	Export boxes heavier, make sure forecasts keep balance between imports/exports, or some adjustment should be made in cost savings for both legs. Again, exports and imports should be treated separately. Claim that because < 12% of container transits greater than –38 ft proves carriers averse to tidal access. This does not mean that less than 12% was in fact constrained, because of over dredging, and vessels arriving above MLLW
55	Table 4-8	In 2007, some vessels transits draft deeper than the supposed 42 ft limit. Forty-two inbound vessels drafted between 42 and 43 ft. Based on the maximum practicable drafts in Table 35 of the Economics Analysis, all of these transits must be PPX vessels. The discussion on p. 56 implies that relatively few PPX vessels called on the port during part of that year. So, it seems possible that most PPX inbound transits are slightly greater than 42 ft. Does the model allow frequent drafts this deep w/o project?
56	1st para	Savannah Maritime Association has published Port of Savannah Industry Guidelines for Minimum Under-Keel Clearances, dated Feb 2009. These guidelines read as follows: (a) Four (4) feet for transits in the navigation channel between the sea buoy, across the Savannah Bar, through Jones Island range, USACE Station – 14, where the project depth of the channel decreases from 44 feet to 42 feet. (b) Two (2) feet for transits between Jones Island range and the point in the navigation channel which is adjacent to the facility of destination. Given these guidelines, underkeel assumptions used in the economic analysis seem to be incorrect.
58	4.8	Here, tidal range average is 6.8 ft with upper limit of 7.9 ft. On p. 56, it's 6.9 feet. Are economists and environmental scientists using different values?
69	5.2	Jasper County terminal was relevant in previous reports using much lower cargo forecasts. If uncertainty around Jasper County Terminal precludes it from the without-project condition, then GRR needs to demonstrate that Garden City plan can in fact accommodate all future growth assumed in the study.
70	Table 5-2	Unclear which ports assumed in the w/o project. Given that Jasper County does not meet the criteria for inclusion in the w/o project condition, how do these plans satisfy the criteria for inclusion in the without project, especially ten years into the future.

70	5.3	Garden City capacity increases to 6.5 million TEU annually. Assumes berth productivity increase from 280 to 700 TEU's per berth foot.
71	5.4	Trade projections based on 2005-07 condition, pre-recession. These are the bubble years in world trade. Overall, world trade seems to be stabilized at about 20% of World GDP. There should be an evaluation of growth forecasts using such general indices as regional population growth, real income and GDP growth forecasts as a check for reasonableness
71	5.4	"For example, major products destined for the Mediterranean are heavier pulp and kaolin clay whereas imports from the Far East involve lighter Manufactured goods and textiles. For each service, the historical average weight per TEU was calculated and used for this conversion." But as imports grow faster than exports, the average weight of export TEUs, including empties, should decline.
74	Table 5-4 & 5-5	The weighted average from 2005-07 condition, is too short a time and weighing more heavily on 2007 uses this particular year to a large extent to establish the baseline forecast for the next 50 years. Use broader incises as mentioned in the comment above (p. 71).
76	Table 5-8	There should be total weighted growth rate given on this table of import metric tons and growth rates. NE Asia is the lions share; overall growth rates of 5-6% seem really high long term with GDP growth in US nowhere near that. All tables showing growth rates on a yearly basis should also show the total growth rate for the period.
77 & 79	Table 5-10 & 5-14	This seems more reasonable than the projections in Table 5-8. Imports should follow a similar trend. We can only import so much. It is not reasonable to assume that imports can grow at a significantly higher rate than long-term GDP given the size of the US trade deficit.
78 & 80	Table 5-12 & 5-16	Total import tonnage area projected to increase by 80% in the 12 yrs from 2020 to 2032. This is preceded by a 73% growth rate in 10 years, which is somewhat explained by the enlargement of the Panama Canal and the change in destination from the west coast ports (LA/LB) to the east coast that is associated with this development. It seems that this rate of growth is assumed to continue without any competitive response by the west coast ports. What happens if they lower their terminal and inland transport rates? If west coast TEU throughput is impacted by the deepening project, NED benefits need to be adjusted downward to reflect that less to the west coast region. Continuing to assume dramatic compound rates of increased cargo flow well after the Panama Canal is enlarged seems more than suspect. The rate of growth should significantly decline after 2020.
80	Table 5-15	Are the values in this table short or metric tons? Either way, 5.87 tons per TEU is very light. Also, vessels departing thru the Panama Canal will be very light loaded with 67% empty containers. Avg. weights by imports and export routes. Do these change over time with the forecast? Loaded imports double while loaded exports triple by 2032.
81	Table 5-16	High export empties TEU volume, huge growth of imports 2020-2032.
84	Figure 5-4	The figure seems to be mislabeled as Panamax vessel calls. It should be labeled Post-Panamax vessel calls based on the text in the previous page.

85		"The combination of assumptions and calculations used in the LFA are the determining factors for vessel deployment and vessel drafts used in the Transportation Cost Savings Model." These important assumptions and calculations should be done separately for imports and exports. This becomes more important the later in the study period as imports increase relative to exports and the near balance of today is lost.
87	Table 5-20	Unit costs are never defined. What is a unit? How were these calculated, and what are they based on. Whatever the units are, the costs need to be evaluated by direction so that they vary for exports and imports. This is not understandable. PPX1 most economical at 42 ft. PPX2 becomes more economical at 44 ft for only FE (Panama) ECUS. PPM2 most economical for all at 46 ft. This needs to be explained.
88	Table 5-21	Why is Panama vessel mix constant for 44 to 48 ft? Seems like it would change at 45 ft based on Table 5-20.
90		Would like to see socio-economic profile of any neighborhoods near the Port. Use to consider social justice and potential health impacts.
91	Table 5-26	Does not take into account competing ports (HOU, NOL, MOB, CHS, and ORF) in determining true competitive market area.
92		Sea level rise projection seems to be based on political ideology instead of science. Using the historical rate as the most likely rates does not seem to meet the letter or spirit of EC 1165-2-211because they exclude global sea rise. May be overspending on wetland mitigation because salt intrusion will occur with or without a project. Decisions are made at the margin, and the optimal depth may well be sensitive to the incremental mitigation costs. Sea level rise would also reduce bridge clearances, and this issue does not seem to be addressed.
95	5.8	CSS Georgia is removed in w/o project. This is inconsistent with including the cost of removal as a SHEP project cost and any harbor delays w/o project that are associated with the CSS Georgia.
97	6.2	There is only one study objective which is to reduce navigation transportation costs to and from the harbor. This hardly seems to be a balanced approach to problem solving given the environmental, social, and NED aspects of planning.
97	6.4	If the forecasted tonnage cannot be accommodated by the future landside developments described in the report, then the study is incomplete.
98	last line	Plans do not need to be consistent with state & local laws. ER 1105-2-100 2-3 c(1) states that plans "should be in compliance ... or include proposals for changes as appropriate."
100	6.5	Reducing under keel clearance requirement is a specific non-structural measure.
104	6.6.1	Underkeel clearance has been 2ft, not 4 ft, since at least 1996.
104		How are Savannah Harbor underkeel guidelines consistent with all the other harbors mentioned that have 3 ft clearances?
105		Revising the underkeel clearance established 14 yrs ago is made all too readily given the improvements in technology available since then.
106		By dismissing non-structural alternatives so readily, the study effectively does not give "equal consideration" of non-structural options as required by ER 1105-2-100 2-3 c(5).

106		Industry standard 50% berth utilization is max capacity. Expectation is 58% at garden city in 2020 buildout. In addition, LNG vessel calls restrict berth access under any condition, so the industry standard may be too high to apply to Savannah.
106		Focusing on berth capacities, given the 9700' of berth at Garden City, annual TEU per foot of berth is estimated at 270 TEU. This compares with an estimated 251 TEUs per foot for LA/LB Harbors, and 166 TEUs per foot for S. Atlantic ports. Table 5-1 of IWR report 10-R-4 (NED Manual for Deep Draft Navigation) gives an estimate of 212 TEUs annually per foot of berth. 700 TEU's per berth foot per year in 2020 not realistic and there is no basis for asserting that such capacity can be realized.
111	Table 6-1	Unit costs per mile for trail/truck should be included. There is no indication how these figures were developed.
	6.8.2	Alternative sites all dismissed.
115	Table 6-3	Many alternatives terminals seem competitive cost-wise with Garden City, if you include mitigation costs for Garden City that have increased over $100 million since these costs were developed in 2005 as displayed in App. O of the EIS. Most, if not all, of that increase does not apply to downstream alternatives. Also, the dredging costs to Garden City have increased about another $100,000 million and it is reasonable to assume that the cost increase for dredging to the downstream locations has increased less than that. We question the likelihood of GPA expanding the Garden City Terminal without additional channel depth. Terminal capacity analysis indicates berthing space is constrained and GPA improvements do not address this shortage of berthing space.
116	Table 6-4	Hurricanes and other weather events will affect all of these alternatives, not just the offshore terminal. It is reflective of the lack of risk assessment in the report that the potential for these events is ignored.
124	6.12.2	Why 464 ft for bottom channel width? 50+140+150+140+50 ft would be required. The 530' width should be reflected in costs. Does Harbor Sym assume a Panamax and Post-Panamax vessel can meet in the channel?
125		Turning basin at 1600' x 1600', why not have at least one step with interim design vessel at say 45' to measure channel/turning basin width requirements and costs?
128	Table 7-1	There should be a weighted average of SAV proportion of cargo for all trade routes. Looks like it should compute to low-mid 20% range.
128	7.1	There should be a table in this section showing total costs per voyage per route and vessel class
129	Table 7-2	What does '140$ rr for PPX2' mean?
130	7.2	Are meeting area benefits calculated relative to no channel improvements? Should be incremental, after each channel deepening. Does HarborSym account for LNG vessel safety impacts, AIWW impacts, hurricane/weather impacts, etc.?
131		LNG transits increase to 80% of capacity by 2030. Don't they continue to increase beyond that? If so, then traffic delays should increase beyond 2032.
132	Table 7-6	Meeting area benefits go up, then down as depths increase. Benefits seem to decrease with increasing channel depth over 45'. But over 46 ft, there is no change in the number of PPX vessel transits and those are the only vessels that require the meeting areas. Why do benefits decrease? Should consider Long Island only early and Oglethorpe later in time.

133		Tidal delay reductions should address the air draft constraint of 185' at the Talimadge Memorial Bridge.
134	Table 7-7	Tide Delay benefits increase by a factor of eleven over time. There will eventually be about one LNG transit per day. With all of these delays, is the vessel transit capacity of the channel ever exceeded?
135	Table 7-9	Is it appropriate to simply sum meeting area and tide delay benefits? Meeting areas decrease transit time, thus effectively increasing tidal windows.
143	8.2.4	Monitoring of chloride in water, but what if it happens? Again, this is a missed opportunity to incorporate risk into the analysis
145	8.2.6	Without project assumes all cargo traffic will happen anyway. This assumption seems to reflect an inherent bias in the analysis.
146	para 2	GPA claims there should not be a significant change in port operations. However, larger vessels will berth longer. The larger vessels will require more than "slightly longer time at the dock". There will be a substantial increase in berthside times. 8600 TEU vessels will take over 24 operating hours to complete a single berth call.
146	para 4	Reference to multi port analysis and findings of increased overland costs would not overcome decreased waterborne transit costs to induce traffic to SAV. So, the least cost alternative is to always unload at the nearest port. By the same token, how can SAV compete with any closer port within their defined hinterland if this is the case?
149	Fishery	Reallocate water from Corps lakes – what is the opportunity cost? Hasn't the SE had significant droughts recently?
174	10.3.1	Cost include removal of CSS Georgia, but that is a w/o project condition. (p.95 Section 5.8)
179	Table 10-4	Why do DO costs decrease from 44 to 45 ft, then increase at 47 ft?
179	Table 10-4	Spend $191 million to mitigate the first foot, then $30 million to mitigate the next 4 feet. Suspect mitigating for w/o project condition. Incremental costs are suspect.
180	10.3.6	What are w/o project dredging costs? The without project condition is not fully defined.
181	10.3.6	How is it that the bottom width narrows?
181		Risk that O&M costs may be greater than estimated, which should increase the deeper they dredge into the sideslopes. This should all be reflected in a risk analysis.
181		CSS Georgia O&M part of w/o project even though it is removed?
181	Table 10-7	Why would outer harbor dredging increase every two feet, but not every foot depth increases? Doesn't that channel widen with depth?
181	Table 10-7	DO O&M costs do not have the same trend as DO construction costs in Table 10-4. If construction costs the same at 44 & 47 ft, expect O&M costs to then be the same. According to Table 9-6, the capacity of the DO system at 47 ft is larger than at 44 ft. Need to display current, without project O&M for comparison. It seems that the cost of inner harbor dredging increases by $2.7 million annually if the channel is deepened by 2 ft to 44 ft. Acknowledgement of potential for increased costs due to using existing channel slopes for deeper channel is not accounted for in the table.

182	Table 10-8	Most of the O&M in this table is $1,000 more than the O&M in Table 10-7
186	Table 11-2	Meeting areas optimize at 45 ft. No study of the effectiveness of 45 ft meeting areas with 47 ft channel. Simply assumed 47 ft meeting areas needed with 47 ft channel.
192	Table 11-3	Air quality has become the defining problem at LA/LB. Basic question: does the project induce vessel calls?
195	Table 11-3	If no change in shipping volume, where do increased sales volumes, income, and employment come from? What is sales volume? Are these figures annual?
208	Table 11-3	Investment risk ignores the dependence of the b/c ratio on forecasts. How much will shipments need to increase to justify the project? In general, this table should present more quantification. How does a 'minor fleet shift' for all deepening alternatives equate to such substantial transportation cost savings?
	Table 11-3	This table is too long at about 20 pages. Should be separate tables for each letter, A thru F.
214	Table 11-5	How is it legal to dredge 8 ft deeper than authorized project depth for advanced maintenance and allowable over depth?
221	12.1.1	We are providing an analysis of the Garden City Terminal which determines that the capacity is constrained at about 3 million TEU's annually. This affects any without project design and NED benefit computation.
222		Referred to map on page 1. What? Refers to DMCA 12 A&B, but no DMCA 12 B on the maps.
	12.1.2	Sensitivity Analyses are difficult to follow with limited narrative. Better to display fewer scenarios more in depth, especially for meeting area and tide delays.
223	Econ Analysis	There is an implied assumption that at some point there will be a need for additional terminal capacity during the lifetime of the project. Why aren't costs and benefits considered in the overall analysis using this assumption? The study period is 50 years, until 2065.
226	12.4	There may be bridge clearance issues associated with sea level rise.
240		Question no change in project purpose, as removal of CSS Georgia is mitigation of an existing project.
241		Mentions continuing the existing advance maintenance features. Was there a cost analysis in the DMMP? Also mentions deepening container berths 4-7 at GPA. Is this a non-Federal, non-cost shared, but NED cost needed to realize the benefits?
242	13.2	IDC is not a cost authorized by Congress. It is an opportunity cost of capital
245	Trans Cost	If 'increased reliability is expected to encourage carriers to assign more of their large vessels to Savannah route services' ,would this have an impact on competing ports and the NED costs associated with their vessel costs?
264	15	First cost is listed as Fed after cost-sharing. O&M is before cost-sharing.
264	15	GPA responsible for 50% of excess O&M costs above those estimated for a 45 ft channel. This may relate to claim that O&M essentially will not increase. This should apply to DO O&M, also.

2.4. Competition

There is nothing in the document that addresses the competition among Southeastern U.S. ports to provide docking facilities and services to the upcoming generation of very large ships that will be coming through the enlarged Panama Canal in approximately five years. This is a very important consideration for the Region's economic future. If one of the other key competitors (namely Norfolk, Miami or Jacksonville) beats an enlarged Savannah and/or new Jasper County port to the "punch," it will have an adverse effect not just on future economic growth but also on existing economic conditions.

2.5. Land Transportation as a Growth Limitation

There is no mention of the fact that at the current time one of the major inhibitors on expansion of the Port of Savannah is the road network (it is definitely NOT a system) that serves the port's operations. Trucks pulling the larger containers directly off the ships to the import distribution centers located within five miles of the port's gates have no choice but to travel on an old street and road network built to handle the residential and commercial traffic of at least 30 years ago. As a result, it is both inconvenient and unsafe for the trucks and also for the people who still live in the small homes along the streets. Passenger vs. freight conflicts are a problem.

As well, there are freight train grade crossings that hold up other both cars and commercial truck traffic near the port. The Savannah MPO reports that they are working on plans to alleviate some of the problems, but the investment that will be required is extremely large, and no commitments for funding have been made at any level of government. In addition to the financial costs, adding new highways will result in residential and small commercial dislocation and relocation, which will likely be considered environmental justice issues.

The economic "Uncertainty" analysis is in report was more of a summary. Is there additional information on this? There was no economic and marketing justification material in the report, nor were sources of data or assumptions used in their sensitivity analyses identified.

3. DEIS Economic Appendix Comments

3.1. Introduction

The following comments are structured on the Evaluation Procedures for Deep Draft Navigation contained in the Corps' Planning Guidance Notebook (PGN) (ER 1105-2-100). The nine steps described in the PGN are evaluated below:

Step 1 – Determine the Economic Study Area.
Step 2 – Identify Types and Volumes of Commodity Flow.
Step 3 – Project Waterborne Commerce.
Step 4 – Determine Vessel Fleet Composition and Cost.
Step 5 – Determine Current Cost of Commodity Movements.
Step 6 – Determine Current Cost of Alternative Movement.
Step 7 – Determine Future Cost of Commodity Movements.
Step 8 – Determine Use of Harbor and Channel With- and Without-Project.
Step 9 – Compute NED Benefits.

3.2. Determining the Economic Study Area

This is Step 1. The hinterland definition does not account for Gulf ports. A competitive analysis for areas claimed, such as Jackson, MS, Birmingham, AL, New Orleans, LA, and Charleston, SC should be done. "The final delineation of the economic study are for a given improvement, should adequately discuss the trade area relative to adjacent ports" (ER 1105-2-100)

There is a focus in the DEIS on discussing the growth of local warehousing that serves as distribution centers in the immediate counties adjacent to Savannah Harbor. Given the identification of the study hinterland covering the Southeast US, distribution centers sited close to major retail destinations should result in major population centers in the Southeast US being the DC hubs within the study area. The focus on warehouse availability adjacent to Savannah appears to be a bias in assessing the economic impacts of SHEP. Centering DC clusters further away from Savannah will open the potential for competing ports in the Gulf/and Southeast US for these markets.

3.3. Identify Types and Volumes of Commodity Flow

This is Step 2. Some portion of the existing foreign waterborne commerce generated to and from the Savannah hinterland is currently moving via West Coast US ports. A significant rational for harbor expansion projects based on currently ongoing expansion work at the Panama Canal is anticipated to result in a shift from movements via US West Coast ports to all water services between the Far East and the U.S. East Coast.

This shift is potentially impacted by canal transit tariffs that could significantly rise after the completion of the canal improvements. There needs to be a sensitivity analysis performed to assess the relative routing advantages of all water versus ongoing use of US West Coast ports.

There is an ongoing competition between East Coast ports for additional through-put expected as a result of the Panama Canal expansion. The only way to effectively allocate throughput for a given port is to analyze the region as a whole. Then, and only then, can "a study should be made of various alternatives for the existing traffic and of new traffic susceptible to diversion from alternative harbors or other modes of transportation" be made. "In determining the likelihood of prospective commerce, particular attention should be given to alternative competitive harbors in the case of new movements and to hinterland traffic." (ER 1105-2-100)

The NED analysis is based on no change in tonnage, origin, or destination of existing cargo trends. Thus the transportation cost savings benefits are based on the distances from origins to destinations. If there were only changes in destination, the transportation benefits would be much smaller. Accepting that cargo will divert via the Panama Canal to the East Coast regardless of a Corps project, the assumption that cost savings begin when a vessel sets sail from China is not valid. Given cargo is moving on these trade lanes defined in the commodity projections, a competitive port analysis should be the basis for transportation cost savings.

3.4. Project Waterborne Commerce

This is Step 3. The Corps' 2004 study projected a TEU volume of 3.5 million loaded TEUs for Savannah in 2030. The Corps 2007 Regional Port Analysis forecasts 2.5 million loaded TEUs for Savannah in 2030. The current forecast for Savannah for 2030 is 4.9 million loaded TEUs. There is no basis for such a huge increase in 3 years, unless there is consideration for impacts of the Panama Canal improvements. If this is the case, the overall impacts should account for any offsets in U S West Coast TEU traffic, and transportation costs to their ultimate destination need to be estimated for later calculating benefits.

There is no sensitivity analysis to account for any canal transit fees levied by Panama, and affects such fees may have on relative costs between US West Coast transits and U S East Coast transits for USEC FE cargoes.

Initially, Global Insight projected that imports would increase 80 percent from 2015 to 2028 (Table 16). These forecasts were adjusted downward based on a one-year "trend" from 2007 to 2008 (as shown in Table 21), before the global financial crisis. Then, the GI forecasts were extended just four more years to 2032, and imports are now expected to

increase by 127 percent from 2015 to 2032 (Table 22). Why and how is higher growth rates factored into the revised forecasts?

Import containerized tonnage is expected to more than double from 2015 to 2032 (Table 22). Export containerized tonnage is expected to increase only about 50 percent during the same period (Table 24). Yet, the ratio of total loaded export TEUs to total loaded import TEUs is assumed to be about constant (Table 26) at 70 percent for the same period. Therefore, the average weight of an outbound TEU should decrease.

3.5. Determine Vessel Fleet Composition and Cost

This is Step 4. The analysis assumes that the equivalent of 25 percent of the PPX2 world fleet will be devoted to trade routes stopping at Savannah (Table 50). This seems to assume that Savannah will be one of the dominant world trade centers globally. There should be some kind of comparison to demonstrate that the largest container ships operating in 2030 will be most efficiently allocated to those trade routes as opposed to others, especially those not involving the USA, such as European trade with the Far East.

3.6. Determine Current Cost of Commodity Movements

This is Step 5. There is no effective analysis of commodity movements between one port to another within the hinterland market area for determining the potential for cargo diversions within US East Coast ports. Given assumptions in the study, each port that is closest in highway miles to a given hinterland destination should have all cargo allocated to that destination. International cargo traffic is based on a variety of factors, including adjacent markets to ports for immediate market access, comparative cost advantages to inland destinations, including both rail and truck. There is no comparative cost analysis for rail in the report, even though GPA claims the ICTF facilities at Garden City are expected to handle up to 25 percent of traffic in the future.

Also, ER 1105-2-100 seems to require analysis of observed vs. apparent deviations from underkeel clearance standards to address this problem in application of the guidance. The use of 4 ft, even though the local guidance is 2 ft, must be demonstrated with empirical data, not based on an a priori assumption. This is especially true because the prevailing clearance at other ports is repeated cited as 3 ft.

3.7. Determine Current Cost of Alternative Movement

This is Step 6. There was no attempt to "determine transportation costs prevailing at the time of the study for all tonnage identified in Step 2 for alternative movements" (ER 1105-2-100). These alternative movements include shifts from movements via U.S. West Coast ports to U.S. East Coast destinations via land bridge, to all water services between the Far East and the U.S. East Coast.

3.8. Determine Future Cost of Commodity Movements

This is Step 7. We did not have access to, nor could we review the detailed calculations used. We believe that the average draft of an outgoing vessel will be less than incoming vessels in the future and this trend will become more pronounced over time. However, it appears that problems related to Table 26 affect the analysis and overstate the benefits associated with outgoing vessels because the analysis seems to carry forward existing average weights per TEU. This does not account for the increasing percentage of empty export containers that are missing from Table 26.

NED benefits for harbor deepening are based on design drafts. The load factor analysis in the report (sec. 3.4.4.1) does not account for the large proportion of empties that grow over time, due to increasing deficits in TEU export containers versus import containers. An attempt to utilize current weight and empty proportions given in Table 25 was used to show expected vessel utilization weights as a percentage of vessel weight capacity. The table below shows vessels will be significantly light loaded at Savannah, and resulting operating drafts are expected to be significantly shallower than design drafts. Table 25 shows a percent factor for empties by trade route and direction, which does not relate at all to empty percent, indicated in Table 33 of the load factor analysis. Any load factor analysis should be direction specific, as the variables vary substantially for export and import directions at most all US container ports.

The PDT had problems calibrating their model because vessels too often drafted more than design draft. They addressed this problem by reducing the amount of empties. It would seem that the proportion of empties should increase over time, decreasing the predicted drafts.

3.9. Use of Harbor and Channel With and Without Project

This is Step 8. There is an assumption under without project that commodity forecasts can be handled throughout the project period. There is no capacity analysis of existing and future facilities at Savannah to demonstrate forecasted cargo can be accommodated. This comment in more fully documented in the Terminal Capacity Analysis.

There is no detail provided regarding the HarborSym model used to assist in determining overall capacity and utilization factors in the analysis for Savannah Harbor

Table 3-1:
Vessel Load Factor for 8200 TEU Design Vessel

Route	TEU Weight (Table 25)	Empty (Table 25)	Avg. Cargo Weight Per Loaded TEU	Total TEU Cargo Weight	Total TEU Weight w/ Container (P. 41)	DWT (P. 51)	Gross Tonnage (P. 51)	TEU weight / Gross Tonnage = Load factor for vessel by weight
Panama export	10.72	67%	3.53	28,956	45,356	104,700	91,560	49.5%
Panama import	5.67	2%	5.53	45,355	61,755	104,700	91,560	67.4%
Suez export	10.02	21%	7.88	64,622	81,022	104,700	91,560	88.5%
Suez import	7.52	15%	6.40	52,470	68,870	104,700	91,560	75.2%
FE ECUS MED PEN export	10.52	41%	6.18	50,671	67,071	104,700	91,560	73.3%
FE ECUS MED PEN import	6.15	11%	5.45	44,691	61,091	104,700	91,560	66.7%
FE ECUS EU PEN export	9.8	16%	8.22	67,366	83,766	104,700	91,560	91.5%
FE ECUS EU PEN import	7.45	47%	3.96	32,445	48,845	104,700	91,560	53.3%

3.10. Compute NED Benefits

This is Step 9. Over the life of the project, the volume of empty containers involved in vessel calls at Savannah is anticipated to increase significantly. From 2032-2065 the estimated volume of empty TEUs is over 1.5 million annually (loaded import TEUs - loaded export TEUs 3032, table 26), owing to much larger compounded growth rates of import volumes versus export volumes on most trade routes.

Moving empty containers back to origins for loading is called repositioning. Global carriers factor these costs and lost revenue opportunities into their pricing structure to maintain sustainable revenues and profitability. Thus shippers pay indirectly for these costs. As the percentage of empty containers and the associated cost to return those increases, the only way to recoup that cost is to increase the rate charged for imports to that destination. Another way to look at this is that the cost to ship to Savannah will increase as the imbalance of trade increases. This trend, via the resultant price increases that can be reasonably expected, should retard the growth of trade.

The computation of NED benefits should account for the proportion of TEUs, which are part of the overall volume forecasts at Savannah. Empty container movements should not be counted in NED benefit computations.

Transportation cost savings are computed based on containers transiting the entire length of a given trade lane. There is no consideration that containers may be on or off loaded at an interim port, either due to an origin or destination along the route, or due to being transshipped at an interim port to a feeder vessel for final destination. These factors should be considered in applying the total vessel cost savings as NED benefits.

3.11. Regional Economic Development

The most widely accepted model for estimating regional development is IMPLAN. Instead, the report includes a regression analysis relating harbor tonnage vs. personal income. Why tonnage instead of TEUs? Regardless, the chosen model should then be applied to project construction related employment. Of the two models, only IMPLAN fits that purpose.

The NED analysis would lead to little or no local (RED) impact on income because shipping volume supposedly remains unchanged. The GRR seems to claim no RED impacts, but it also seems to imply there are significant RED benefits at the same time. The real issue of benefit incidence would be how are the cost saving distributed between foreign producers, foreign shippers, American merchants, and American consumers.

3.12. Risk Analysis

Lastly, the Appendix repeatedly refers to the Federal discount rate as the OMB mandated discount rate. There is no such OMB mandate. It's the law, specifically Section 80 of PL 93-251. Also, the Treasury Department calculates it, not OMB.

Table 3-2:
Specific Comments

Page	Section/Para.	Comment
3		Intro paints a grim picture. Why wouldn't some of the cargo move to deeper ports without project if that would be cheaper?
6		Who owns/uses these large distribution centers? It is more efficient to locate them near major population centers. Define 40 mile "trade radius", and what is the significance?
7	2.2.1	A berth is a berth. Regardless of the number of operators, there is still a physical constraint to port facilities.
12	footnote 7	The Corps should use a holistic approach to expanding/deepening port facilities in response to the deepening of the Panama Canal, not port-by-port analysis.
13	last sentence	Attributing SAV cargo growth to GPA success in attracting DCs to greater SAV has limits, given slow population growth of greater SAV.
20		The text seems to confuse vessel calls with the loading and unloading of cargo. It is typical for vessels to call seven days a week. However, it is not the practice to work weekends, especially Sundays. The Regional Port Analysis alludes to this
22	Figure 17	There were 32 separate classes in Table 5. It is difficult to track the analysis when it moves to only these 5 classes.
23	2.6	Clarify the loaded LNG clearance requirement, if 90,000 ft then pretty much the entire channel and entrance must be cleared until berthing or departure from the entry bar of LNG vessel. Is this accounted for in HarborSym?
24	Table 7	What is the basis for the values, especially for PPX class, underkeel clearance? See main report page 104, 6.1.1(b), 2 ft underkeel?
24	Figure 18	42 ft channel provides 42 ft of depth 94% of the time, not 100%. What's this about, especially with overdredging and advanced maintenance?
25	last sentence	Panama Canal max draft currently 39.5 ft, not 38.5 ft. (ACP Notice N-1-2007)
27	last para	Statement that transport of empties causes problems with channel limitations doesn't hold water. Empties are lighter, only if exports nearly match imports is this true. The "problems" caused by empties as they relate to channel depth constraints does not seem to make sense.
29		"The carriers emphasized repeatedly that East Coast ports would need to be able to receive loaded Post Panamax vessels upon Panama Canal expansion or risk losing services to ports which can accommodate this traffic." How does this compare the without project assumption that Garden City will not lose traffic?
30	3.3.1.1	Using 2005-07 for the baseline, weighted toward 07, is not representative. At the top of the bubble. The data should be independently validated, GPA as sole data source has a vested interest in the project. What about waterborne commerce stats?
30	last para	Why is furniture the leading import commodity? If so, these particle board pieces are heavy. Why are import TEU's far east so light (5.67 tons)?
32	Table 12	Metric tons exported thru (Panama) greatly exceed imports, yet empties compose 67% in Table 25.
32	3.3.2	Trade forecasts for what? How were they allocating total imports and exports between various harbors?

34	Table 14	Does putting Canada, Caribbean, Central America into NE Asia region skew the analysis in favor of Panama crossings? There is plenty of Canadian shipping thru the St Lawrence Seaway that has nothing to do with Panama.
34	Table 14	Egypt would make more sense in Mediterranean than SE Asia.
35	Table 15	Half of the Imported TEUs from China. How long is this trend expected to continue? What if currency imbalances are corrected? This may sound like the macroeconomic question for the ages, but it must someday be addressed. As the K/L ratio increases in China and India, the trade advantage from lower wages will diminish.
36		"The fastest growth will take place in developing countries." Fastest growth in NE Asia and slowest is with Africa. However, it seems likely that Africa may well host the next generation of low cost factories.
36- 38	Tables 16 & 19	Table 16 shows imports increasing by 80 % from 2015 to 2028. Table 19 shows exports increasing 38% during the same period. On page 38 is says "the rate of change in exports is slightly lower than that of imports." Less than half the rate is not "slightly lower". All of these figures are by weight, which brings to question the claim that trade is balanced in the future.
	Tables 17 & 20	Should show overall total annual rate of change rather than just by trade lane
42	Table 26	50% increase in loaded TEU exports 2015-2032, 130% increase in loaded import TEUs 2015-2032. 87% total TEU increase including empties. MTs increase 63.2%. Since empties increase as a percentage of export totals, this should lighten export transit vessels and decrease draft requirements. This table is misleading. In order to balance TEU cargo flows including empties, for each year total inbound and outbound container counts should match. This table needs to be completely redone because the imbalance eventually reaches about 1.5 million TEUs annually for 2032 - 2064, or over 28% of all container movements at Savannah. Basic shipping 101; unless storing or off leasing containers locally, total loaded and empty TEUs import and export should equate.
41	Tables 22, 24, 25, 26	An analysis was done to substantiate the conversion from tonnage in the commodity forecasts to TEUs. The conversion appears correct. A further analysis was done to evaluate the weights of containers loaded, their average weights by service route and direction, and the percent of empties to determine how heavy vessels will be. Findings indicate vessels will be loaded from under 50% of weight capacity to under 92% of weight capacity of the design vessel. This means vessels will be utilizing far less than vessel design drafts in transits within Savannah Harbor. This should be accounted for in NED benefit calculations.
41		Empty to loaded TEUs by route should change over time.
	Table 25	refer back to Table 12
45	2nd para	How long can the US continue to grow imports that exceed exports? This relates to commodity projections and the assumption that imports continue to grow unabated.
46	Table 27	Have mercy on the reader and list the actual drafts. Why not use a numeric code instead of an alpha code?
53	Figure 26	Regression equations using natural logs almost always have an extremely high R2, so the correlation may be relatively meaningless.
54	Figures 26 & 27	These Figures prove nothing more than the intuitively obvious that you need more boats to move more containers. However, this study is based on using bigger boats. How are these figures incorporated into the study?

57	Figure 28	The forecast estimates about 900 PPX2 vessel calls in 2025, with most (600+) going to SE Asia thru the Panama Canal or the Far East thru the Suez. A round trip on either route takes about 8 weeks. That represents equivalent of the full-time use of about 90 PPX2 vessels on these two routes alone, or over 15 %. Overall, it seems that more than 20% of the PPX2 world fleet is expected to be devoted to trade routes that include Savannah. For this to be a reasonable assumption, the GRR should demonstrate that carriers will deploy so many such vessels in these services based on cost efficiency relative to other routes throughout the world.
55		The correct presentation of the equation should be: $y = 0.3621 x + 105,718$ TEU's Units are often omitted from equations/calculations (eg. box on p. 56) which makes following the logic employed more difficult than necessary.
58	Table 31	This is almost completely static. Hard to believe no sourcing shifts over the next 50 years. The sensitivity analysis is focused on absolute growth rates, but never addresses sourcing shifts.
62	Table 33	FE (Panama) route has 8.74% empties, while table 25 shows 67% empties for export to FE (Panama). The entire study should be consistent in applying directional analysis. TEU weights, vessel load factors are very different import/export. Panama route has lowest Tons/TEU. Trade with S. America has minimum % empty of 30.24%, which is highest by far and yet the Tons/TEU is the highest.
62-63	3.4.4.2	The PDT assumes that vessels would load to their Max Practical Load Draft. Given the volume of empties and average tons per container previously provided, this is not the case. Vessels cube out before reaching MPLD.
67	Table 35	The sailing draft columns seem to be channel depths, but why would they vary by route? Why is max sailing draft 42.8 for ppx1 and 42.7 for ppx2 at 42 and both increase at 44 ft? What is the rational for different Max Practicable Sailing Drafts for the PPX1 and PPX2 well before the channel depths at which the maximum MPSD? An example in the text might be helpful to validate the calculation.
68	Table 37	Is it appropriate to look at costs per ton instead of cost per container? Step 5 - Determine Current Cost of Commodity Movements of ER 1105-2-100 seems to also require that costs include transit fees at the Panama Canal. Are these fees, which are $72 per TEU transit, included in the unit costs?
69		It would seem that PPX2 vessels would be assigned to the most efficient routes in the world. Where are those? Analysis starts the PPX2 at 44 ft channel. The PPX2 becomes most efficient on the Panama Route at a channel depth less than any other route. Why? Need to explain.
70		"Upon further discussions with the PDT and reviewers, the PDT changed their assumptions slightly by applying a 140 percent replacement ratio of PPX1 vessels." 140 % does not seem to be a slight change. What is this adjustment, as opposed to say 120%, based on? It seems odd that the adjustment is only from PPX2 to PPX1 vessels at 42 ft. This narrative seems unclear and leaves the adjustment seemingly arbitrary.
71	Table 39	What does the 140% replacement ratio mean? In the w/o project condition, (42 ft), w/ no PPX1 vessels, the PPX2 vessels are increased by 5% in 2015 to 24% in 2032. Also, the only difference between the adjustment and no adjustment at 48 ft is 1 fewer PPX1 in 2020 and one fewer PPX2 in 2025.
70	Table 38	Why are there 279 PPX2 vessels at 44 ft in 2020 and only 276 at 45 and 276 in Table 39? Looks like a typo.

72		At certain depths it becomes economically advantageous to switch from a PPX1 vessel to a PPX2 vessel. The number of PPX calls that was predicted by MSI for its unconstrained channel could then be applied. (For the FE (Panama)-ECUS example, once the channel depth reached 44 feet, PPX2 vessels were deployed at Savannah.
72	Table 41	Comparing table 41 with table 25 P. 42, FE trade looks like about 1300 import TEUs per PPX1 Call and 1800 TEUs per PPX2 call at -48'. Import only. Why no such analysis of exports? Why show Gulf when benefits primarily to Panama and Suez services?
72		The residual forecasted tonnages left after allocation to the Sub-Panamax and PPX vessel classes were then allocated to the Panamax fleet. The number of vessel calls required by this class was based on historical averages of Savannah's share of vessel capacity for the Panamax vessel class." These statements seem to contradict themselves. How does the residual tonnage magically match the historic share?
73	Table 42	Sums are often off by one. Net savings between 46 ft and 47 ft is 0 PX voyage in 2015 (after correcting math), 5 PX in 2020, 9 PX in 2025 (after correcting math), and 11 PX voyages in 2032.
74 - 75	Assumptions	1. Not an assumption, but a fact 6. Question the need for 4+ ft of underkeel clearance. 8. Avg. weight per container should include empties and differentiate between imports and exports. Vessels exceed MPD 85% of time? This should be substantiated by specific examples, as this assumption is critical to determining appropriate drafts for vessels in transit. 15. Does final comment mean that rerouting cost savings exist and benefit model somewhat overstates benefits by not allowing rerouting w/o a project? Under the without project cargo is likely to be rerouted to Charleston and Jacksonville. Likely in the with project condition, cargo would be routed to Savannah from Charleston and Jacksonville. This should be considered when computing benefits. Also, historic growth rates at SAV have been affected by labor lockout on W Coast in 2003, which has already given impetus for shift to SE US ports. Hinterlands are not unique to a given port, especially in SE where CHS is less than 100 miles away and has rail/highway access as well.
80	Table 49	This table seems to be a duplicate of Table 42.
81	Table 50	The % World Fleet looks very high (sometimes 25%) for PPX2 vessels in the out years. At 42 ft, 32% share of PPX1 also looks very significant.
85	Box	"a certain share of each vessel's cargo was exclusive to Savannah." Yes, but how much of the cargo to Savannah is "exclusive to Savannah"? Some could have just as easily gone to Charleston.
85	Equation 3	The equation is used to calculate Savannah fraction of cargo, but it is not done separately for imports and exports as is appropriate.
86	Table 56	All of the cargo does not go the entire length of the voyage because of interim port calls en route. There should be a factor applied to account for cargo with origins or destinations other than the terminus nodes of the vessels' routes.
108	Table 76	Just a 1% reduction in the commodity growth reduces vessel cost savings benefits by $30 million (almost 30%). Also, a 1% increase adds fewer benefits than a 1% decrease. So, the economic analysis does not seem to be symmetrically sensitive to the commodity forecast.
114	Table 82	A 25% reduction in PPX calls reduces benefits even more than a 1% decline in commodity growth.

115	5.4.2	Actually, the most successful greening initiative to date seems to be the slowing of vessel cruising speeds to save fuel and reduce emissions.
124	5.4.6	No growth scenario. Vessels transportation cost savings benefits decline by more than half. While the b/c ratio is over 4 for the project as a whole and justification of a project is not sensitive to the forecast, the size of the optimal plan certainly is. The NED plan is sensitive to the assumption that the forecasted commodities will move through SAV, regardless of the actual Garden City capacity.
130		"overall results of the sensitivity analyses confirm that there is a strong likelihood that improvements to Savannah Harbor are well justified economically and that the NED plan for Savannah Harbor is 47 feet." Disagree. There is no discussion of the relative likelihood of these sensitivity scenarios. The discuss focuses on the overall B/C ratio and the relevant discussion should be on the optimal channel depth. The sensitivity analysis does not conform to the requirements of ER 1105-2-100 E-10.e. (4)(b) to consider alternative user fees. Total TEUs in the future rely on cargo moving from west coast to east coast destinations after the Panama Canal is enlarged. However, as stated in the NYT (12 Dec 2010), "Officials in Panama are also expected to charge higher tolls for the canal to pay off the national loan that is financing the expansion. Those costs to shippers could offset potential savings in improved logistics."
134	Figure 34	What units correspond to the Y-axis? They appear to be seconds, which seems an unimaginable level of detail. This model estimates the number of seconds? If so, then most iterations are within a minute of each other. The discussion of the Harbor Sym model does not list all specific variables or their distributions. If indeed the output variable is seconds, the average vessel is in the system just under 35 hours. This computes, based upon 2032 vessel calls to just Garden City (over 3000) This would put 12 vessels in the system every moment of every day on average trying to use only 9 berths at Garden City. If the outputs are measured in hours, hours of vessel time in harbor? Transiting channel? For what year? With or without which meeting areas?
135	6.2.1	"The Pilots indicated that they currently "can meet all vessel classes using the harbor now including two post Panamax vessels". Does the model ever allow vessels to meet w/o project? If not, it overestimates benefits.
136	Para. 4	Do LNG vessel restraints account for 90,000' clearance as required? What about advance shutdown of channel in advance of LNG arrivals/departures to insure safety range of vessels? Berthing duration assumptions are crucial for terminal capacity analysis.
137	6.2.1.2 & 6.2.1.3	Why does one meeting area need to be 4,000 ft long and the other 8,000 ft long?
138		The bigger the ship, the longer time it spends at the dock. Container fleet averages may be 16 hours currently, but they will increase significantly with larger vessels. The 16 hours claimed needs to be substantiated.
139	Table 103	Calls to the LNG terminal forecasted to increase from 1 every 3 days to 1 every other day. Each vessel stop involves two 4 hr periods of an essentially closed the harbor. In the future, that's 4 hrs a day that the harbor will be closed to other traffic. Text notes that the number of LNG vessel calls may reach 200 annually.

140	General Cargo	Why end the growth in 2030 and not 2065? Harbor Sym should have growth beyond 2030 inputted. This anticipates about 10 vessel calls daily over and above the containers going to Garden City. In total, there will be about two transits an hour for each hour the channel is not closed due to LNG movements. One would expect more of the unexpected and more variability in the system time than illustrated in Figure 34, and therefore we also question whether only 50 iterations is sufficient. Given 3000 container calls to Garden City in 2030, 3000 general cargo calls in 2030, and 200 LNG calls in 2030, a total of 6200 vessel calls equates to about 35 vessel transits daily at Savannah Harbor, not including traffic on the Intercoastal Waterway.
140	6.2.3	What is the purpose of analyzing observed sailing drafts limited to tide delay and meeting areas? Assume it also relates to the vessel cost savings.
141	Table 105	By definition, a Panamax vessel can only draft 39.5 feet. Panamax vessels are designed to transit the canal under loaded conditions at this draft. To claim that Panamax drafts significantly greater that this depth limitation does not make sense.
141	Data Set	Why would this be sensitive data?
143	Table 108	There is no obvious reason why the Panamax sailing drafts below 38 ft would change as channel depths increase. These are unaffected by the channel constraint. Those are 86% of traffic at Savannah and 67% elsewhere. The historical data in Table 105 indicates about 2100 Panamax Vessel transits annually in or out of Garden City. Then, Table 106 relies on a subset of data covering only two carriers responsible for only about 300 transits (?) annually. The smaller subset represents a significantly lower percentage of Panamax vessels sailing at or below 38 ft. This equation makes little sense. Other Harbors Panamax /Some Savannah Panamax * All Savannah Panamax = Other Harbors Panamax * All Savannah Panamax/Some Savannah Panamax = Future Savannah Panamax It would make more sense to hold the percentage of Panamax vessels drafting at or below 38 ft constant as channel depth increases. Then, that percentage may decrease as more Panamax vessels are expected to arrive over the time. This would have been an ideal assumption for sensitivity testing.
145	Equation	This equation could not be understood. However, the net effect seems to be directly using the percentages from Table 111 for all drafts greater than 40 ft for a 45 ft channel. This makes sense and no-one should care about shallower drafts for that depth of channel. So, is this methodology, applying world-wide sailing draft distributions, used throughout the spectrum of alternative channel depths considered?
148	Underkeel	Says from IWR with Pilots assistance. Main report says used assertions from the Pilots. What input did IWR have to this assumption?
151	Transit Costs	This model, unlike the vessel cost model, is run for 2030.
136	Meeting Area Alts	There seem to be 7 existing turning basins. Can these ever be used as meeting areas?
152	Tables	These tables need more descriptive titles. For 135 LNG & Panamax, why do avg. transit costs go down from 2015 to 2020 and up for other vessels? The costs are transit costs and they are multiplied by the number of calls. Is there a misnomer, or should these values be doubled to reflect transits instead of calls?

154	Annual Benefits	Meeting area benefits are at FY2010 costs. Report does not seem to mention the price level that Transportation costs savings were estimated at. All tables displaying benefits should always display price levels and, if applicable, the discount rate.
155		Meeting area costs are at Oct 09 price levels. So, FY 10 means Oct 09?
155	Table 124	Why do the meeting area benefits go down after 2030? Why does the ratio of benefits for two areas to the sum of benefits for individual areas steadily decline from 2016 to 2030? See Meeting Area Benefits table below.
156	Table 126	The incremental costs do not seem intuitive because they have no consistent trend. The same can be said about O&M in Table 127. Incremental Cost Of Meeting Areas 45 ft \$278,253 46 ft \$159,339 47 ft \$413,956 48 ft \$389,723
156		"Operations and Maintenance was considered negligible. This is due to the harbor being in equilibrium, meaning that there will be no increase in the amount of dredged material within the harbor due to the deepening." If the aerial extent of the channel is enlarged, the meeting areas widen the channel and the sideslopes where cost effective advance dredging occurs will be reduced.
157	6.3 Tide Delay	In modern times, ships should know well in advance when they can take advantage of the tide. Then they can slow to economic speed from service speed (Table 115) while in transit to minimize the cost of tide delays. This seems especially important for the PPXs which represent well over half the benefits in every decade.
159 - 163	Tables	Why are benefits so often negative for the LNG vessels?
165	Cumulative Benefits	Do meeting area benefits assume tide delay? Do tide delay benefits assume cannot meet? If the answer to both is yes, you can't sum them. The must be done incrementally.
172	Multiport Analysis	This should include a discussion of distribution centers
174	8.1	RED is limited to the entire State of Georgia while South Carolina is on the other side of the river
174	8.2	"This relationship should not be considered as the impact of traffic on income because the model does not explicitly reveal the causal relation." If the same amount of tonnage moves with or without project, then there seems to be no RED benefit. If delays are reduced, then local pilot hours will decrease, so the RED impact may slightly increase GSP.

Table 3-3:
Meeting Area Benefits ($)

(RE: Comment on p. 155, Table 124)

Yr	Long Island	Oglethorpe	Long Island/ Oglethorpe	LI&O (LI +O)
2015	7,699	20,861	24,792	87%
2016	57,150	63,305	105,597	88%
2017	106,601	105,748	186,403	88%
2018	156,051	148,192	267,209	88%
2019	205,502	190,636	348,015	88%
2020	254,953	233,079	428,821	88%
2021	306,608	274,069	501,972	86%
2022	358,263	315,058	575,123	85%
2023	409,918	356,047	648,274	85%
2024	461,573	397,037	721,426	84%
2025	513,228	438,026	794,577	84%
2026	604,649	515,518	917,184	82%
2027	696,070	593,010	1,039,791	81%
2028	787,491	670,502	1,162,398	80%
2029	878,912	747,995	1,285,005	79%
2030	970,333	825,487	1,407,612	78%
2031	916,739	730,351	1,336,737	81%
2032	863,144	635,215	1,265,863	84%

3.13. Other Comments on the DEIS Economics Appendix

The Corps Study explores the impact of port operations in Savannah, however the methodology is weak and the region of study is improperly defined. Although the report does include a brief discussion of planned port improvements, it does not provide insights or analyses with respect to the stimulative economic impact of construction and equipping of new port facilities that have been planned by the Georgia Ports Authority (GPA) in connection with the Savannah dredging project.

An impact report addressing Savannah Port operations should include the impact upon Chatham County (GA) and its surrounding communities, including those in South Carolina. Further, and as an extension to the work done by Wilber Smith, a separate and distinct report should be generated to understand the regional impact of a large capital investment like the proposed Savannah dredging project.

On the cover of the report by the US Army Corps of Engineers it is explicitly stated that the expansion project is in Chatham County, Georgia and Jasper County, South Carolina. However, the report ignores any economic impact that would occur in South Carolina, thereby telling me that the economic analysis is seriously flawed.

The content is primarily centered on shipping and the arguments for expanding the port to capture additional cargo demand. The exception is Chapter 8, Regional Economic Impact Analysis. Here, the authors make an attempt to model the impact of operations solely within Georgia and some of its counties. The omission of South Carolina and its counties (particularly Jasper) from the analysis makes no sense if part of the capital improvements associated with the dredging project will be located in Jasper County, South Carolina. Moreover, the inadequate regional definition is not the only problem with the Corp's assessment.

The Corp's methodology uses a multivariate least-squares regression analysis to forecast impacts. It argues that additional tonnage at the port should generate additional income. While there is correlation with the activity, it is difficult to reach a reasonable conclusion about impacts in this manner due to the oversimplification that is inherent in the authors' approach. Realistically, the growth of income (or Domestic Product) should be highly correlated with additional tonnage but with variations that reflect local conditions, such as workforce make-up, availability of transportation and the presence or lack thereof of certain industries. Thus, an increase in tonnage may or may not have an impact upon the state or substate areas. The economic impacts of a project will be determined by the mix of activity within a study area – which is the reason most economists use an input-output model such as IMPLAN to measure operational impacts.

The regional impact in the Corps study is defined for Chatham and its surrounding counties in Georgia. There is an inner ring of Chatham's Contiguous neighbors (Effingham, Bryan, and Liberty) and an outer ring of the seven counties contiguous to the inner ring (Bulloch, Evans, MacIntosh, Long, Tattnall, Candler, and Screven). It is interesting that the Corps would omit the South Carolina County that is contiguous to Chatham to the north, Jasper. Even though there is a river between the land masses, there are bridges that provide good access for transportation of people and goods between Savannah and Chatham County, Georgia, on one side of the Savannah River and Jasper County and other South Carolina points of origin and destinations, on the other. Moreover, from a statistical point of view, it has been shown that Beaufort County (Jasper County's northern neighbor) experiences a greater employment impact from the Port of Savannah home (Chatham County) than six of the Georgia counties in Savannah's "outer ring," so there is no methodologically-sound argument for omitting Beaufort from the Corp's analysis either. In fact, given the commuting pattern data mentioned earlier, one could easily argue to include two other South Carolina counties, Hampton and Colleton, in the Corp's report. It is noteworthy that Standard & Poor's cites the

importance of the Savannah economy to the credit of Jasper County in its rationale for the ratings of Jasper's bonds (Standard & Poor's).

Summary and Conclusion

From this economist's point of view, the inherent weaknesses of data, scope and analytical focus contained in the report make it impossible to obtain a reasonable understanding of the economic impact of port operations at Savannah on the affected communities from a reading of either document. The Corps Study has not done an adequate job of assessing the operational economic impacts of the Savannah Port or the construction and installation-related economic impacts of the planned dredging-dependent port facilities improvements at Savannah.

The Corps Study makes an attempt to look at the regional impact of the dredging project. However, the methodology is weak and that the regional definition is inappropriate – especially given the fact that the Savannah Port expansion will physically affect Jasper County. Additionally, any impact model should include the impacts of capital investment. Although Section 3 of the Corps Study contains a description of planned improvements that go hand-in hand with the proposed dredging project, there is no discussion of the stimulative economic impact of such investments in that document or the impact on the tax bases of the impacted South Carolina communities.

With respect to South Carolina and Jasper County, the Savannah Port operations currently have an important economic impact upon these areas. While the report does not address these impacts, guidance as to what could be achieved in one or more thorough studies of the economic impact of the Savannah Port dredging project and port expansion can be seen in a number regional economic impact studies that are readily available in the public domain. A common feature of these reports is that they credibly demonstrate that the affect of expansion by a large employer upon a contiguous region would be substantial. Additionally, many of the data reviewed indicate that a major construction project should have a substantial stimulative impact upon the construction industry in both Jasper and Chatham Counties – even though these neighbors are in two different states. And, given the current depressed state of the construction industry, the dredging project should be a godsend for the unemployed/underemployed construction workers, whose services can be expected to be required in connection with the construction and installation of the improvements listed in Chapter 8 of the Corps Study. The extent of the impacts discussed here can only be measured within the framework of a properly defined economic impact study. This has not been under taken.

4. Terminal Capacity Analysis

This analysis evaluates the assumed capacity of Garden City Terminal to determine baseline conditions under the Without Project condition. The Without Project condition at Savannah Harbor relies on several assumptions to define the baseline case, under which NED impacts as a result of improvements to the navigation features of the Savannah River up to Garden City Container Terminal and the Kings Island Turning Basin are determined.

These assumptions include:

- A cargo/container movement forecast for Savannah of 6.5 million TEUs in 2032.
- A terminal capacity at Garden City Container Terminal of 6.5 million TEUs.
- Flat lining of NED benefits past 2032 after reaching capacity at the terminal.
- No other container terminals will be developed at Savannah.

The IWR NED Deep Draft Navigation Manual (p. 49) states "Terminal capacity is, at best, an estimate. Individual estimates may be biased for competitive reasons. Therefore, it is advisable to supplement terminal operator interviews with comparative estimates based on the criteria of an independent authority. The approximate annual throughput of cargo at any or all facilities may be obtained by inquiry. For relevant commodities, it will be necessary to account for actual quantities through specific terminals in order to have an accurate basis for computing benefits."

The physical limits of Garden City Terminal, after the anticipated capital improvement plan being implemented by the Georgia Port Authority (GPA), include the following. (p. 70 General Reevaluation Report)

- 1200 acres
- 9700' berth
- 560 CY (container yard) acres
- Mason ITCF (NS rail yards)
- RTG operating mode
- 33 container cranes
- 169 rubber tire gantry cranes
- Chatham Yard ITCF (CSX rail yard)

To perform a capacity analysis of the Garden City Terminal facility, we apply the methodology from *Improving Marine Container Terminal Productivity: Development Of Productivity Measures, Proposed Sources Of Data, And Initial Collection Of Data From*

Proposed Sources prepared by The Tioga Group, Inc. for the Cargo Handling Cooperative Program, U. S. Maritime Administration, U. S. Department of Transportation, July 8, 2010 (hereafter referred to as the MARAD report).

The MARAD report analyses the performance of major US container ports for the year 2008. It then applies a series of measurements of performance to come up with an overall capacity assessment for each port. Using these measurements and updating the baseline calculation to account for the GPA capital improvement plan, an assessment of capacity at Garden City was performed to determine the ability of that facility to handle the 6.5 million TEUs.

In summary, Garden City appears to have:

- Land and landside operations to accommodate 6.5 million TEUs.
- Container crane capacity to accommodate 6.5 million TEUs.
- Berthing space to accommodate about 3 million TEUs

Focusing on berth capacities, the design vessel (PPX2) is 1,138 feet long. At that length, it would require a minimum berth length of about 1,300 feet. PPX1 vessels are also over 1,000 ft and require berths at least 1,100 long. By the year 2032, the economic analysis assumes that 700 PPX1 and 1,100 PPX2 vessels will call annually. On average, we assume these vessels will require 14 and 19 hrs at berth, respectively. One vessel has to move out of the way before another can use the berth. Our analysis assumes that time is only 3 hrs for turnaround, birth positioning, and the like between berthings. So each PPX1 berthing requires 17 hrs and each PPX2 berthing requires 22 hrs.

The MARAD report compares annual vessel calls per berth for 18 US harbors. Savannah has the highest rate in the nation at 184 per year. This is not surprising because the length of calls at berths increases as the size of vessels increases and the current channel limitations lead to smaller vessels calling at Savannah on average. So, no other harbor in the country has vessels calling on the typical berth every other day. The national average is 80 calls per berth annually.

The MARAD report also provides berth call utilization rates (Exhibit 64). Savannah has a current utilization rate of 71%. This is only exceeded by Charleston at 79%. The SHEP General Reevaluation Report states an industry standard for berth utilization of 50% (p.106) which reasonably corresponds to the national average of just fewer than 40%. However, the GRR bases utilization on 24/7 operation 365 days a year. This assumption is unrealistic and differs from the assumption used in the MARAD report because the GRR assumes the current utilization is only approximately 42 percent at Savannah

instead of the more accurate 71 percent. This is a critical oversight in the GRR forecast of future terminal capacity.

The MARAD report provides performance rates for US ports in TEUs per berth (Exhibit 63). NY/NJ, Savannah and LA/LB all have throughput rates slightly exceeding 290,000 TEUs per berth. The national average is about 185,000 TEUs per berth. In order to process 6.5 million TEUs, each berth at Garden City would have to handle over 720,000 TEUs.

Annual TEU per foot of berth is estimated at 270 TEU. This compares with an estimated 251 TEUs per foot for LA/LB Harbors, and 166 TEUs per foot for S. Atlantic ports. Table 5-1 of IWR report 10-R-4 (NED Manual for Deep Draft Navigation) gives an estimate of 212 TEUs annually per foot of berth. In order to meet the capacity given of 6.5 million TEUs, given the 9700 ft of berth at Garden City, annual TEU per foot of berth at Garden City would have to be 670.

In summary, The General Reevaluation Report should develop a scenario with a baseline capacity at Garden City of 3 million TEUs annually. Each sensitivity analysis should be run against this scenario. There should also be a scenario developed where the proposed Jasper County container facility is assumed to come on line at some point within the study period, likely about when the commodity forecasts exceed 3 million TEUs. If Jasper County is assumed to exist under a Without Project scenario, there should be a reanalysis of NED benefits to allocated benefits between each facility. This may lead to significant changes in the project features.

The following table provides the findings using the analysis within the MARAD report. The information for LA/LB and South Atlantic Ports is directly from that report. Some of the information for Savannah has been modified from the MARAD report to reflect the planned modification of Garden City Terminal.

Table 4-1:
Terminal Capacity Comparison Based on MARAD Report
(Exhibit 67 and 69)

Container Yard	Savannah 2015	LA/LB Harbors	S. Atlantic Ports
TEU	2,616,126	14,337,801	6,676,245
Gross Acres	1,200	2,757	3,839
CY Acres	560	1370	1,715
CY / Gross Acres Ratio	47%	50%	45%
Annual CY Capacity-TEU (CY TEU slots x 70 turns/slot x .8 max utilization factor)	8,153,600	16,341,696	20,545,280
Annual TEU/Gross Acre	2,180	5,201	1,739
Annual TEU/CY Acre	4,653	10,466	3,893
Est. CY TEU Slots	145,600	243,180	366,880
Avg. CY Slots/Acre-Density	261	178	214
Avg. Annual TEU/CY Slot (Turns)	20	59	18
CY Utilization	32%	88%	32%
Container Cranes			
Cranes	33	133	77
Cranes per berth	3.7	2.7	1.8
Annual Crane Capacity - TEU	8,289,015	33,130,563	19,177,987
Annual TEU/Crane (2008)	79,278	107,803	86,704
Annual Moves/Crane (2008)	44,186	60,587	48,739
Annual Vessel Calls/Crane (2008)	50	21	61
Crane Utilization	32%	43%	35%

Table 4-1 (continued) :
Terminal Capacity Comparison Based on MARAD Report (Exhibit 67 and 69)

Berths and Vessels			
Berths	9	22	44
Berth Feet	9,693	57,053	40,108
Annual Vessel Calls	1,659	2,795	4,732
Annual Vessel Calls per Berth	184	57	108
Berth Utilization-Vessel Call Basis	71%	27%	52%
Annual TEU per Berth	290,681	292,608	151,733
Annual TEU/Foot of Berth	270	251	166
Average Vessel Capacity-TEU	4,093	4,534	3,466
Est. Max. Vessel Capacity-TEU	4,067	13,000	N/A
Avg. vs. Max. Vessel Capacity	101%	35%	N/A
Average TEU per Vessel	1,577	5,130	1,411
Avg. Vessel Ute.- %Discharge/Load	39%	113%	41%
Berth Capacity- Avg. Vessel Basis	2,952,012	52,282,959	14,247,368
Berth Utilization-Avg. Vessel Basis	89%	27%	47%
Avg. Discharge/Load per Max. Vessel	1,567	14,708	N/A
Berth Capacity-Max. Vessel Basis	2,933,090	149,907,029	N/A
Berth Utilization-Max. Vessel Basis	89%	10%	N/A

Another way to analyze terminal capacity is to work backwards and take the vessel calls forecast for 2032 (projected capacity maximization) and apply berthing factors based on operational considerations. The following depicts this analysis. Assumptions include:

- 25% vessel utilization factor to allocate transportation cost savings per vessel (Table 56);
- 1.8 TEUs per container (based on recent AAPA statistics for Savannah);
- 30 crane moves per hour;
- 3 hour duration between vessel calls;
- 300 day operating year to account for Sundays, holidays, weather shutdowns;
- 20 hour day to account for shift changes, breaks, and work stoppages.

This essentially depicts a 24/7 port operation. The utilization factor refers to the proportion of a ships capacity on or off loaded at Savannah. The 3 hour duration between vessel calls is to account for vessel navigation of the Kings Island turning basin, positioning to berth, setup to work the vessel, setup to depart the vessel, depart the berth, navigate the turning basin, and exit past the berths at Garden City.

The table below incorporates these assumptions to estimate the total berth hours per class needed to handle the forecasted volume in 2032.

Table 4-2:
Berth Hours per Vessel Class in 2032

Vessel Class	SPX	PX	PPX1	PPX2	Total
Calls in 2032 w/ 48 ft	633	1040	716	1078	3,467
TEU	3,000	4,500	6,200	8,200	
% Utilization of vessel for SAV	0.25	0.25	0.25	0.25	
On and off loading	2	2	2	2	
TEUs moved	1,500	2,250	3,100	4,100	
TEUs to crane movements conversion	1.8	1.8	1.8	1.8	
Container moves per vessel call	833.3	1250.0	1,722.2	2,277.8	
cranes per berth	3	3	4	4	
Cranes movements per hour	30	30	30	30	
Hours at berth	9.26	13.89	14.35	18.98	
Additional hours per call for berthing, prep, turning basin transit past berth	3	3	3	3	
Total berthing hours	12.26	16.89	17.35	21.98	
Total hours at berth per class	7,760	17,564	12,424	23,696	61,444

The hours needed under the given assumptions would total 61,444. The TEU Capacity table on the next page shows that the fully developed Garden City terminal would have to operate at 114% of berth capacity to meet the requirements. At a berth occupancy ratio of 100%, capacity would be 5.7 million TEUs annually. At the more realistic 75% occupancy ratio, capacity would be 4.28 million TEUs annually. At the IWR recommended 50% occupancy ratio, capacity would be 2.86 million TEUs annually. In order to process 6.5 million TEUs, each berth would need to accommodate 385 vessels a year annually. That is more than one vessel a day. There is not a berth in the world that services one container vessel a day, regardless of local labor agreements or safety and environmental regulations.

Table 4-3:
TEU Capacity

Total hours at berth - all vessels	61,444
# berths	9
hours per berth	6,827
Total annual hours worked (300 days x 20 hours/day)	6000
Berth utilization rate to achieve 6.5 million TEUs	114%
TEU Capacity at 50% Berth utilization (6.5 million TEU vs. computed berth utilization rate)	2,856,235
TEU Capacity at 75% utilization rate (6.5 million TEU vs. computed berth utilization rate)	4,284,353
TEU Capacity at 100% berth utilization rate (6.5 million TEU vs. computed berth utilization rate)	5,712,471

A third approach is to assume that Garden City's efficiency ultimately match the most efficient in the world. PSA Singapore Terminals is widely seen as the most efficient port operation in the world. Much of the activities at Singapore constitute transshipment activities, which lends too much higher throughput per facility than a tradition origin/destination hub. Applying the PSA output per berth to Savannah would yield an annual capacity of 4.83 million TEUs for the nine berths. Applying PSA output per berth foot results in a capacity at Savannah of 5.76 million TEUs annually. Even with applying PSA output for an entirely different operation, a proposed capacity of 6.5 million TEUs for Garden City appears to be an over-estimate.

Lastly, Drewry Publishing has recently published 'Container Terminal Capacity and Performance Benchmarks'. Using the optimum berth capacity of 1700 TEU annually per meter of berth, or 557 TEU per berth foot for a large terminal with extensive transshipping operations, a theoretical capacity of 5 million TEUs is determined. Garden City with its traditional origin/destination operations could not be expected to approach this figure.

An analysis of terminal capacity that fully accounts for the berth limitations at Garden City concludes that it is significantly less than the 6.5 million TEUs.

Savannah River Maritime Commission, Cost and Economic Benefits

Page 1-1

760V2-MM-231-EC01, 760V2-MM-231-EC02

Comment: *Several elements that were essential to the study were not made available as part of the review process. In particular, the specifications used in the HarborSym model to generate overall vessel flows within Savannah Harbor were not available. This makes it difficult to evaluate potential capacity limitations to shipping lanes within the project boundaries used to project tidal delay and meeting area benefits. The vessel capacity utilization analysis offered in the Economics Appendix appears incomplete, and does not look at utilization over time to account for the large percentages of empty containers expected in the future at Savannah, especially for the export transits within the Harbor.*

Response: The draft reports contained the information needed to review the proposed action. The specifications used in the HarborSym analysis are provided in the Economic Appendix, Section 6 – Meeting Area and Tide Delay Analysis. This section describes how the estimated future fleet mix for Savannah Harbor was developed for the model runs as well.

The vessel capacity use analysis includes factors to account for the empty containers transported by the vessels.

760-MM-231-EC03, 760-MM-231-EC04, 760-MM-231-EC05, 760-MM-231-EC06

Comment: *The main findings of the review were the following:*

- *Garden City Container Terminal under current and proposed configurations does not have the capacity to handle 6.5 million TEUs as claimed under the without project condition.*
- *There is no multi-port analysis offered in the report. It is a given that 6.5 million TEUs will come to Savannah by 2032. There is minimal consideration of competing ports.*
- *Transportation cost savings includes all costs per entire trade route. There is no consideration as 10 whether cargo la/from Savannah may have origins or destinations at interim ports along the trade route, or be transshipped along the way.*
- *There is the without project condition, and a series of incremental deepening alternatives offered. There is no non-structural or channel segment alternatives offered. There is no consideration for future facilities at other than Garden City Terminal.*

Response: Under both the without and with project conditions, the Garden City Terminal will reach its build-out capacity [annual] in about 2030 at 6.5 million TEUs per year. This is the maximum number of containers that could reasonably be processed, based on factors such as the size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the container cranes, the number of jockey trucks that move the containers within the terminal, how the containers are stacked within the terminal, and the number of railroads that service the terminal and the frequency of their trains. It is predicted that without deepening, more vessels will be required to transport the cargo that transits the port. With deepening, the total number of vessels decreases as they will be able to load/unload without the current constraints of draft. The firm Moffatt & Nichol conducted an analysis in 2011 which concluded that it is reasonable for the Garden City Terminal berth to achieve a 6.5 million TEUs throughput. The berth productivity required would not need to be particularly exceptional in that time frame.

In 2006, GEC performed a multiport analysis on various hinterland origins and destinations for several South Atlantic and Gulf ports, including Savannah, Charleston and Jacksonville (see GRR-Appendix A, Multiport Analysis. The findings indicated that if Savannah Harbor is deepened, there would be no substantial changes in the origins and destinations of imports and exports to key US markets served by Savannah. Given that study's findings, the SHEP economic analysis was based on the project producing no substantial change in hinterland service area and no change in overall cargo without and with channel improvements at Savannah harbor. This basic conclusion is further supported by the fact that PPX 1 vessels are calling Savannah in increasing numbers and are anticipated to call in greater numbers once the Panama Canal is enlarged.

Page 84 of the Economics Appendix describes how a portion of the total voyage costs was allocated to Savannah.

The SHEP NEPA alternatives analysis considered potential options [structural/nonstructural] to address the navigation problems at the port. The measures included consideration of actions within the port and other South Atlantic ports. Alternative locations for disposal of dredged or fill material along Savannah Harbor and in the Atlantic Ocean along the entrance channel were also considered. The SHEP NEPA alternatives analysis is found in several documents that are part of the SHEP record, including EIS Section 2.0, Need and Objective for Action; EIS Section 3.0, Alternatives; EIS Appendix H, Section 404(b)(1) Evaluation (Practicable Alternatives); EIS Appendix O, Formulation of Alternatives; GRR Section 6, Formulation of Alternatives; GRR Appendix A, Economics; GRR Appendix A, Attachment 3 (Regional Port Analysis); GRR Appendix A, Attachment 5 (Multi-Port Analysis); and GRR Appendix D, Plan Formulation Appendix.

The SHEP NEPA alternatives analysis includes the following key elements: (1) the statement of project purpose and need (EIS Section 2.0); (2) a Regional Port Analysis (GRR, Appendix A, Attachment 6); (3) a Multiport Analysis (GRR, Appendix A, Attachment 4); (4) analysis of various structural and non-structural alternatives (EIS, Section 3.0; GRR, Appendix D); (5) analysis of eight alternative locations or sites for a port/terminal along the Savannah River (EIS, Section 3.0 and Appendix O); (6) analysis of six different depths of harbor deepening along the Savannah River (EIS, Section 3.0 and Appendix O); (7) analysis of alternative disposal sites, methods, or beneficial use of dredged sediments (EIS, Section 3.01.1 and 3.07); (8) analysis of related maintenance dredging requirements (EIS, Section 3.08-3.10); and (9) analysis of the no-action alternative (EIS, Section 3.4 – 3.15).

Although NEPA requires that all reasonable alternatives be evaluated, it does not require detailed study of options eliminated early in the planning process. As described in detail in Appendix O and summarized below, the EIS considered numerous potential alternative locations and methods [structural/nonstructural] to address the harbor's navigation problems [chiefly draft constraints].

Among other things, the Regional Port Analysis specifically evaluated current and projected port capacity, demand, and growth, and environmental impacts and constraints for other South Atlantic ports (Norfolk, VA; Wilmington, NC; Charleston, SC; Savannah, GA; and Jacksonville, FL) and a proposed Jasper County Marine Terminal (GRR, Appendix A, Attachment 3, Final Report, pp. 1-20). In addition, the analysis of a Jasper County Marine Terminal was rolled into a study of the potential costs and environmental impacts of locating the project at one of eight different sites along the Savannah River (four on the South Carolina side, four on the Georgia side) as described in EIS Sec. 3.0 and Appendix O.

As explained in several places in the GRR/EIS, including EIS Appendix H, Section 404(b)(1) Evaluation (Practicable Alternatives), among the conclusions reached as a result of the Regional Port Analysis, the Multi-Port Analysis, and the analysis of eight alternative sites for the project along the Savannah River were the following: (1) no one port could accommodate all the growth in container volume expected in the region, (2) the major South Atlantic ports will experience much cargo growth from 2005 to 2050 such that improvements may be justified at all major South Atlantic ports, and (3) the proposed deepening of Savannah Harbor would not take business from another port because the shipping cost efficiencies would not outweigh the additional landside transportation costs (largely due to the longer distances from each port to and from population centers that are outside its primary service area), and (4) a Jasper County Marine Terminal would not be cost effective when compared to deepening to the existing Garden City Terminal based on the high cost involved (now estimated at $4 billion including the cost of constructing the new transportation infrastructure that would have to be built), and the timing (Jasper does not exist at present and cannot be constructed in time to meet the growth in demand occurring through Savannah Harbor).

Management measures that had the potential to address these limitations [present/future] were evaluated based on technical, economic, and environmental considerations. The evaluations were conducted in accordance with criteria established by the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (U.S. Water Resources Council, 1983) and the policies and procedures established by ER 1105-2-100, Planning Guidance Notebook [April 22, 2000].

The analyses conducted in these early stages of project formulation resulted in several conceptual alternatives being eliminated from further consideration. The District prepared a document that described this work and its conclusions (Formulation of Alternatives, May 2005, Appendix O). It was circulated to interested state/federal agencies as well as the public for review/comment. Four terminal locations were judged as having either MEDIUM or HIGH potential and were compared on their economics (including mitigation costs). When the landside development costs are included, deepening to the Garden City Terminal proved to be the most cost effective. The next site option was 45 percent more expensive. Therefore, deepening to the Garden City Terminal and the no-action (without project) alternative received detailed evaluations.

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760V2-MM-231-EC07

Comment: *Commodity forecasts have increased significantly between the Corps 2004, 2007 and 2010 SHEP studies. While the Panama Canal improvements being undertaken may allow larger vessels to be deployed on certain services calling on Savannah, this should not affect the volumes of cargo handled at Savannah. To assume this is the case would mean an inducement to transfer cargo allocations from other ports, such as LNLB. Cargo forecasts should be measured against broader forecasts of economic activity, such as population growth, income levels and GDP growth for reasonableness. China is unlikely to be the lowest cost provider of goods 20 to 30 years hence. Their K/L ratio will be too high (forcing wages to rise) and their consumption will rise from less than 40% of their GDP toward the US rate of 70%. So~ there is uncertainty about the importer of tomorrow. A general assumption that Garden City Terminal can handle 6.5 million TEUs as the baseline for without project condition is not substantiated. A specific analysis of this terminal's capacity needs to be completed to determine appropriate volumes of cargo that can be handled without project."*

Response: The Corps made its commodity projections independent of the size of container vessel that may carry the goods.

Under both the without and with project conditions, the Garden City Terminal will reach its build-out capacity [annual] in about 2030 at 6.5 million TEUs per year. As described in GRR Section 5.3, GPA already has a 10-year capital improvement plan which includes equipment purchases and upgrades, transportation infrastructure improvements, and container area expansion to increase the Garden City Terminal's container throughput capacity to 6.5 million TEUs annually by 2020, regardless of whether the harbor is deepened. This is the maximum number of containers that could reasonably be processed, based on factors such as the size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the container cranes, the number of jockey trucks that move the containers within the terminal, how the containers are stacked within the terminal, and the number of railroads that service the terminal and the frequency of their trains. It is predicted that without deepening, more vessels will be required to transport the cargo that transits the port. With deepening, the total number of vessels decreases as they will be able to load/unload without the current constraints of draft. The firm Moffatt & Nichol conducted an analysis in 2011 which concluded that it is reasonable for the Garden City Terminal berth to achieve a 6.5 million TEUs throughput. The berth productivity required would not need to be particularly exceptional in that time frame.

760V2-MM-231-EC08

Comment: *The assumption that Garden City will be expanded seems appropriate, however that without condition can change if another major facility opens downstream. Then, the expansion could be scaled back and those savings would be benefits to the new downstream facility. As the Garden City Terminal may not be able handle the forecasted future cargo, the report misses an opportunity to evaluate additional terminal locations. A terminal located well downstream of the Garden City might optimize at a depth deeper than Garden City which would reduce the need for environmental impacts and expensive mitigation.*

Response: EISSection 3.0 and Appendix O contain the analysis the District performed of potential alternate terminal locations. The analysis concluded that the combined site development and dredging (and mitigation) costs for all other sites considered would exceed the dredging (and mitigation) costs for the Garden City Terminal location. No downriver site would have lower total site development, dredging and mitigation costs and environmental impacts than would deepening to the existing Garden City Terminal. This determination is supported by the Regional Port Analysis, which included evaluation of the costs and environmental impacts of deepening or constructing various South Atlantic ports, including a proposed Jasper County Marine Terminal. As noted in various responses, according to the Jasper Ocean Terminal Joint Project Office, developing a Jasper County Marine Terminal at its currently proposed site would cost more than $4 billion, a large cost which must be taken into account.

760V2-MM-231-EC09

Comment: *The multi-port analysis docs not account for competing Gulf ports of Houston, New Orleans and Mobile in defining the Savannah hinterland market area.*

Response: While there could be very minor overlaps, the Ports of Houston, Mobile and New Orleans were found to be located too far from the hinterland serving (and products moved through) Savannah. The Ports of Jacksonville and Charleston were more appropriate for the Regional Port Analysis and the Multiport Analysis and were included in those analyses.

760V2-MM-231-EC10

Comment: *There is an acknowledgement of S. Atlantic ports planning for 12 million TEUs additional capacity in coming years. There is no comparison of impacts by utilizing other ports over Savannah to meet the plan objectives.*

Response: The 2007 GEC Regional Port Analysis examined ports from Norfolk to Jacksonville (see GRR-Appendix A, Attachment 6). The findings indicate that no single port could handle the growth in container volume expected in the Southeast. Every existing port and planned new terminal has environmental, cost, and other limitations that restrict its ability to address the container traffic needs of the region.

760V2-MM-231-EV01, 760V2-MM-231-EV02

Comment: *There is minimal effort to identify a non-structural solution. The Corps should consider the non-structural alternative of reducing the LNG radius given the current. Vessels moving downstream may approach an LNG vessel faster than those moving upstream. So it may be more efficient to shrink the downstream no-sail zone. The ready acceptance of the need for a 4 ft underkeel clearance is inconsistent with the required analysis described in ER 1105-2-100 E-5.e(3).*

Response: The Corps coordinated with the US Coast Guard, who did not believe it was appropriate at this time to reduce the safety zone around moving LNG vessels.

As stated in Appendix E-5 of ER 1105-2-100, "The purpose of Corps of Engineers' underkeel design standards is to provide clearance between a ship's bottom and a channel's bottom, which minimizes the risk of grounding by a design vessel under design conditions in the design channel. That is, underkeel clearances are engineering judgment on the minimum amount of clearance to assure safety and do not necessarily reflect actual behavior." As described in Section 6 of the GRR, the need for a 4-foot underkeel clearance was based on empirical data from SPA, GPA, shippers, terminal operators, towing companies and other maritime industry professionals and is consistent with other deep-water ports in the United States. Additionally, as stated in Section 6.11 of the GRR, the underkeel guidelines used by the Pilots comply with channel design and safety criteria.

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760V2-MM-231-EC11

Comment: *HarborSym is referenced as a basis in determining not only project design, but channel capacity estimates to allow for realization of the project objectives. This model and calculations derived from its use should be pan of the report, and presented at a level of detail for review.*

Response: The HarborSym model is used in two separate analyses to estimate the potential benefits of the project. First, it is used to calculate benefits generated by including the meeting areas. Second, it is used to calculate the reduction in tide delays due to the additional depth. HarborSym does not calculate the bulk of the benefits associated with the transportation cost savings model. Also, HarborSym is not

used to calculate the channel capacity of the harbor. However, meeting areas and reducing tide delays would decrease the overall congestion in the harbor. The final Economic Appendix includes additional information on the HarborSym model and the analyses for which it was used.

760V2-MM-231-EC12

Comment: *1200 acres of terminal space includes ICTF/rail facilities. CY facilities limited to about 650 acres.*

Response: The Garden City Terminal has more than 1,200 acres of terminal space, 9,000 feet of berth, 33 Post-Panamax size cranes, and two on-site intermodal transfer facilities served by two major rail lines. All the facilities within the Garden City Terminal were included in the Corps' assessment of the site's long-term build-out capacity of 6.5 M TEUs.

760V2-MM-231-EC13

Comment: *6.5 million TEU capacity is a given without any justification in the GRR. This capacity needs to be justified to insure the without project condition can accommodate future cargo forecasts.*

Response: Under both the without and with project conditions, the Garden City Terminal will reach its build-out capacity [annual] in about 2030 at 6.5 million TEUs per year. This is the maximum number of containers that could reasonably be processed, based on factors such as the size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the container cranes, the number of jockey trucks that move the containers within the terminal, how the containers are stacked within the terminal, and the number of railroads that service the terminal and the frequency of their trains. It is predicted that without deepening, more vessels will be required to transport the cargo that transits the port. With deepening, the total number of vessels decreases as they will be able to load/unload without the current constraints of draft. The firm Moffatt & Nichol conducted an analysis in 2011 which concluded that it is reasonable for the Garden City Terminal berth to achieve a 6.5 million TEUs throughput. The berth productivity required would not need to be particularly exceptional in that time frame.

760V2-MM-231-EC14

Comment: *Is the A1WW an impediment to navigation?*

Response: No. The AIWW which crosses the deep-draft channel at Fields Cut (roughly Station 24+000, RM 4) does not result in currents or traffic levels that constitute an impediment to deep-draft navigation.

760V2-MM-231-EC15

Comment: *82% of container ships have design drafts restricting access. Container weights vary considerably. Ref: Tab/e 105 P. 141 Econ App, This shows the vast majority of vessel calls are at or below -38' draft. In 2008, Waterborne Commerce Statistics show that of 4,320 inbound self propelled dry cargo vessel calls. 23 were at 42 ft, 32 at 41 ft. and 124 were between 39 and 40 ft. On the export side, 55 were at 42 ft. 73 at 41 ft. and 169 were between 39 and 40 ft. Table 29 of the Econ appendix shows that only 66 (4%) of the total container ships calling at Savannah are post-Panamax.*

Response: With inclusion of the 4-foot underkeel clearance, the -38 foot depth represents a constraint to much deep-draft navigation. Historically, Post-Panamax vessels have been a small share of vessels calling at Savannah, but that share has been growing substantially and would expand further following the completion of the Panama Canal's expansion.

760V2-MM-231-EC16

Comment: *What does "Required depth (for 6' project)" mean?*

Response: Figure 1-3 presents an engineering cross-section of the dredging project, assuming a 6-foot deepening. There is an additional allowance for overdepth (to ensure the navigation depth is obtained).

760V2-MM-231-EC17

Comment: *Currently dredge to 46 to SO ft up to Station 102. Advance maintenance is major, up to 8 feet. Yet, it is not accounted for in the HarborSym analysis and calculation of transportation cost savings and vessel fleet allocation over time.*

Response: Over-dredging and advanced maintenance are included in the environmental modeling. They are not included in the economic analyses because the Pilots cannot count on those areas being clear of sediment. The Corps allows those areas to fill with sediment before performing maintenance dredging.

760V2-MM-231-EC18

Comment: *Sediment and fresh water controls didn't work or not maintained. This does not bode well for any mitigation maintenance measures in the future.*

Response: The sediment control works [which became operational in 1977] was highly effective in keeping the City Front reach of the navigation channel clear of sediments and lowering the cost of removing O&M sediments from the harbor. The Tidegate was removed from service in 1991 as a result of its adverse environmental impacts. The Sediment Basin continues to provide some off-channel storage of O&M sediments.

Although the USFWS had maintained the Freshwater Control System on a regular basis, after 20+ years of service the system needed major rehabilitation. Savannah District prepared a Letter Report in 2009 recommending the major components of the system be renovated. The report was approved and construction on the Federal-lands portion of the Freshwater Control System was completed in 2011.

760V2-MM-231-EC19

Comment: *A shipper is trucking export containers to Charleston because they can't find room on outgoing vessels. Why does MSC see Charleston with 8500 TEU ships as beneficial over Savannah under current conditions? Light loads imply not enough volume for both CHS and SAV cans.*

Response: The recent building of distribution centers, availability of affordable land, port rotations, the hinterland market and the types of commodities all play a role in why cargo moved to Savannah. Many of these factors have nothing to do with the water depths.

Light loads also result from insufficient channel depth which precludes a vessel from loading to its design draft.

760V2-MM-231-EC20
Comment: *Planned Depth is meaningless. P&G says use authorized depth*

Response: The "Planned Depths" are those identified by the listed ports as their desired depth in the future.

760V2-MM-231-EC21
Comment: *The correct web address is www".ci-online.co.uk*

Response: Noted, it will be changed in the General Reevaluation Report (GRR).

760V2-MM-231-EC22
Comment: *The definition of Panamax is a vessel that can transit the Canal. The Greater than Panamax Draft are defined in the footnote as including Panamax vessel, which seem incorrect.*

Response: We have revised this in the final report.

760V2-MM-231-EC23
Comment: *Total Panamax or larger ships is 2075, not 2805. The 43% seems to be correct.*

Response: We corrected that in the final report.

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760V2-MM-231-EC24
Comment: *How does econ analysis account for arrival of LNG vessels delaying other vessels? Is LNG traffic and one mile safety zone figured into the HarborSym analysis? There is also a 90,000' or 1.5 hour restriction for loaded LNG vessels (Econ appendix P. 23, Sec, 2.6). On page 56, the report states that the clear radius is only 1 mile.*

Response: The LNG safety zone requirement is included in the HarborSym analysis. The Georgia Ports Authority has stated that when a loaded LNG vessel is transiting the system, all other traffic is delayed until the vessel reaches the Elba Island terminal. However, due to limitations in the model, vessel traffic cannot be delayed by a specific class. Therefore, the 90,000-foot safety zone for the LNG class was input into the model as a way to cause all other vessel classes from transiting when an LNG vessel was calling on Savannah Harbor.

760V2-MM-231-EC25
Comment: *Surprising that only 20% moves by rail. GPA forecast accounts for rail movements at 25%. Bottom of page, at some point $1 billion capital Improvement plan should be defined, what does it entail?*

Response: A summary of the GPA's capital improvement plan is provided in Section 5.3 of the GRR. The 10-year capital improvement plan includes equipment purchases and upgrades, transportation infrastructure improvements, and container area expansion to increase the Garden City Terminal's container throughput capacity to 6.5 million TEUs annually by 2020, regardless of whether the harbor is deepened.

760V2-MM-231-EC26

Comment: *Wastepaper weighs more than consumer goods so outgoing drafts sometime exceed incoming drafts. (When?) But the value of the cargo is extremely low. What is the ratio of empty/total in & out? Imports and exports should be treated separately throughout the study.*

Response: Imports and exports were evaluated separately in the Economic Appendix.

760V2-MM-231-EC27

Comment: *Export TEU's always > import TEU's*

Response: The fact that there are far more imported containers than exported containers reflects the larger imbalance of trade. While it may appear that there is an imbalanced loading for exports and imports, recall the distribution patterns in the Southeast. It is quite likely that a particular container may enter Savannah, be brought to a distribution center in central Georgia, then reloaded and exported at Jacksonville. As aforementioned, just because you have more empty containers doesn't mean the draft requirements will change significantly, since weight, stowage factors, port rotations and a host of other factors influence the amount carried on a vessel at a given time. The value of an empty container is not worth as much as a loaded one and there could be a large level of container "leakage" from the region. Some areas such as Anchorage have a glut of empty containers.

760V2-MM-231-EC28

Comment: *Loaded Export TEU's < Import TEU's since about 2000. So, more and more room to put wastepaper and export drafts should not be controlling in the future.*

Response: To say that only wastepaper is exported is far too simplistic. Heavy cargo such as kaolin clay, frozen poultry and many others will continue to be exported and result in vessels loading heavily. Also, the amount carried on an outgoing vessel can depend largely on whether shippers have room to make "opportunistic additions" to the vessel. They may decide to carry more or less containers, depending on the availability and the needs at the next port of call.

760V2-MM-231-EC29

Comment: *Should discuss distribution centers in this section, Hinterland definition from Norfolk south; what about CHS as well? Prior reports had addressed CHS vs. Savannah.*

Response: The final GRR contains additional information on the distribution centers along with the comparison of Savannah with Charleston, as addressed in previous reports.

760V2-MM-231-EC30

Comment: *Export boxes heavier, make sure forecasts keep balance between imports/exports, or some adjustment should be made in cost savings for both legs. Again, exports and imports should be treated separately. Claim that because < 12% of container transits greater than -38 ft proves carriers averse to tidal access. This does not mean that less than 12% was in fact constrained, because of over dredging, and vessels arriving above MLLW*

Response: While it may appear that there is an imbalanced loading for exports and imports, recall the distribution patterns in the Southeast. It is quite likely that a particular container may enter Savannah, be brought to a distribution center in central Georgia, then reloaded and exported at Jacksonville. As

aforementioned, just because you have more empty containers doesn't mean the draft requirements will change significantly, since weight, stowage factors, port rotations and a host of other factors influence the amount carried on a vessel at a given time. The value of an empty container is not as worth as much as a loaded one, and there could be a large level of container "leakage" from the region. Some areas such as Anchorage have a glut of empty containers. Finally, it should be noted that the most recent commodity forecast shows a less dramatic split of exports and imports. In fact, imports no longer exceed exports tonnage-wise in the out years. This information is included in the final report.

760V2-MM-231-EC31

Comment: *In 2007, some vessels transits draft deeper than the supposed 42 ft limit. Forty-two inbound vessels drafted between 42 and 43 ft. Based on the maximum practicable drafts in Table 35 of the Economics Analysis, all of these transits must be PPX vessels. The discussion on p. 56 implies that relatively few PPX vessels called on the port during part of that year. So, it seems possible that most PPX inbound transits are slightly greater than 42 ft. Does the model allow frequent drafts this deep w/o project?*

Response: Yes, for two of the trade routes, the cargo is so heavy that their respective MPDs are high (for PX vessels). Recall that the MPDs were determined first as a means of calculating the unit costs used in the deployment analysis.

760V2-MM-231-EC32

Comment: *Savannah Maritime Association has published Port of Savannah Industry Guidelines for Minimum Under-Keel Clearances, dated Feb 2009. These guidelines read as follows: (a) Four (4) feet for transits in the navigation channel between the sea buoy, across the Savannah Bar, through Jones Island range, USAGE Station - 14, where the project depth of the channel decreases from 44 feet to 42 feet. (b) Two (2) feet for transits between Jones Island range and the point in the navigation channel which is adjacent to the facility of destination. Given these guidelines, underkeel assumptions used in the economic analysis seem to be incorrect.*

Response: The underkeel clearances stated in the Appendix also account for the dynamic condition, and include squat, trim, and freshwater sinkage. Once these factors are netted out, the underkeel clearance requirements are representative of the standard practice.

760V2-MM-231-EC33

Comment: *Here, tidal range average is 6.8 ft with upper limit of 7.9 ft. On p. 56, it's 6.9 feel. Are economists and environmental scientists using different values?*

Response: The Economics considered the MLLW value of 6.9 feet. There are variations of tide, with an average of 6.8 feet as well as extreme tidal ranges. The tide range also varies with the location in the estuary, with the tide range decreasing as one progresses upriver.

760V2-MM-231-EC34

Comment: *Jasper County terminal was relevant in previous reports using much lower cargo forecasts. If uncertainty around Jasper County Terminal precludes it from the without project condition, then GRR needs to demonstrate that Garden City plan can in fact accommodate all future growth assumed in the study.*

Response: Under both the without and with project conditions, the Garden City Terminal will reach its build-out capacity [annual] in about 2030 at 6.5 million TEUs per year. This is the maximum number of containers that could reasonably be processed, based factors such as the size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the container cranes, the number of jockey trucks that move the containers within the terminal, how the containers are stacked within the terminal, and the number of railroads that service the terminal and the frequency of their trains. It is predicted that without deepening, more vessels will be required to transport the cargo that transits the port. With deepening, the total number of vessels decreases as they will be able to load/unload without the current constraints of draft. The firm Moffatt & Nichol conducted an analysis in 2011 which concluded that it is reasonable for the Garden City Terminal berth to achieve a 6.5 million TEUs throughput. The berth productivity required would not need to be particularly exceptional in that time frame.

760V2-MM-231-EC35

Comment: *Unclear which ports assumed in the w/o project. Given that Jasper County does not meet the criteria for inclusion in the w/o project condition, how do these plans satisfy the criteria for inclusion in the without project, especially ten years into the future.*

Response: The ports shown in the table are included in the Without Project condition.

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760V2-MM-231-EC36

Comment: *Garden City capacity increases to 6.5 million TEU annually. Assumes berth productivity increase from 280 to 700 TEU's per berth foot.*

Response: The firm Moffatt & Nichol conducted an analysis in 2011 which concluded that it is reasonable for the Garden City Terminal berth to achieve a 6.5 million TEUs throughput. The berth productivity required did not differ substantially from that occurring in other ports and would not need to be particularly exceptional in that time frame.

760V2-MM-231-EC37

Comment: *Trade projections based on 2005-07 condition, pre-recession. These are the bubble years in world trade. Overall, world trade seems to be stabilized at about 20% of World GOP. There should be an evaluation of growth forecasts using such general indices as regional population growth, real income and GOP growth forecasts as a check; for reasonableness.*

Response: The study team reevaluated the project economics to include the recent economic downturn. The updated results are included in the final report.

760V2-MM-231-EC38

Comment: *For example, major products destined for the Mediterranean are heavier pulp and kaolin clay whereas imports from the Far East involve lighter manufactured goods and textiles. For each service, the historical average weight per TEU was calculated and used for this conversion. But as imports grow faster than exports, the average weight of export TEUs, including empties, should decline.*

Response: The commenter is assuming more empties will be loaded on outbound vessels over time. While it may appear that there is an imbalanced loading for exports and imports, there are unique cargo distribution patterns in the Southeast. It is quite likely that a particular container may enter Savannah from overseas, taken to a distribution center in central Georgia, then reloaded and exported at Jacksonville. Also, just because you have more empty containers doesn't mean the draft requirements will change significantly, since weight, stowage factors, port rotations and a host of other factors influence the amount carried on a vessel at a given time. The value of an empty container is not as worth as much as a loaded one, and there could be a large level of container "leakage" from the region. In some areas such as Anchorage, Alaska, there is a glut of empty containers.

760V2-MM-231-EC39

Comment: *The weighted average from 2005-07 condition. Is too short a time and weighing more heavily on 2007 uses this particular year to a large extent to establish the baseline forecast for the next 50 years. Use broader incises as mentioned in the comment above (p. 71).*

Response: The study team reevaluated the project economics to include the recent economic downturn. The updated results are included in the final report.

760V2-MM-231-EC40

Comment: *There should be total weighted growth rate given on this table of import metric tons and growth rates. NE Asia is the lions share: overall growth rates of 5-6% seem really high long tern with GOP growth In US nowhere near that. All tables showing growth rates on a yearly basis should also show the total growth rate for the period.*

Response: The District will consider revising tables as suggested.

760V2-MM-231-EC41

Comment: *This seems more reasonable than the projections in Table 5-8. Imports should follow a similar trend. We can only import so much. It is not reasonable to assume that imports can grow at a significantly higher rate than tong-term GOP given the size of the US trade deficit.*

Response: GDP growth in Asia has well exceeded 5-6% in recent years and the rates determined by Global Insight were reviewed for reasonableness. Also recall that world voyages are comprised of many port calls. While the trade deficit is a concern, we do not expect global trade to contract. Finally, the study team truncated the volume of cargo at the year 2032, given the landside terminal capacity; this means the benefit stream levels off at that point.

760V2-MM-231-EC42

Comment: *Total Import tonnage area projected to increase by 80% in the 12 yrs from 2020 to 2032. This is preceded by a 73% growth rate in 10 years, which is somewhat explained by the enlargement of the Panama Canal and the change in destination from the west coast ports (LA/LB) to the east coast that is associated with this development.*
It seems that this rate of growth is assumed 10 continue without any competitive response by the west coast ports. What happens if they lower their terminal and inland transport rates? If west coast TEU throughput is impacted by the deepening project. NED benefits need to be adjusted downward to reflect that less to the west coast region.

Continuing to assume dramatic compound rates of increased cargo now well after the Panama Canal is enlarged seems more than suspect. The rate of growth should significantly decline after 2020.

Response: Based on the findings of the Multiport Analysis as well as dialogues with HQUSACE and reviewers, the conclusions regarding Savannah's cargo with and without a deepening project were found to be reasonable and that most, if not all, of the benefitting cargo claimed in Savannah was due to increased waterborne efficiencies. The West Coast lockout reverberated strongly in the shipping world and may have led to further shifts to the Southeast (we can add that statement on history). The Corps agrees that hinterlands are not unique to Savannah. Global Insight's commodity forecast contains an implicit hinterland analysis.

760V2-MM-231-EC43

Comment: *Are the values in this table short or metric tons? Either way, 5.67 tons per TEU is very light. Also, vessels departing thru the Panama Canal will be very light loaded with 67% empty containers. Avg. weights by imports and export routes. Do these change over time with the forecast? Loaded imports double while loaded exports triple by 2032.*

Response: The values are measured in metric tons (or a tonne as it's commonly spelled). It is not unreasonable to find such light cargo for that particular trade route. No, these were modified slightly as part of the Load Factor Analysis calibration.

760V2-MM-231-EC44

Comment: *High export empties TEU volume, huge growth of imports 2020-2032.*

Response: While it may appear that there is an imbalanced loading for exports and imports, there are unique cargo distribution patterns in the Southeast. It is quite likely that a particular container may enter Savannah from overseas, taken to a distribution center in central Georgia, then reloaded and exported at Jacksonville. Also, just because you have more empty containers doesn't mean the draft requirements will change significantly, since weight, stowage factors, port rotations and a host of other factors influence the amount carried on a vessel at a given time. The value of an empty container is not as worth as much as a loaded one, and there could be a large level of container "leakage" from the region. In some areas such as Anchorage, Alaska, there is a glut of empty containers.

760V2-MM-231-EC45

Comment: *The figure seems to be mislabeled as Panamax vessel calls. It should be labeled Post-Panamax vessel calls based on the text in the previous page.*

Response: Concur. We re-labeled Figure 5-4, as recommended.

Page 2-5

760V2-MM-231-EC46
Comment: *The combination of assumptions and calculations used in the LFA are the determining factors for vessel deployment and vessel drafts used in the Transportation Cost Savings Model. - These important assumptions and calculations should be done separately for imports and exports. This becomes more important the later in the study period as imports increase relative to exports and the near balance of today is lost.*

Response: The information used in the LFA was derived separately for imports and exports.

760V2-MM-231-EC47
Comment: *Unit costs are never defined. What is a unit? How were these calculated, and what are they based on. Whatever the units are, the costs need to be evaluated by direction so that they vary for exports and imports.*
This is not understandable. PPX1 most economical at 42 ft. PPX2 becomes more economical at 44 ft for only FE (Panama) ECUS, PPM2 most economical for all at 46 ft. This needs to be explained.

Response: The unit cost is defined as the waterborne transportation cost per metric tonne. The final report clarifies this point. The purpose of the deployment analysis (using unit costs) was to identify the breakpoints where it made economic sense for a shipper to switch to a larger class of vessel. Also, recall that the Load Factor Analysis necessitated the use of averages to estimate the amount of cargo (and drafts) since containerships carry cargo destined for multiple ports loaded onto a vessel at a given time. The only way of performing a true directional deployment analysis would be to know the "vessel manifests" for an entire journey. This information is proprietary.

760V2-MM-231-EC48
Comment: *Why is Panama vessel mix constant for 44 to 48 ft? Seems like it would change at 45 ft based on Table 5-20.*

Response: No, the unit costs are minimized at 44' and thus comprise the breakpoint. It makes economic sense for a shipper to deploy a larger vessel from that depth forward.

760V2-MM-231-EC49
Comment: *Would like to see socio-economic profile of any neighborhoods near the Port. Use to consider social justice and potential health impacts.*

Response: The final EIS contains an expanded discussion of parameters such as income and employment for the communities that surround the Garden City Terminal and the port.

760V2-MM-231-EC50
Comment: *Does not take into account competing ports (HOU, NOL, MOB, CHS. and ORF) in determining true competitive market area.*

Response: The Multiport Analysis (GRR-Appendix A, Attachment 4) discusses potential transfers to/from competing ports.

760V2-MM-231-EC51

Comment: *Sea level rise projection seems to be based on political ideology instead of science. Using the historical rate as the most likely rates does not seem to meet the letter or spirit of EC 1165-2-211 because they exclude global sea rise. May be overspending on wetland mitigation because salt intrusion will occur with or without a project. Decisions are made at the margin, and the optimal depth may well be sensitive to the incremental mitigation costs.*
Sea level rise would also reduce bridge clearances, and this issue does not seem to be addressed.

Response: The change in sea-level rise does not impact specifications for waterway depth but does impact influence or needs for structures with fixed elevations in relation to changes in absolute elevation of water levels for the waterway. Accordingly the jetty system may be reduced in elevation above the water and other structures such as the Talmadge Bridge will undergo a reduction in the air draft that it affords for navigation. The issue as to whether sea-level rise is a significant consideration is relative to the degree or amount that it is projected to rise over time. Depending on the modeling procedures and assumptions for analysis applied, currently available information indicates sea level rise over the 50-year horizon of the project analysis (i.e., 2015 to 2065) will range from a minimum of approximately 0.7 feet to as much as approximately 2.3 feet by year 2065. Given uncertainty in the range of sea-level rise and margins as described for clearance, depth and typical draft requirements for the fleet projected to serve Savannah Harbor, sea level rise could impose some restriction on movement relative to air draft of the bridge but it is not expected to be significant given the range of variability available for vessel operating parameters.

760V2-MM-231-EC52

Comment: *CSS Georgia is removed in w/o project. This is inconsistent with including the cost of removal as a SHEP project cost and any harbor delays w/o project that are associated with the CSS Georgia.*

Response: The condition of the *CSS Georgia* is precarious and it needs to be conserved before it no longer exists. The site would be adversely impacted by the proposed harbor deepening, so measures to document, remove, and conserve it are included as costs of harbor deepening. References to the removal being part of the without project condition have been deleted from the documents.

760V2-MM-231-EC53

Comment: *There is only one study objective which is to reduce navigation transportation costs to and from the harbor. This hardly seems to be a balanced approach to problem solving given the environmental, social, and NED aspects of planning.*

Response: As discussed in other responses, the SHEP NEPA alternatives analysis considered potential options [structural/nonstructural] to address the navigation problems at the port. The measures included consideration of actions within the port and other South Atlantic ports. Alternative locations for disposal of dredged or fill material along Savannah Harbor and in the Atlantic Ocean along the entrance channel were also considered. The SHEP NEPA alternatives analysis is found in several documents that are part of the SHEP record, including EIS Section 2.0, Need and Objective for Action; EIS Section 3.0, Alternatives; EIS Appendix H, Section 404(b)(1) Evaluation (Practicable Alternatives); EIS Appendix O, Formulation of Alternatives; GRR Section 6, Formulation of Alternatives; GRR Appendix A, Economics; GRR Appendix A, Attachment 6 (Regional Port Analysis); GRR Appendix A, Attachment 4 (Multiport Analysis); and GRR Appendix D, Plan Formulation Appendix.

The SHEP NEPA alternatives analysis includes the following key elements: (1) the statement of project purpose and need (EIS Section 2.0); (2) a Regional Port Analysis (GRR, Appendix A, Attachment 6); (3) a Multiport Analysis (GRR, Appendix A, Attachment4); (4) analysis of various structural and non-structural alternatives (EIS, Section 3.0; GRR, Appendix D); (5) analysis of eight alternative locations or sites for a port/terminal along the Savannah River (EIS, Section 3.0 and Appendix O); (6) analysis of different depths of harbor deepening along the Savannah River (EIS, Section 3.0 and Appendix O); (7) analysis of alternative disposal sites, methods, or beneficial use of dredged sediments (EIS, Section 3.01.1 and 3.07); (8) analysis of related maintenance dredging requirements (EIS, Section 3.08-3.10); and (9) analysis of the no-action alternative (EIS, Section 3.4 – 3.15).

760V2-MM-231-EC54

Comment: *If the forecasted tonnage cannot be accommodated by the future landside developments described in the report, then the study is incomplete.*

Response: Under both the without and with project conditions, the Corps expects the Garden City Terminal to reach its build-out capacity [annual] in about 2030 at 6.5 million TEUs per year. This is the maximum number of containers that could reasonably be processed, based factors such as the size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the container cranes, the number of jockey trucks that move the containers within the terminal, how the containers are stacked within the terminal, and the number of railroads that service the terminal and the frequency of their trains. It is predicted that without deepening, more vessels will be required to transport the cargo that transits the port. With deepening, the total number of vessels decreases as they will be able to load/unload without the current constraints of draft. The firm Moffatt & Nichol conducted an analysis in 2011 which concluded that it is reasonable for the Garden City Terminal berth to achieve a 6.5 million TEUs throughput. The berth productivity required would not need to be particularly exceptional in that time frame.

760V2-MM-231-EC55

Comment: *Plans do not need to be consistent with state & local laws. ER 1105-2-100 2-3 c(1) states that plans ·should be in compliance ... or include proposals for changes as appropriate,"*

Response: According to the ER, "Plans should be in compliance with existing statutes, administrative regulations, and common law or include proposals for changes as appropriate. Alternative plans shall not be limited to those the Corps of Engineers could implement directly under current authorities. Plans that could be implemented under the authorities of other Federal agencies, State and local entities and non-government interest should also be considered." The selected plan is consistent with this guidance.

760V2-MM-231-EC56

Comment: *Reducing under keel clearance requirement is a specific non-structural measure.*

Response: Concur. That was one of the management measures considered early in the Tier II studies, as described in EIS-Appendix O. The current underkeel guidelines were developed by the Port Users Group (1996) which consisted of representatives of SPA, GPA, shippers, terminal operators, towing companies, other maritime industry professionals, the Corps, USCG, and other Federal agencies responsible for safe and efficient navigation on these waterways. This Group established the minimum underkeel clearance at 4-feet. However, according to the Savannah Pilots Association, it is the Pilot's

decision as to whether conditions are adequate for a vessel to transit the river at a given time. The Savannah underkeel guidelines (4-feet) are minimum standards and are not intended to be limiting for Pilots, operators, or owners that choose to require a higher degree of safety for their operations.

760V2-MM-231-EC57
Comment: *"Underkeel clearance has been 2ft, not 4 ft, since at least 1996."*

Response: The underkeel clearances stated in the Appendix account for the static condition but also account for the dynamic condition, and include squat, trim, and freshwater sinkage. Once these factors are netted out, the underkeel clearance requirements are representative of the standard practice.

760V2-MM-231-EC58
Comment: *"How are Savannah Harbor underkeel guidelines consistent with all the other harbors mentioned that have 3 ft clearances?"*

Response: The underkeel clearance for the Savannah Harbor Expansion Project is comparable to those in similar harbors. The additional requirements may be explained by the large swath of freshwater and its consequences on sinkage.

760V2-MM-231-EC59
Comment: *"Revising the underkeel clearance established 14 yrs ago is made all too readily given the improvements in technology available since then."*

Response: The underkeel clearances stated in the Appendix also account for the dynamic condition, and include squat, trim, and freshwater sinkage. Once these factors are netted out, the underkeel clearance requirements are representative of the standard practice. The Harbor Pilots could not identify any measures that would provide them with more information on real-time conditions or other modifications to the channel that could allow them to conclude that a smaller underkeel clearance would provide the same measure of safety as the present underkeel clearance guideline.

760V2-MM-231-EC60
Comment: *"By dismissing non-structural alternatives so readily, the study effectively does not give "equal consideration" of non-structural options as required by ER 1105-2-1002-3 c(5)."*

Response: Numerous non-structural measures were considered [GRR- Section 6.5 "Management Measures"]. Appendix O of the EIS contains the document that describes the early plan formulation that the District conducted on this project. All management measures were given equal consideration at that point in the study process. The District screened the measures to identify the ones that appeared to best meet the project needs at the lowest economic and environmental cost. The evaluations concluded that the alternatives that should be considered in detail were deepening to the existing Garden City Terminal and the no-action alternative.

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760V2-MM-231-EC61
Comment: *"Industry standard 50% berth utilization is max capacity. Expectation is 58% at garden city in 2020 buildout. In addition, LNG vessel calls restrict berth access under any condition, so the industry standard may be too high to apply to Savannah."*

Response: Moffatt & Nichol examined the capacity of the Garden City Terminal. They point out the dangers of over-reliance on historical averages, present ship-to-shore crane capacity, and make comparisons with a transshipment terminal. Moffatt & Nichol then listed components which influence berth capacity and demonstrated the wide disparity in productivity rates for container ports throughout the world. They provide an example with the Port at Long Beach (a proxy port for Savannah), and show how actual throughput versus *potential* throughput can result in quite different answers. Finally, Moffatt & Nichol provide rationale for how 6.5 million TEU's could be achieved at the Garden City Terminal by adding cranes, labor hours, etc. In the end, they state that it is reasonable for the Garden City Terminal berth to achieve 6.5 million TEU's of throughput given the demand in the forecasted time frame. The resultant berth productivity would not need to be particularly exceptional in that time frame.

760V2-MM-231-EC62
Comment: *"Focusing on berth capacities, given the 9700' of berth at Garden City, annual TEU per foot of berth is estimated at 270 TEU. This compares with an estimated 251 TEUs per fool for LA/LB Harbors, and 166 TEUs per foot for S. Atlantic ports. Table 5-1 of IWR report 10-R-4 (NED Manual for Deep Draft Navigation) gives an estimate of 212 TEUs annually per foot of berth_ 700 TEU's per berth foot per year in 2020 not realistic and there is no basis for asserting that such capacity can be realized."*

Response: See response to previous comment.

760V2-MM-231-EC63
Comment: *"Unit costs per mile tor trail/truck should be included. There is no indication how these figures were developed."*

Response: Rail and truck costs (per mile) were developed by the Intermodal Association of America, based on the Savannah to Atlanta route. The cost difference may be significantly greater than expressed by these estimates, since per mile truck and rail costs for the Atlanta route (approximately 250 miles by Interstate) are significantly less than costs of relatively slow movements to/from an alternative terminal in the vicinity of the port.

760V2-MM-231-EC64
Comment: *"Alternative sites all dismissed..."*

Response: The March 2004 report "Formulation of Alternatives has been added (in entirety) to the Plan Formulation Appendix of the GRR. All management measures were given equal consideration at that point in the study process. The District screened the measures to identify the ones that appeared to best meet the project needs at the lowest economic and environmental cost. The combined landside site development costs and dredging costs rendered new terminal sites less cost-effective than deepening to the existing Garden City Terminal. The evaluations concluded that the alternatives that

should be considered in detail were deepening to the existing Garden City Terminal and the no-action alternative.

760V2-MM-231-EC65

Comment: *"Many alternatives terminals seem competitive cost-wise with Garden City, if you include mitigation costs for Garden City that have increased over $100 million since these costs were developed in 2005 as displayed in App. O of the EIS. Most, if not all, of that increase does not apply to downstream alternatives. Also, the dredging costs to Garden City have increased about another $100,000 million and it is reasonable to assume that the cost increase for dredging to the downstream locations has increased less than that. We question the likelihood of GPA expanding the Garden City Terminal without additional channel depth. Terminal capacity analysis indicates berthing space is constrained and GPA improvements do not address this shortage of berthing space."*

Response: While the cost increase in dredging may not have increased as fast as the costs for mitigation, the cost to develop the infrastructure at new terminal sites has also increased substantially. Appendix O of the EIS describes other factors that were also considered.

760V2-MM-231-EC66

Comment: *"Hurricanes and other weather events will affect all of these alternatives, not just the offshore terminal. It is reflective of the lack of risk assessment in the report that the potential for these events is ignored."*

Response: Hurricanes and other weather events will affect all of these alternatives, but the extent of those effects could differ substantially between locations. Terminal sites located on land would not be encumbered by the costs of double handling of the containers. The additional handling costs alone would exceed the costs of deepening to the Garden City Terminal.

760V2-MM-231-EC67

Comment: *Why 464 ft for bottom channel width? 50+140+150+140+50 ft would be required. The 530' width should be reflected in costs. Does Harbor Sym assume a Panamax and Post-Panamax vessel can meet in the channel?*

Response: The channel would be deepened by following the slide slopes down to a greater depth. This would result in a narrowing of the channel bottom. The 464-foot bottom would result from a 18-foot narrowing on each side (6-foot deepening of a 1V:3H slope). HarborSym does include meeting of Panamax and Post-Panamax vessels throughout the harbor. Meeting areas have been included to allow for meeting of two Post-Panamax vessels in the inner harbor.

760V2-MM-231-EC68

Comment: *Turning basin a 1600' x 1600', why not have at least one step with interim design vessel at say 45' to measure channel/turning basin width requirements and costs?*

Response: Channel design manuals indicate that a 1,600- by 1,600-foot turning basin would be needed to safely turn the design vessel (length of 1,138 feet).

760V2-MM-231-EC69
Comment: *There should be a weighted average of SAV proportion of cargo for all trade routes. Looks like it should compute to low-mid 20% range.*

Response: Concur. The average for all trade routes can be included in Table 7-1 [as suggested]; however, recall that each trade route was examined separately in the project's economic analysis.

760V2-MM-231-EC70
Comment: *There should be a table in this section showing total costs per voyage per route and vessel class.*

Response: The District will consider the suggested revision and include it if it judged to be helpful in this table.

760V2-MM-231-EC71
Comment: *What does '140$ rr for PPX2' mean?*

Response: That error was corrected in the Final report.

760V2-MM-231-EC72
Comment: *Ate meeting area benefits calculated relative to no channel Improvements? Should be incremental, after each channel deepening, Does HarborSym account for LNG vessel safely impacts, AIWW impacts, hurricane/weather impacts, etc.?*

Response: The HarborSym model calculates the meeting area benefits at each depth relative to current channel dimensions. An existing channel width condition was conducted for each proposed channel depth and then compared to a model run completed with each of the three proposed meeting area alternatives. The model evaluates the impacts of all vessel classes calling on the harbor as well. A general cargo class was developed to ensure that both the Container and LNG vessel classes must interact, presenting the most realistic scenario possible. The HarborSym model does not have the capability to include weather delays. However, it is assumed that Hurricanes/Storm Events would occur at the same frequency with and without the project.

760V2-MM-231-EC73
Comment: *LNG transits increase to 80% of capacity by 2030. Don't they continue to increase beyond that? If so, then traffic delays should increase beyond 2032.*

Response: LNG transits increase from 60% of capacity in the base year of the period of analysis to 80% capacity by 2030. As of 2008, no domestic LNG facility operated at 50% of capacity. Therefore, although growth in the industry is expected to occur, a restraint was placed on the overall growth for the analysis to remain conservative. As stated in the Economic Appendix, Section 6.2.2.2 it is possible that LNG transit could reach approximately 200 if 100% capacity was reached.

760V2-MM-231-EC74

Comment: *"Meeting area benefits go up, then down as depths increase. Benefits seem to decrease with increasing channel depth over 45'. But over 46 ft, there is no change in the number of PPX vessel transits and those are the only vessels that require the meeting areas. Why do benefits decrease? Should consider Long Island only early and Oglethorpe later in time."*

Response: The Post-Panamax vessel class is the main benefactor from including meeting areas at Savannah Harbor. There is also the same number of anticipated calls with the same sailing draft distribution in the period of analysis regardless of the project depth. However, benefits of the meeting area decrease due to the availability of the channel depth. A vessel that must wait for tide to enter the harbor at one depth has an extended period of time in which to transit with additional depth. The deeper the channel depth the longer the period of time these vessel have to transit the harbor.

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760V2-MM-231-EC75

Comment: *Tidal delay reductions should address the air draft constraint of 185' at the Tallmadge Memorial Bridge.*

Response: The present container fleet is not restricted by the 185-foot clearance of the Talmadge Bridge. General evaluation of vessels with nominal TEU ratings up to approximately 9,100 to 9,200 TEUs with design for single accommodations revealed specifications for summer loadline fixed air drafts of 164 to nearly 173 feet depending on placement of accommodations for line-of-sight and other requirements. Given that no segment of the world fleet projected to serve Savannah has air drafts exceeding 164 to 173 feet, even at extreme high tides and immersed to near or at full summer loadline draft (SLLD) the bridge does not pose an impediment to navigation.

760V2-MM-231-EC76

Comment: *Tide Delay benefits increase by a factor' of eleven over time. There will eventually be about one LNG transit per day. With all of these delays, is the vessel transit capacity of the channel ever exceeded?*

Response: The estimated number of LNG calls at 80% facility capacity is 167 calls or one every 2.2 days. At 100% facility capacity, the total calls are estimated to be around 200 or one every 1.8 days. It is not anticipated that the number of calls will reach 1 per day. The LNG vessels are included in the HarborSym simulation runs.

760V2-MM-231-EC77

Comment: *Is it appropriate to simply sum meeting area and tide delay benefits? Meeting areas decrease transit time, thus effectively increasing tidal windows.*

Response: The HarborSym model is used in two separate analyses to estimate the potential benefits of the project. First, calculating benefits generated by the inclusion of meeting areas at each proposed project depth. Secondly, the model calculates the reduction in tide delays due to the additional depth. The tide delay benefits at each proposed depth were calculated with the existing channel width dimensions to ensure that double counting did not occur.

760V2-MM-231-EC78

Comment: *Monitoring of chloride in water, but what if it happens? Again, this is a missed opportunity to incorporate risk into the analysis.*

Response: Risk is included in the analysis in several locations, including GRR-Section 12 and EIS-Appendix Q

760V2-MM-231-EC79

Comment: *Without project assumes all cargo traffic will happen anyway. This assumption seems to reflect an inherent bias in the analysis.*

Response: The commodity projection includes consideration of several factors, including the expected growth in the demand for goods in the Southeast. GEC performed a multiport analysis on various hinterland origins and destinations for several South Atlantic and Gulf ports, including Savannah. The findings suggest that deepening the harbor would result in no substantial changes in the origins and destinations of imports and exports to key US markets served by Savannah. Given this study's findings, no substantial changes in hinterland service area are expected, so no change is expected in the overall cargo volumes without and with channel improvements at Savannah harbor. This basic conclusion is further supported by the fact that PPX 1 vessels are calling Savannah in increasing numbers and are anticipated to call in greater numbers once the Panama Canal is enlarged.

In the draft report, it was assumed that PPX 2 vessels would call only if the channel is deepened to at least 44 feet. However, recent developments and carrier announcements indicate that even in the without project condition, PPX 2 vessels have and will continue to call at Savannah. The savings per TEU for the ocean voyage costs range from about $10 to $60 depending on the trade route distance, percentage of Savannah cargo and other factors. This is derived by dividing the "benefiting tonnes" on each trade route, by the ocean voyage transportation costs for the respective routes. At these levels of savings, and with landside trucking costs within the local area of Savannah are estimated to range from $100 to $150 each round trip, and movements outside of the local area are estimated to average $1.50 to $2.00 per round trip mile, there is not a sufficient differential to divert large amounts of cargo from or to other ports. It is further believed that there are numerous other factors involved in port developments that would have a greater effect on cargo diversions, such as new container yard developments, location of distribution centers, and landside transportation improvements.

760V2-MM-231-EC80

Comment: *GPA claims there should not be a significant change in port operations. However, larger vessels will berth longer. The larger vessels will require more than slightly longer time at the dock". There will be a substantial increase in berthside times. 8600 TEU vessels will take over 24 operating hours to complete a single berth call.*

Response: The Georgia Ports Authority has stated that as the total number of vessel calls and the size of those vessels grow, they will continue to add additional cranes at Garden City to minimize the overall impact to the berthing time of the larger vessels.

760V2-MM-231-EC81
Comment: *Reference to multi port analysis and findings of increased overland costs would not overcome decreased waterborne transit costs to induce traffic to SAV. So, the least cost alternative is to always unload at the nearest port. By the same token, how can SAY compete with any closer port within their defined hinterland if this is the case?*

Response: Shippers are likely to deliver the same volume of cargo through Savannah and incur the inefficiencies in the absence of a project. The sentence was intended to state that shippers would rather deliver cargo to Savannah inefficiently than call at a nearby port and then truck or rail the cargo back to Savannah. It is more costly to do the latter.

760V2-MM-231-EC82
Comment: *Reallocate water from Corps lakes - what is the opportunity cost? Hasn't the SE had significant droughts recently?*

Response: Reallocation of water from Corps Lakes upstream of Augusta was considered. The large volumes of water required to make changes in the harbor for sustained periods of time would require a major change to the authorized purposes of the Corps reservoirs. The environmental and social effects of such large volumes has not been considered in detail, but are expected to be substantial. There are also river flow requirements for the Savannah River below Augusta to meet environmental commitments and point source discharge permitting.

760V2-MM-231-EC83
Comment: *Cost include removal of CSS Georgia, but that is a w/o project condition, (p.95 Section 5.8)*

Response: The condition of the *CSS Georgia* is precarious and it needs to be conserved before it no longer exists. The site would be adversely impacted by the proposed harbor deepening, so measures to document, remove, and conserve it is included as costs of harbor deepening. References to the removal being part of then without project condition have been deleted from the documents.

760V2-MM-231-EC84
Comment: *Why do DO costs decrease from 44 to 45 ft. then increase at 47 lt?*

Response: Oxygen injection requirements were considered for all project depths. One of the other mitigation features, McCoy's Cut modifications, would not be needed until the 45-foot depth. The increase in flow brought about by this feature required the use of 8 speece cones for the 45 and 46-foot depths, as opposed to the 9 required for the 44-foot depth. This is the reason for the difference in costs.

760V2-MM-231-EC85
Comment: *Spend $191 million 10 mitigate the first foot, then $30 million to mitigate the next 4 feet. Suspect mitigating for w/o project condition. Incremental costs are suspect.*

Response: The mitigation plan was developed in an iterative manner. The types of project impacts do not vary by project depth, only the amount varies by depth. Most of the mitigation measures are required in all depths. The Corps developed a mitigation plan for the 44-foot depth then enlarged its features as possible to address the impacts of the greater depths. As a result, the bulk of the mitigation costs would occur with the 44-foot depth and only grow incrementally with the other depths.

760V2-MM-231-EC86
Comment: *What are w/o project dredging costs? The without project condition is not fully defined.*

Response: Project impacts to the O&M program are discussed in detail in the "Savannah Harbor Expansion Project Impacts to O&M" which is included in the Supplemental Materials of the Engineering Appendix to the GRR. Table 6 of this document titled "Current O&M Costs vs. Projected O&M Costs after Deepening" shows the current O&M dredging costs and the projected O&M dredging costs after project construction is completed. In addition, the without project dredging plan is detailed in Table 11.2-8 of the Engineering Appendix to the GRR titled "Inner Harbor Annual Maintenance Material Disposal Plan 2010 -2066 (Without Project Conditions)".

760V2-MM-231-EC87
Comment: *How is it that the bottom width narrows?*

Response: The District designed a narrower bottom width for the deeper channel depth alternatives as a way of reducing project impacts and costs. The deepening would be performed in the channel bottom and join an extension of the existing channel's side slopes. In general, this would result in no dredging of the existing side slopes and a slight narrowing of the channel's bottom width.

760V2-MM-231-EC88
Comment: *Risk that O&M costs may be greater than estimated, which should Increase the deeper they dredge into the sideslopes. This should all be reflected in a risk analysis.*

Response: The channel side slopes would not be moved laterally to accommodate a deeper channel possessing the same bottom width. Instead, the side slopes would generally remain untouched and dredging would only occur on the bottom of the channel. Deepening of the channel would occur in sediments with generally consisting of dense sands and sand clay materials that are well consolidated and exhibit high blow counts (n values). The dense materials in the lower elevations do not readily 'adjust' without substantial outside energy. Erosion of sediments in the upper/higher elevations is not expected because those areas would generally not be dredged.

760V2-MM-231-EC89
Comment: *CSS Georgia O&M part of w/o project even though it is removed?*

Response: The *CSS Georgia* would be adversely impacted by the proposed harbor deepening, so measures to document, remove, and conserve it are included as costs of harbor deepening. References to the removal being part of the without project condition have been deleted from the documents. Recurring annual O&M costs attributed to the CSS Georgia in With Project scenarios are for the curation of artifacts after they are removed from the wreck site.

760V2-MM-231-EC90
Comment: *Why would outer harbor dredging increase every two feel, but not every fool depth increases? Doesn't that channel widen with depth?*

Response: We will re-evaluate that table and revise it if corrections are needed. The channels do not widen with depth. The SHEP is designed with a narrower post-project bottom width to reduce dredging costs, real estate costs, and environmental impacts.

760V2-MM-231-EC91
Comment: *DO O&M costs do not have the same trend as DO construction costs In Table 10-4. If construction costs the same at 44 & 47 ft, expect O&M costs to then be the same. According to Table g-6 the capacity of the DO system at 47 ft is larger than at 44 ft.*
Need to display current, without project Q&M for comparison. It seems that the cost of inner harbor dredging increases by $2.7 million annually if the channel is deepened by 2 ft to 44 ft.
Acknowledgement of potential for increased costs due to using existing channel slopes for deeper channel is not accounted for in the table.

Response: The Corps will review the numbers in the Table 12.4-1 and revise them if any are in error.

An evaluation of sedimentation in the inner harbor indicates that the amount of O&M material is not expected to change significantly whether you dredge to 44-feet or 48-feet. However, where the sediment is expected to shoal would change with removal of the Tidegate and filling of the Sediment Basin. The difference in where the material falls out in relation to the disposal area where it is to be placed is expected to result in the $2.7M annual increase.

The District is confident that additional shoaling will not occur on a long term basis as a result of constructing the deeper channel as proposed with its narrower bottom width.

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760V2-MM-231-EC92
Comment: *Most of the O&M in this table is $1,000 more than the O&M in Table 10-7.*

Response. The difference has to do with rounding errors that are corrected in the final report so that both tables match.

760V2-MM-231-EC93
Comment: *Meeting areas optimize at 45 ft. No study of the effectiveness of 45 ft meeting areas with 47 ft channel. Simply assumed 47 ft meeting areas needed with 47 ft channel.*

Response: The meeting areas were evaluated and would be constructed to the same depth as the navigation channel. Unless the meeting areas are constructed to the same depth as the proposed deeper channel, lighter-loaded vessels would be the only ones that could use the meeting areas.

760V2-MM-231-EC94
Comment: *Air quality has become the defining problem at LA/LB. Basic question: does the project induce vessel calls?*

Response: No. The Corps believes that a deeper channel would reduce the number of vessel calls – when compared to the without project condition. Fewer vessels would result in fewer air emissions.

760V2-MM-231-EC95
Comment: *If no change in shipping volume, where do increased sales volumes, income, and employment come from? What is sales volume? Are these figures annual?*

Response: Increased income and employment would be an outcome of the cost of constructing the Savannah Harbor Expansion Project. These are Regional Economic Development benefits. These temporary economic benefits would be spread out over the period of construction.

760V2-MM-231-EC96
Comment: *Investment risk ignores the dependence of the b/c ratio on forecasts. How much will shipments need to increase to justify the project? In general, this table should present more quantification.*
How does a 'minor fleet shift· for all deepening alternatives equate to such substantial transportation cost savings?

Response: The Panama Canal expansion is no longer a source of uncertainty as the construction is well under way and is expected to be completed on schedule. In response, the shipping industry has been evolving to use a greater share of Post-Panamax vessels. The Corps expects that trend to be relatively more pronounced on the East Coast after the Canal construction is complete. The risks and vulnerabilities associated with these have been reduced significantly over the past several years. Moreover, the various sensitivity tests performed as part of the economic analysis show positive net benefits and high B/C ratios, meaning there is little risk of this deepening being a non-justified project.

760V2-MM-231-EC97
Comment: *This table is too long at about 20 pages. Should be separate tables for each letter, A thru F.*

Response: The structure of the table is an attempt to fulfill Corps guidance to compare all project features in the Planning System of accounts.

760V2-MM-231-EC98
Comment: *How is it legal to dredge 8 ft deeper than authorized project depth for advanced maintenance and allowable over depth?*

Response: Advance maintenance must be economically justified and receive the same environmental evaluations and approvals as other harbor improvements. Overdepth is a construction and contracting

technique where the Government pays the contractor for a certain additional dredging depth beyond that which he is required to remove, in recognition that the contractor will likely remove some of that material as he removes the required area above it. The Overdepth is included in all modeling, so its removal is also evaluated and approved environmentally.

760V2-MM-231-EC99

Comment: *We are providing an analysis of the Garden City Terminal which determines that the capacity is constrained at about 3 million TEU's annually. This affects any without project design and NED benefit computation.*

Response: Under both the without and with project conditions, the Garden City Terminal will reach its build-out capacity [annual] in about 2030 at 6.5 million TEUs per year. This is the maximum number of containers that could reasonably be processed, based on factors such as the size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the container cranes, the number of jockey trucks that move the containers within the terminal, how the containers are stacked within the terminal, and the number of railroads that service the terminal and the frequency of their trains. It is predicted that without deepening, more vessels will be required to transport the cargo that transits the port. With deepening, the total number of vessels decreases as they will be able to load/unload without the current constraints of draft. The firm Moffatt & Nichol conducted an analysis in 2011 which concluded that it is reasonable for the Garden City Terminal berth to achieve a 6.5 million TEUs throughput. The berth productivity required would not need to be particularly exceptional in that time frame.

760V2-MM-231-EC100

Comment: *Referred to map on page 1. What?*
Refers to DMCA 12A&B, but no DMCA 12B on the maps.

Response: During 2010, the cross dike between DMCAs 12B and 13A was removed to make it a larger DMCA that could be paired more evenly with DMCA 12A. It was designated as DMCA 13A (so DMCA 12B no longer exists).

760V2-MM-231-EC101

Comment: *Sensitivity Analyses are difficult to follow with limited narrative. Better to display fewer scenarios more in depth, especially for meeting area and tide delays.*

Response: The detailed description and discussion of the sensitivity analyses are included in the Economic Appendix. The summary is included in Section 12 of the GRR only to provide an overview of the analyses and its conclusion – that the economic analysis shows harbor deepening is not sensitive to the economic assumptions, but is instead justified under a wide range of economic assumptions.

760V2-MM-231-EC102

Comment: *There is an implied assumption that at some point there will be a need for additional terminal capacity during the lifetime of the project. Why aren't costs and benefits considered in the overall analysis using this assumption? The study period is 50 years, until 2065.*

Response: The period of analysis was from 2017 to 2067. Given the expected commodity growth and the expectation that the Garden City Terminal's capacity will be reached by 2032, the benefit stream remains constant from that period forward. The harbor deepening is justified without assuming additional landside capacity is provided in year 2032.

760V2-MM-231-EC103
Comment: *There may be bridge clearance issues associated with sea level rise.*

Response: Careful consideration was given to the height constraint imposed by the Talmadge Bridge. The present container fleet is not restricted by the 185-foot clearance of the Talmadge Bridge. General evaluation of vessels with nominal TEU ratings up to approximately 9,100 to 9,200 TEUs with design for single accommodations revealed specifications for summer loadline fixed air drafts of 164 to nearly 173 feet depending on placement of accommodations for line-of-sight and other requirements. Given that no segment of the world fleet projected to serve Savannah has air drafts exceeding 164 to 173 feet, even at extreme high tides and immersed to near or at full summer loadline draft (SLLD) the bridge does not pose an impediment to navigation. Currently available information indicates sea level rise over the 50-year horizon of the project analysis will range from a minimum of approximately 0.7 feet to as much as approximately 2.3 feet. Those amounts are not sufficient to render the bridge a hazard to navigation.

760V2-MM-231-EC104
Comment: *Question no change in project purpose, as removal of CSS Georgia is mitigation of an existing project.*

Response: Savannah District determined that the CSS Georgia has been damaged over time and would be further impacted by additional harbor deepening. Plans for the CSS Georgia (With Project Condition) are described in EIS-Appendix F, Cultural Resources and include artifact recovery, conservation, curation, and the development of an interpretive/display center. Action needs to be taken soon to protect the remaining cultural and historic information.

760V2-MM-231-EC105
Comment: *Mentions continuing the existing advance maintenance features. Was there a cost analysis in the DMMP?*
Also mentions deepening container berths 4-7 at GPA. Is this a non-Federal, non-cost shared, but NED cost needed to realize the benefits?

Response: Yes, a cost analysis was conducted. The justification for advance maintenance is in the Engineering Appendix on page 243. Yes, deepening berths is a project cost because the action is needed to obtain the economic benefits. It is a non-Federal expense, in compliance with cost sharing law (WRDA 1986).

760V2-MM-231-EC106
Comment: *IDC is not a cost authorized by Congress. It is an opportunity cost of capital.*

Response: Concur. We will footnote that cost, as it is an economic cost used in the analysis and not financial cost of the project.

760V2-MM-231-EC107
Comment: *If 'increased reliability is expected to encourage carriers to assign more of their large vessels to Savannah route services', would this have an impact on competing ports and the NED costs associated with their vessel costs?*

Response: Without harbor deepening, the larger vessels in the fleet would continue to make multiple port calls and stop at Savannah albeit inefficiently. With a project, such vessels will be able to load more fully or even larger vessels could be incorporated into the string of calls on a route. The transportation costs are thereby reduced in the overall system.

760V2-MM-231-EC108
Comment: *First cost is listed as Fed after cost-sharing. O&M is before cost-sharing.*

Response: This section of the GRR is written formally. Cost sharing will follow the rules established by WRDA 1986. First costs are cost shared. O&M costs are shared, depending on the channel depth.

760V2-MM-231-EC109
Comment: *GPA responsible for 50% of excess O&M costs above those estimated for a 45 ft channel. This may relate to claim that O&M essentially will not increase. This should apply to DO O&M. also.*

Response: The Corps' estimate of future O&M requirements is not developed in light of what party may be responsible for paying those costs. It is the organization's estimate of future costs that should be expected. The commenter is correct in stating that the non-Federal sponsor is responsible for 50% of O&M costs above those estimated for a 45 foot channel. That would include the additional costs to operate and maintain the D.O. systems beyond what is estimated for a 45-foot depth channel.

Page 2-9

760V2-MM-231-EC110
Comment: *There is nothing in the document that addresses the competition among Southeastern U.S. ports to provide docking facilities and services to the upcoming generation of very large ships that will be coming through the enlarged Panama Canal in approximately five years. This is a very important consideration for the Region's economic future.*

Response: In 2006, GEC performed a multiport analysis on various hinterland origins and destinations for several South Atlantic and Gulf ports, including Savannah, Charleston and Jacksonville. The findings indicate that deepening Savannah Harbor would not result in substantial changes in the origins and destinations of imports and exports to key US markets served by Savannah. Given this study's findings, the economic analysis assumed there would be no substantial changes in hinterland service area and therefore no change in overall cargo without and with channel improvements at Savannah. This basic assumption is supported by the fact that PPX 1 vessels are calling Savannah in increasing numbers and are anticipated to call in greater numbers once the Panama Canal is enlarged.

In the draft report, it was assumed that PPX 2 vessels would call only if the channel were deepened to at least 44 feet. However, recent developments and carrier announcements indicate that even in the without project condition, PPX 2 vessels have and will continue to call at Savannah.

760V2-MM-231-111

Comment: *The economic "Uncertainty" analysis is in report was more of a summary. Is there additional information on this? There was no economic and marketing justification material in the report, nor were sources of data or assumptions used in their sensitivity analyses identified.*

Response: The study team and reviewers emphasized "plausible" future conditions when developing each sensitivity analysis. The conclusions were meant to inform the reader that under most of the "plausible" sensitivities, project improvements were economically justified and that the NED plan is -47 feet most of the time.

Page 3-1

760V2-MM-231-EC112

Comment: *This is Step I. The hinterland definition does not account for Gulf ports. A competitive analysis for areas claimed, such as Jackson, MS, Birmingham, AL, New Orleans, LA, and Charleston, SC should be done. "The final delineation of the economic study arc for a given improvement should adequately discuss the trade area relative to adjacent ports (ER 1105·2· 100)*

Response: While there could be minor overlaps, the Ports of Houston, Mobile and New Orleans were found to be located too far from the hinterland serving (and commodities moved through) Savannah. The ports of Jacksonville and Charleston are more appropriate for the multiport analysis.

760V2-MM-231-EC113

Comment: *There is a focus in the DEIS on discussing the growth of loea1 warehousing that serves as distribution centers in the immediate counties adjacent to Savannah Harbor. Given the identification of the study hinterland covering the Southeast US, distribution centers sited close to major retail destinations should result in major population centers in the Southeast US being the DC hubs within the study area. The focus on warehouse availability adjacent to Savannah appears to be a bias in assessing the economic impacts of SHEP. Centering DC clusters further away from Savannah will open the potential for competing ports in the Gulf/and Southeast US for these markets.*

Response: Population is not always the driving force behind where distribution centers are located, though the Atlanta metropolitan area, located 200 miles away is home to 5.3 million people. Savannah is the closest major container port to Atlanta. The recent availability of affordable land, congestion at West Coast ports, the hinterland market and the types of commodities all played a strong role in the port's growth and in the decisions of private companies to locate distribution centers near the Port of Savannah.

Page 3-2

760V2-MM-231-EC114

Comment: *This shift is potentially impacted by canal transit tariffs that could significantly rise after the completion of the canal improvements. There needs to be a sensitivity analysis performed to assess the relative routing advantages of all water versus ongoing use of US West Coast ports.*

Response: As aforementioned, the project assumes the same volumes of cargo with or without a project (in a given year). Recent indications show that some of the market share has already been shifting from the west coast to the east coast. There are many underlying reasons for this (West Coast congestion, availability of affordable land at Savannah, location of outgoing products such as kaolin clay and poultry, among others).

760V2-MM-231-EC115

Comment: *There is an ongoing competition between East Coast ports for additional through-put expected as a result of the Panama Canal expansion. The only way to effectively allocate throughput for a given port is to analyze the region as a whole. Then, and only then, can "a study should be made of various alternatives for the existing traffic and of new traffic susceptible to diversion from alternative harbors or other modes of transportation" be made. "In determining the likelihood of prospective commerce, particular attention should be given to alternative competitive harbors in the case of new movements and to hinterland traffic." (ER 1105-2-100)*

Response: The Corps performed a multiport analysis (through GEC) for this project. The analysis concluded that deepening Savannah Harbor is not expected to result in diversion of cargo from one port to another.

760V2-MM-231-EC116

Comment: *The NED analysis is based on no change in tonnage, origin, or destination of existing cargo trends. Thus the transportation cost savings benefits are based on the distances from origins to destinations. If there were only changes in destination, the transportation benefits would be much smaller. Accepting that cargo will divert via the Panama Canal to the East Coast regardless of a Corps project, the assumption that cost savings begin when a vessel sets sail from China is not valid. Given cargo is moving on these trade lanes defined in the commodity projections, a competitive port analysis should be the basis for transportation cost savings.*

Response: The major economic benefits would accrue as a result of increase efficiencies that would be gained through the use of larger vessels. Those cost savings result from the lower cost per TEU to move each container with the larger vessels. Page 84 of the Economics Appendix describes how a portion of the total voyage costs was allocated to Savannah.

760V2-MM-231-EC117

Comment: *This is Step 3. The Corps' 2004 study projected a TEU volume of 3.5 million loaded TEUs for Savannah in 2030. The Corps 2007 Regional Port Analysis forecasts 2.5 million loaded TEUs for Savannah in 2030. The current forecast for Savannah for 2030 is 4.9 million loaded TEUs. There is no basis for such a huge increase in 3 years, unless there is consideration for impacts of the Panama Canal improvements. If this is the case, the overall impacts should account for any offsets in U S West Coast TEU traffic, and transportation costs to their ultimate destination need to be estimated for later calculating benefits.*

Response: The Corps assumes the same volumes of cargo with or without a deepening project. Recent indications show that some of the market share has already been shifting from the west coast to the east coast. There are many underlying reasons for this (West Coast congestion, availability of affordable land at Savannah, location of outgoing products such as kaolin clay and poultry, among others).

760V2-MM-231-EC118

Comment: *There is no sensitivity analysis to account for any canal transit fees levied by Panama, and affects such fees may have on relative costs between US West Coast transits and US East Coast transits for USEC FE cargoes.*

Response: The $72/TEU fees are not included in the total costs, assuming that tonnage is constant. These costs would be incurred with and without a project. If there are indeed increases in the marginal costs per TEU, the change would probably not be significant enough to warrant further investigation.

760V2-MM-231-EC119

Comment: *Initially, Global Insight projected that imports would increase 80 percent from 2015 to2028 (Table 16). These forecasts were adjusted downward based on a one-year "trend" from 2007 to 2008 (as shown in Table 21), before the global financial crisis. Then, the GI forecasts were extended just four more years to 2032, and imports are now expected to increase by 127 percent from 2015 to 2032 (Table 22). Why and how is higher growth rates factored into the revised forecasts?*

Response: Forecasts for container volumes are less variable over a long term than over short durations. Over shorter periods, short term events can have a dramatic effect, such as the commenter observed. Those short term events (both positive and negative) are smoothed out when long term predictions are made. The commenter identified large percentage changes in the imported container volumes between the tables, but the number of tons predicted in the later years did not change nearly as much – 20.9M tons in Table 16 vs. 18.3M in Table 22 for 2028. The forecasted volumes were smaller for 2028 in Table 22 than the previous table. Both tables contained displayed continuous growth in tonnage over the years. The fact that the tonnage predicted for 2032 in Table 22 would be higher than that predicted for 2028 is not surprising.

Page 3-3

760V2-MM-231-EC120

Comment: *Import containerized tonnage is expected to more than double from 1015 to 2032 (Table 22). Export containerized tonnage is expected to increase only about 50 percent during the same period (Table 24). Yet, the ratio of total loaded export TEUs to total loaded import TEUs is assumed to be about constant (Table 26) at 70 percent for the same period. Therefore, the average weight of an outbound TEU should decrease.*

Response: While it may appear that there is an imbalanced loading for exports and imports, recall the distribution patterns in the Southeast. It is quite likely that a particular container may enter Savannah, be brought to a distribution center in central Georgia, then reloaded and exported at Jacksonville. As aforementioned, just because you have more empty containers doesn't mean the draft requirements will change significantly, since weight, stowage factors, port rotations and a host of other factors influence the amount carried on a vessel at a given time. The value of an empty container is not as worth as much as a loaded one, and there could be a large level of container "leakage" from the region. Some areas such as Anchorage have a glut of empty containers. Finally, it should be noted that the most recent commodity forecast shows a less dramatic split of exports and imports. In fact, imports no longer exceed exports tonnage-wise in the out years. This information will be included in the final report.

Smaller to moderate size vessels often do not have the marginal capacity to make opportunistic adjustments (in the form of carrying additional empty boxes).

760V2-MM-231-EC121

Comment: *This is Step 4. The analysis assumes that the equivalent of 25 percent of the PPX2 world fleet will be devoted to trade routes stopping at Savannah (Table 50). This seems to assume that Savannah will be one of the dominant world trade centers globally. There should be some kind of comparison to demonstrate that the largest container ships operating in 2030 will be most efficiently allocated to those trade routes as opposed to others, especially those not involving the USA, such as European trade with the Far East.*

Response: Right now, the most efficient routes for PPX2 vessels are for the Asia to Europe trade, but over time more routes would be added as the containerized trade continues to grow and PPX2 vessels comprise greater shares of the world fleet. The deployment component of the TCSM applied the reduction of unit costs as a basis for switching from one class of vessel to another. The FE (Panama) trade route contains so much light cargo and given the low percentage of empties and vacant slots, vessels "cube out" or "volume out" at a low project depth. The savings can be realized with just a 44-foot project and by switching to PPX2. This is not the case for many of the other routes.

760V2-MM-231-EC122, 760V2-MM-231-EC123

Comment: *This is Step 5. There is no effective analysis of commodity movements between one port to another within the hinterland market area for determining the potential for cargo diversions within US East Coast ports. Given assumptions in the study, each port that is closest in highway miles to a given hinterland destination should have all cargo allocated to that destination. International cargo traffic is based on a variety of factors, including adjacent markets to ports for immediate market access, comparative cost advantages to inland destinations, including both rail and truck. There is no comparative cost analysis for rail in the report, even though GPA claims the ICTP facilities at Garden City are expected to handle up to 25 percent of traffic in the future.*

Response: In 2006, GEC performed a multiport analysis on various hinterland origins and destinations for several South Atlantic and Gulf ports, including Savannah, Charleston and Jacksonville. The findings indicate that deepening in Savannah would not result in substantial changes in the origins and destinations of imports and exports to key US markets served by Savannah. Given this study's findings, the SHEP economic analysis assumed there would be no substantial changes in hinterland service area and therefore no change in overall cargo without and with channel improvements at Savannah harbor. This basic assumption is supported by the fact that PPX 1 vessels are calling Savannah in increasing numbers and are anticipated to call in greater numbers once the Panama Canal is enlarged.

In the draft report, it was assumed that PPX 2 vessels would call only if the channel were deepened to at least 44 feet. However, recent developments and carrier announcements indicate that even in the without project condition, PPX 2 vessels have and will continue to call at Savannah. The savings per TEU for the ocean voyage costs range from about $10 to $60 depending on the trade route distance, percentage of Savannah cargo and other factors. This is derived by dividing the "benefiting tonnes" on each trade route, by the ocean voyage transportation costs for the respective routes. At these levels of savings, and with landside trucking costs within the local area of Savannah are estimated to range from $100 to $150 each round trip, and movements outside of the local area are estimated to average $1.50 to $2.00 per round trip mile, there is not a sufficient differential to attract large amounts of cargo from

other ports. It is further believed that there are numerous other factors involved in port developments that would have a greater affect on cargo diversions such as new container yard developments, location of distribution centers, and landside transportation improvements.

760V2-MM-231-EC124,

Comment: *Also, ER 1105-2-100 seems to require analysis of observed vs. apparent deviations from underkeel clearance standards to address this problem in application of the guidance. The use of 4 ft, even though the local guidance is 2 ft, must be demonstrated with empirical data, not based on an a priori assumption. This is especially true because the prevailing clearance at other ports is repeated cited as 3 ft.*

Response: The underkeel clearances stated in the Appendix account for the dynamic condition and include squat, trim, and freshwater sinkage. Once these factors are netted out, the underkeel clearance requirements are representative of the standard practice.

760V2-MM-231-EC125

Comment: *This is Step 6. There was no attempt to "determine transportation costs prevailing at the time of the study for all tonnage identified in Step 2 for alternative movements" (ER 1105-2-100). These alternative movements include shifts from movements via U.S. West Coast ports to U.S. East Coast destinations via land bridge, to all water services between the Far East and the U.S. East Coast.*

Response: In 2006, GEC performed a multiport analysis on various hinterland origins and destinations for several South Atlantic and Gulf ports, including Savannah, Charleston and Jacksonville. The findings indicate that deepening in Savannah would not result in substantial changes in the origins and destinations of imports and exports to key US markets served by Savannah. Given this study's findings, the SHEP economic analysis assumed there would be no substantial changes in hinterland service area and therefore no change in overall cargo without and with channel improvements at Savannah harbor. This basic assumption is supported by the fact that PPX 1 vessels are calling Savannah in increasing numbers and are anticipated to call in greater numbers once the Panama Canal is enlarged.

In the draft report, it was assumed that PPX 2 vessels would call only if the channel were deepened to at least 44 feet. However, recent developments and carrier announcements indicate that even in the without project condition, PPX 2 vessels have and will continue to call at Savannah.

Page 3-4

760V2-MM-231-EC126

Comment: *This is Step 7. We did not have access to, nor could we review the detailed calculations used. We believe that the average draft of an outgoing vessel will be less than incoming vessels in the future and this trend will become more pronounced over time. However, it appears that problems related to Table 26 affect the analysis and overstate the benefits associated with outgoing vessels because the analysis seems to carry forward existing average weights per TEU. This does not account for the increasing percentage of empty export containers that are missing from Table 26.*

Response: While it may appear that there is an imbalanced loading for exports and imports, recall the distribution patterns in the Southeast. It is quite likely that a particular container may enter Savannah, be brought to a distribution center in central Georgia, then reloaded and exported at Jacksonville. As

aforementioned, just because you have more empty containers doesn't mean the draft requirements will change significantly, since weight, stowage factors, port rotations and a host of other factors influence the amount carried on a vessel at a given time. The value of an empty container is not as worth as much as a loaded one, and there could be a large level of container "leakage" from the region. Some areas such as Anchorage have a glut of empty containers. Finally, it should be noted that the most recent commodity forecast shows a less dramatic split of exports and imports. In fact, imports no longer exceed exports tonnage-wise in the out years. This information will be included in the final report.

Smaller to moderate size vessels often do not have the marginal capacity to make opportunistic adjustments (in the form of carrying additional empty boxes).

760V2-MM-231-EC127, 760V2-MM-231-EC128

Comment: *NED benefits for harbor deepening arc based on design drafts. The load factor analysis in the report (sec. 3.4.4.1) does not account for the large proportion of empties that grow over time, due to increasing deficits in TEU export containers versus import containers. An attempt to utilize current weight and empty proportions given in Table 25 was used to show expected vessel utilization weights as a percentage of vessel weight capacity. The table below shows vessels will be significantly light loaded at Savannah, and resulting operating drafts are expected to be significantly shallower than design drafts. Table 25 shows a percent factor for empties by trade route and direction which does not relate at all to empty percent indicated in Table 33 of the load factor analysis. Any load factor analysis should be direction specific, as the variables vary substantially for export and import directions at most all US container ports.*

Response: While it may appear that there is an imbalanced loading for exports and imports, recall the distribution patterns in the Southeast. It is quite likely that a particular container may enter Savannah, be brought to a distribution center in central Georgia, then reloaded and exported at Jacksonville. As aforementioned, just because you have more empty containers doesn't mean the draft requirements will change significantly, since weight, stowage factors, port rotations and a host of other factors influence the amount carried on a vessel at a given time. The value of an empty container is not as worth as much as a loaded one, and there could be a large level of container "leakage" from the region. Some areas such as Anchorage have a glut of empty containers. Finally, it should be noted that the most recent commodity forecast shows a less dramatic split of exports and imports. In fact, imports no longer exceed exports tonnage-wise in the out years. This information will be included in the final report.

Smaller to moderate size vessels often do not have the marginal capacity to make opportunistic adjustments (in the form of carrying additional empty boxes).

Recall that the Load Factor Analysis necessitated the use of averages to estimate the amount of cargo (and drafts) since containerships carry cargo destined for multiple ports loaded onto a vessel at a given time. A detailed directional deployment analysis would require knowledge of the "vessel manifests" for an entire journey. This information is proprietary. The study team used what was loaded and unloaded at Savannah. By applying average empties, bunkerage, and other factors, the study team could estimate the aggregate tonnage on a vessel at a given time given the vessel's draft.

760V2-MM-231-EC129

Comment: *The PDT had problems calibrating their model because vessels too often drafted more than design draft. They addressed this problem by reducing the amount of empties. It would seem that the proportion of empties should increase over time, decreasing the predicted drafts.*

Response: While it may appear that there is an imbalanced loading for exports and imports, recall the distribution patterns in the Southeast. It is quite likely that a particular container may enter Savannah, be brought to a distribution center in central Georgia, then reloaded and exported at Jacksonville. As aforementioned, just because you have more empty containers doesn't mean the draft requirements will change significantly, since weight, stowage factors, port rotations and a host of other factors influence the amount carried on a vessel at a given time. The value of an empty container is not as worth as much as a loaded one, and there could be a large level of container "leakage" from the region. Some areas such as Anchorage have a glut of empty containers. Finally, it should be noted that the most recent commodity forecast shows a less dramatic split of exports and imports. In fact, imports no longer exceed exports tonnage-wise in the out years. This information will be included in the final report.

Smaller to moderate size vessels often do not have the marginal capacity to make opportunistic adjustments (in the form of carrying additional empty boxes).

760V2-MM-231-EC130

Comment: *This is Step 8. There is an assumption under without project that commodity forecasts can be handled throughout the project period. There is no capacity analysis of existing and future facilities at Savannah to demonstrate forecasted cargo can be accommodated. This comment in more fully documented in the Terminal Capacity Analysis.*

Response: Under both the without and with project conditions, the Garden City Terminal will reach its build-out capacity [annual] in about 2030 at 6.5 million TEUs per year. This is the maximum number of containers that could reasonably be processed, based factors such as the size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the container cranes, the number of jockey trucks that move the containers within the terminal, how the containers are stacked within the terminal, and the number of railroads that service the terminal and the frequency of their trains. It is predicted that without deepening, more vessels will be required to transport the cargo that transits the port. With deepening, the total number of vessels decreases as they will be able to load/unload without the current constraints of draft. The firm Moffatt & Nichol conducted an analysis in 2011 which concluded that it is reasonable for the Garden City Terminal berth to achieve a 6.5 million TEUs throughput. The berth productivity required would not need to be particularly exceptional in that time frame.

Page 3-6

760V2-MM-231-EC131

Comment: *The computation of NED benefits should account for the proportion of TEUs, which are part of the overall volume forecasts at Savannah. Empty container movements should not be counted in NED benefit computations.*

Response: Empty containers are part of containerized shipping and comprise a non-cargo related component of a vessel's operation. Operating drafts are key to any Corps deep-draft study, so the

District accounted for empty containers, bunkerage, and ballast in the transportation cost savings model.

760V2-MM-231-EC132

Comment: *Transportation cost savings are computed based on containers transiting the entire length of a given trade lane. There is no consideration that containers may be on or off loaded at an interim port, either due to an origin or destination along the route, or due to being transshipped at an interim port to a feeder vessel for final destination. These factors should be considered in applying the total vessel cost savings as NED benefits.*

Response: The savings per TEU for the ocean voyage costs range from about $10 to $60 depending on the trade route distance, percentage of Savannah cargo and other factors. This is derived by dividing the "benefiting tonnes" on each trade route, by the ocean voyage transportation costs for the respective routes. Benefits were only claimed for cargo that was loaded or unloaded in Savannah.

760V2-MM-231-EC133, 760V2-MM-231-EC134

Comment: *The most widely accepted model for estimating regional development is IMPLAN. Instead, the report includes a regression analysis relating harbor tonnage vs. personal income. Why tonnage instead of TEUs? Regardless, the chosen model should then be applied to projcc.1 construction related employment. Of the two models, only IMPLAN fits that purpose.*

Response: Tonnage is the most common metric used in Corps navigation projects and it is used in developing the unit costs for the transportation cost savings. The vessel operating costs tables are also "tonnage centric", but also provide the TEUs.

The Corps evaluates its water resource projects from the National Economic Development (NED) perspective, which comprises the Federal objective and is defined as the gain in the national benefits to the US as a whole. The NED benefits are comprised primarily of the reduced transportation costs as a result of project improvements. The savings are presumably passed onto US consumers and businesses in the form of lower prices. In performing NED analysis, Corps analysts are mindful not to claim benefits if a project would shift business from one port to another, since that would not be considered a gain to the nation but merely a transfer from one region to another.

In recent years, the Corps has undertaken additional analyses which focus on the Regional Economic Development account. In doing so, Corps analysts calculate the economic impacts to the region resulting from the influx of construction funds. The primary effects measured in an RED analysis include temporary jobs and income.

760V2-MM-231-EC135

Comment: *The NED analysis would lead to little or no local (RED) impact on income because shipping volume supposedly remains unchanged. The GRR seems to claim no RED impacts, but it also seems to imply there are significant RED benefits at the same time. The real issue of benefit incidence would be how are the cost saving distributed between foreign producers, foreign shippers, American merchants, and American consumers.*

Response: The economic analysis identifies where cost savings would occur as a result of the proposed action. For this project, the cost to move containers through the Garden City Terminal would decrease if the harbor is deepened. Corps guidance does not require estimation of how those cost savings are translated (i.e., lower commodity prices which would lead to additional exports, additional profits, etc.).

760V2-MM-231-EC136
Comment: *Lastly, the Appendix repeatedly refers to the Federal discount rate as the OMH mandated discount rate. There is no such OMB mandate. It's the law specifically Section 80 of PL 93-251. Also, the Treasury Department calculates it, not OMB.*

Response: Concur. The Corps has revised the final report.

Page 3-7

760V2-MM-231-EC137
Comment: *Intro paints a grim picture. Why wouldn't some of the cargo move to deeper ports without project if that would be cheaper?*

Response: It is possible that some cargo could move to deeper and often competing ports without a project, as mentioned. However, the Corps analyses do not indicate that is likely. In 2006, GEC performed a multiport analysis on various hinterland origins and destinations for several South Atlantic and Gulf ports, including Savannah, Charleston and Jacksonville. The findings suggest that there would be no substantial changes in the origins and destinations of imports and exports to key US markets served by Savannah. Given this study's findings, the SHEP economic analysis assumed that harbor deepening would not result in substantial changes in hinterland service area and therefore no change in overall cargo without and with channel improvements at Savannah harbor. This assumption is supported by the fact that PPX 1 vessels are calling Savannah in increasing numbers and are anticipated to call in greater numbers once the Panama Canal is enlarged.

In the draft report, it was assumed that PPX 2 vessels would call only if the channel were deepened to at least 44 ft; however, recent developments and carrier announcements indicate that even in the without project condition, PPX 2 vessels have and will continue to call at Savannah.

There are many reasons why ports successfully capture business that have nothing to do with harbor depths. In one recent example, Hanjin Shipping decided to leave Savannah Harbor and relocate to Jacksonville Harbor because the Port of Jacksonville gave them more control over their own terminal.

760V2-MM-231-EC138
Comment: *Who owns/uses these large distribution centers?*
It is more efficient to locate them near major population centers.
Define 40 mile "trade radius", and what is the significance?

Response: According to the GPA website, Wal-Mart, Kmart/Sears, Dollar Tree, Lowes, Ikea, Pier One Imports, Home Depot and Dick's Sporting Goods are some of the larger distribution centers in the region.

With respect to trade networks, there are many trade radii. One of the more commonly-cited ones is

the 40-mile trade radius. Recent information shows 30% of all imports remain within a 30-mile radius of Savannah Harbor; 70% of exports are within 200 miles of the port. This would include the Atlanta metropolitan region, home to 5.3 million people. The distribution centers servicing Savannah are established in that area for a variety of regions.

760V2-MM-231-EC139
Comment: *A berth is a berth. Regardless of the number of operators, there is still a physical constraint to port facilities,*

Response: Under both the without and with project conditions, the Garden City Terminal will reach its build-out capacity [annual] in about 2030 at 6.5 million TEUs per year. This is the maximum number of containers that could reasonably be processed, based factors such as the size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the container cranes, the number of jockey trucks that move the containers within the terminal, how the containers are stacked within the terminal, and the number of railroads that service the terminal and the frequency of their trains. It is predicted that without deepening, more vessels will be required to transport the cargo that transits the port. With deepening, the total number of vessels decreases as they will be able to load/unload without the current constraints of draft. The firm Moffatt & Nichol conducted an analysis in 2011 which concluded that it is reasonable for the Garden City Terminal berth to achieve a 6.5 million TEUs throughput. The berth productivity required would not need to be particularly exceptional in that time frame.

760V2-MM-231-EC140
Comment: *The Corps should use a holistic approach to expanding/deepening port facilities in response to the deepening of the Panama Canal, not port-by-port analysis.*

Response: The Multiport Analysis dealt with alternate routing to Savannah and was found to be reasonable by reviewers, including independent entities. The Congressional authorization of this project did not include the authority to conduct the requested analysis.

760V2-MM-231-EC141
Comment: *Attributing SAV cargo growth to GPA success in attracting Des to greater SAV has limits, given slow population growth of greater SAV.*

Response: The Port of Savannah experienced rapid growth for a number of reasons. Distribution centers setting up shop in the area is just one of the factors.

760V2-MM-231-EC142
Comment: *The text seems to confuse vessel calls with the loading and unloading of cargo. It is typical for vessels to call seven days a week. However, it is not the practice 10 work weekends, especially Sundays. The Regional Port Analysis alludes to this*

Response: While ports may not prefer to employ workers (gangs) on Sundays, they are gradually adopting their practices to comply with the international standards of the shipping industry, most of which involve a minimum of 6-day workweek and 16-hour days. Some ports now operate 24 hours a

day, 7 days a week, with only a handful of holidays throughout the year. For Savannah to approach their expected capacity, they will more than likely need to operate continuously.

760V2-MM-231-EC143
Comment: *There were 32 separate classes in Table 5. It is difficult to track the analysis when it moves to only these 5 classes.*

Response: Recall that Table 5 was intended to describe the world fleet in general (which was analyzed by MSI). Later the information was filtered down and presented the deployment patterns found to be more representative to North America, to the US East Coast, then ultimately to Savannah. The District debated over whether to keep Table 5 in the appendix because of this potential confusion, but decided to keep it in to depict the world fleet.

760V2-MM-231-EC144
Comment: *Clarify the loaded LNG clearance requirement, if 90,000 ft then pretty much the entire channel and entrance must be cleared until berthing or departure from the entry bar of LNG vessel. Is this accounted for in HarborSym?*

Response: The LNG safety zone requirement is included in the HarborSym analysis. The Georgia Port Authority stated that when a loaded LNG vessel in transiting the system, all other traffic is delayed until the vessel reaches the Elba Island terminal. Vessel traffic in the HarborSym model cannot be delayed by a specific class. Therefore, the 90,000-foot safety zone for the LNG class was used in the model as a way to keep all other vessel classes from transiting when an LNG vessel calls on Savannah Harbor.

760V2-MM-231-EC145
Comment: *What is the basis for the values, especially for PPX class underkeel clearance? See main report page 104. 6.1.1(b), 2 ft underkeel?*

Response: The underkeel clearances stated in the Appendix account for the dynamic condition and include squat, trim, and freshwater sinkage. Once these factors are netted out, the underkeel clearance requirements are representative of the standard practice.

760V2-MM-231-EC146
Comment: *42 ft channel provides 42 ft of depth 94% of the time, not 100%. What's this about, especially with overdredging and advanced maintenance?*

Response: Reference depths are tied to reference datums of Mean Lower Low Water (MLLW). There are times when the tides are below the average of the MLLW, and therefore represent what is known as the extreme tide. In the graph, 6% of the time the tides will be below -42 feet. Depths identified as over-dredging and advanced maintenance are areas related to dredging and sediment storage; they are not reliable for use by vessels.

760V2-MM-231-EC147
Comment: *Panama Canal max draft currently 39.5 ft. not 38.5 ft. (ACP Notice N-2007)*

Response: Concur. We have revised the report.

760V2-MM-231-EC148

Comment: *Statement that transport of empties causes problems with channel limitations doesn't hold water. Empties are lighter, only if exports nearly match imports is this true. The "problems' caused by empties as they relate to channel depth constraints does not seem to make sense.*

Response: While it may not appear to make sense at first, recall that some trade routes predominantly deal with heavy exports so that it is possible for vessels carrying a significant imbalance of empties yet still requiring deep drafts. Smaller to moderate size vessels often do not have the marginal capacity to make opportunistic adjustments (in the form of carrying additional empty boxes).

760V2-MM-231-EC149

Comment: *"The carriers emphasized repeatedly that East Coast ports would need to be able to receive loaded Post Panamax vessels upon Panama Canal expansion or risk losing services to ports which can accommodate this traffic.' How does this compare the without project assumption that Garden City will not lose traffic?*

Response: Just because the carriers state that they will risk losing services to ports that are able to accommodate the traffic (or threatened to leave), doesn't mean it will actually happen. Savannah Harbor experienced rapid growth in spite of its present channel restrictions. The analysis assumes the same volume of cargo with and without a project.

760V2-MM-231-EC150

Comment: *Using 2005-07 for the baseline, weighted toward 07, is not representative. At the top of the bubble. The data should be independently validated, GPA as sole data source has a vested interest in the project. What about waterborne commerce stats?*

Response: The year 2005 was not a bubble, at least as Savannah was concerned. The commodity forecast has been updated to include historical data for tonnages, TEUs and other data of actual containership vessel calls at Garden City Terminal from 2005 through 2010. A regression analysis (2005-2010) was performed for each world region route and will be used to establish the baseline forecast starting point with the following exceptions. The ECUS Africa service has limited data (i.e., 2005 and 2006). Trade on this route is intermittent at best. Accordingly, a straight average was used. The FE ECUS EU PEN and FE ECUS PEN services were capped at 2010 tonnage levels versus using the regression results. This capping was performed due to the trend, which developed over the last few years whereby there has been a shifting of services that were originally on routes that use the Panama Canal to those that use the Suez Canal.

Route specific Savannah Harbor growth rates were then developed from a 2010 Global Insight South Atlantic Trade forecast (as performed in the original analysis). These rates were applied to the new forecast baseline to establish the long-term trade forecast (metric tons).

The narrative describing the reason for departure from the GI forecast and the methodology for developing the growth rates has been updated. The GI forecast was used to derive rates of growth/change and apply those rates to actual Savannah cargo information.

As for why GPA data was used, it is widely accepted that there is a time lag with obtaining PIERS and WCSC statistics. The data had been derived from history, pilots, harbor masters and from WCSC was found to be reasonable for this study. PIERS and WCSC data were used to calibrate the LFA model and to make adjustments, so the data was not entirely GPA's.

760V2-MM-231-EC151
Comment: *Why is furniture the leading import commodity? If so, these particle board pieces are heavy. Why are impor1 TEU's far east so light (5.67 tons)?*

Response: Furniture is the leading import, but recall that container vessels often carry a variety of items (heavy and light) simultaneously. Furniture could include very light bamboo chairs and pre-assembled plastic tables (which comprise a lot of dead space), not only heavy rubber wood or particle board. They may also include light weight packaging, which may occupy more space.

760V2-MM-231-EC152
Comment: *Metric tons exported thru (Panama) greatly exceed imports, yet empties compose 67% in Table 25.*

Response: See response to prior comment. There are fewer filled containers, but they are heavier. In fact, their weights are among the heaviest used. Thus, it is quite possible to carry half as many loaded boxes with a lot of empties and still draw that depth of water.

760V2-MM-231-EC153
Comment: *Trade forecasts for what? How were they allocating 10tallmpor1S and exports between various harbors?*

Response: The subsequent sections (Section 3.3.2.1 through 3.3.2.2) elaborate on the GI commodity forecast. They describe commodities and regions, rather than on a port-by-port basis.

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760V2-MM-231-EC154
Comment: *Does putting Canada, Caribbean, Central America into NE Asia region skew the analysis in favor of Panama crossings? There is plenty of Canadian shipping thru the St Lawrence Seaway that has nothing to do with Panama.*

Response: No. Most, if not all stops in Canada would presumably call at other North American ports, primarily those in the United States. Halifax is another port that is naturally deep. Long voyages generally result in shippers calling at many ports.

760V2-MM-231-EC155
Comment: *Egypt would make more sense in Mediterranean than SE Asia.*

Response: See response to prior comment. Egypt may be located in the Mediterranean, but serves as a main stopping point of the SE Asian voyages (and so it is likely to experience the same vessel traffic as a result of the SE Asian growth).

760V2-MM-231-EC156

Comment: *Half of the Imported TEUs from China. How long is this trend expected to continue? What if currency imbalances are corrected? This may sound like the macroeconomic question for the ages, but it must someday be addressed. As the K/L ratio increases in China and India the trade advantage from lower wages will diminish.*

Response: Shipping research suggests that as the Northeast China market matures, the manufacturing centroid may relocate to SE Asia then possibly to India. It is less certain for Africa given their lack of comparable infrastructure. There is great uncertainty surrounding this in the near term.

Corps guidance on deep-draft navigation projects emphasizes using empirical data whenever possible and making forecasts over a 50-year period of analysis. Data on the past and present problems help shape the future without project condition scenario, which serves as a baseline for project formulation and evaluation. As one would expect, a 50-year forecast contains uncertainty, so several sensitivity analyses were performed using lower growth rates, no growth, and increased packaging densities. The results generally show project improvements would be economically justified under the alternate scenario.

Sensitivity analyses were performed using alternate growth forecasts, some of which address the concern about import growth from China. The types of sensitivity analyses were carefully developed by the PDT and reviewers, and capture the main sources of uncertainty.

760V2-MM-231-EC157

Comment: *"The fastest growth will take place in developing countries." Fastest growth in NE Asia and slowest is with Africa. However, it seems likely that Africa may well host the next generation of low cost factories.*

Response: Shipping research suggests that as the Northeast China market matures, the manufacturing centroid may relocate to SE Asia then possibly to India. It is less certain for Africa given their lack of comparable infrastructure. There is great uncertainty surrounding this in the near term.

Corps guidance on deep-draft navigation projects emphasizes using empirical data whenever possible and making forecasts over a 50-year period of analysis. Data on the past and present problems help shape the future without project condition scenario, which serves as a baseline for project formulation and evaluation. As one would expect, a 50-year forecast contains so much uncertainty, so several sensitivity analyses were performed using lower growth rates, no growth, and increased packaging densities. The results generally show project improvements would be economically justified under the alternate scenario.

Sensitivity analyses were performed using alternate growth forecasts, some of which addresses your concern about import growth from China. The types of sensitivity analyses were carefully developed by the PDT and reviewers, and capture the main sources of uncertainty.

760V2-MM-231-EC158

Comment: *Table 16 shows imports increasing by 80 % from 2015 to 2028. Table 19 shows exports increasing 38% during the same period. On page 38 is says "the rate of change in exports is slightly lower than that of imports." Less than half the rate is not 'slightly lower". All of these figures are by weight which brings to question the claim that trade is balanced in the future.*

Response: Concur. The text has been revised.

760V2-MM-231-EC159

Comment: *Should show overall total annual rate of change rather than just by trade lane*

Response: The Corps will consider this suggestion and include it if it enhances the tables.

760V2-MM-231-EC160

Comment: *50% increase in loaded TEU exports 2015-2032, 130% increase in loaded import TEUs 2015-2032. 87% total TEU increase including empties. MTs Increase 63.2%. Since empties Increase as a percentage of export totals, this should lighten export transit vessels and decrease draft requirements. This table is misleading, In order to balance TEU cargo flows including empties for each year total Inbound and outbound container counts should match. This table needs to be completely redone because the Imbalance eventually reaches about 1.5 million TEUs annually for 2032 - 2064, or over 28% of all container movements at Savannah. Basic shipping 101 ; unless storing or off leasing containers locally, total loaded and empty TEUs Import and export should equate.*

Response: While it may appear that there is an imbalanced loading for exports and imports, recall the distribution patterns in the Southeast. It is quite likely that a particular container may enter Savannah, be brought to a distribution center in central Georgia, then reloaded and exported at Jacksonville. As aforementioned, just because you have more empty containers doesn't mean the draft requirements will change significantly, since weight, stowage factors, port rotations and a host of other factors influence the amount carried on a vessel at a given time. The value of an empty container is not as worth as much as a loaded one, and there could be a large level of container "leakage" from the region. Some areas such as Anchorage have a glut of empty containers. Finally, it should be noted that the most recent commodity forecast shows a less dramatic split of exports and imports. In fact, imports no longer exceed exports tonnage-wise in the out years.

760V2-MM-231-EC161

Comment: *An analysis was done to substantiate the conversion from tonnage in the commodity forecasts to TEUs. The conversion appears correct. A further analysis was done to evaluate the weights of containers loaded their average weights by service route and direction, and the percent of empties to determine how heavy vessels will be. Findings Indicate vessels will be loaded from under 50% of weight capacity to under 92% of weight capacity of the design vessel.*
This means vessels will be utilizing far less than vessel design drafts in transits within Savannah Harbor, This should be accounted for In NED benefit calculations.

Response: Yes. The TCS model accounted for cargo and no-cargo use patterns of each trade route. Vessels generally did not reach their design drafts. Also, the empty to loaded TEUs were the MINIMUM percentages, not the average.

760V2-MM-231-EC162
Comment: *Empty to loaded TEUs by route should change over time.*

Response: The empty to loaded TEUs were the minimum percentages, not the average. The average may indeed change over time. The Corps believes that using the minimum percentages results in a conservative assessment.

760V2-MM-231-EC163
Comment: *refer back to Table 12*

Response: The Corps will consider the suggested revision.

760V2-MM-231-EC164
Comment: *How long can the US continue to grow imports that exceed exports? This relates to commodity projections and the assumption that Imports continue to grow unabated.*

Response: Global Insight recently provided an updated commodity forecast, which provides growth rates lower than the ones used in the draft report. The GI database contained over 180,000 rows of cargo related data and based on an *unconstrained* forecast. As you noted, the capacity at Savannah is far lower than the forecast. The District truncated the cargo volumes for the out years when the 6.5 million TEU capacity at Garden City Terminal is reached. On a broader level, the trade imbalance is quite real and has been the focus of the current Administration's initiative to double exports.

760V2-MM-231-EC165
Comment: *Have mercy on the reader and list the actual drafts. Why not use a numeric code instead of an alpha code?*

Response: MSI's database categorized the world fleet in this manner. They are presented in this way to allow the reader to follow how the Corps used the input data to produce its calculation of expected economic benefits.

760V2-MM-231-EC166
Comment: *Regression equations using natural logs almost always have an extremely high R2, so the correlation may be relatively meaningless.*

Response: The R^2 was not intended to prove that there is a correlation between the number of vessels and containers (that's a given). The formula in the equation is reused to calculate the capacity and ultimately, the number of vessel calls. At the same time, the Corps applied MSI's vessel forecast, which shows a gradual replacement of smaller vessels in the world fleet with larger ones (and once the Panama Canal is completed, an entirely new vessel, PPX2, appears for many of the trade routes). The transportation cost model meshes the two forecasts together by assigning cargo on a fleet of vessels which change over time.

760V2-MM-231-EC167

Comment: *These Figures prove nothing more than the intuitively obvious that you need more boats to move more containers. However, this study is based on using bigger boats. How are these figures incorporated into the study?*

Response: The R^2 was not intended to prove that there is a correlation between the number of vessels and containers (that's a given). The formula in the equation is reused to calculate the capacity and ultimately, the number of vessel calls. At the same time, we applied MSI's vessel forecast, which shows a gradual replacement of smaller vessels in the world fleet with larger ones (and once the Panama Canal is completed, an entirely new vessel, PPX2, appears for many of the trade routes). The transportation cost model meshes the two forecasts together by assigning cargo on a fleet of vessels which change over time.

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760V2-MM-231-EC168

Comment: *The forecast estimates about 900 PPX2 vessel calls in 2025, with most (600+) going to SE Asia thru the Panama Canal or the Far East thru the Suez. A round trip on either route takes about 8 weeks. That represents equivalent of the full-time use of about 90 PPX2 vessels on these two routes alone, or over 15 %. Overall, it seems that more than 20% of the PPX2 world fleet is expected to be devoted to trade routes that include Savannah. For this to be a reasonable assumption, the GRR should demonstrate that carriers will deploy so many such vessels in these services based on cost efficiency relative to other routes throughout the world.*

Response: While there are periodic realignments of vessel strings from time to time, recall that the 20% of the Panamax vessels are calling at Savannah right now, so it is not unreasonable to expect the assumed percentages in the future.

760V2-MM-231-EC169

Comment: *The correct presentation of the equation should be: y = 0.3621 x + 105.718 TEU's*
Units are often omitted from equations/calculations (eg. box on p. 56) which makes following the logic employed more difficult than necessary.

Response: Concur. The Corps has revised the report to increase traceability.

760V2-MM-231-EC170

Comment: *This is almost completely static. Hard to believe no sourcing shifts over the next 50 years. The sensitivity analysis is focused on absolute growth rates, but never addresses sourcing shifts.*

Response: The information provided in Table 31 provides the aggregate share of tonnage for the PX and PPX vessels, so it is likely to remain static from that standpoint. However, recall that there are major shifts *across vessel classes* for each of the trade routes. The Corps included Table 31 to allow the reader to identify trade routes benefitting from the project.

760V2-MM-231-EC171

Comment: *FE (Panama) route has 8.74% empties, while table 25 shows 67% empties for export to FE (Panama). The entire study should be consistent in applying directional analysis. TEU weights, vessel toad factors are very different import/export.*
Panama route has lowest Tons/TEU. Trade with S. America has minimum % empty of 30.24%, which is highest by far and yet the Tons/TEU is the highest.

Response: The FE (Suez) route has 8.74% empties, rather than the FE (Panama) route identified in the comment. The FE (Panama) shows 6.46% empties. The 8.74% represents the minimum percentage of empties for that particular trade route. The 67% figure refers to the historical average. The percentages shown in Table 33 were minimums, not averages. These minimum percentages are input into the load factor analysis to correctly calibrate the model and determine the vessels' maximum practicable capacities. Not including these minimums in the model could potentially show vessels requiring too much draft. Trade routes are significantly different and reflect the wide variation in trade (weights, % empties, vacant, etc). The data in Table 25 was derived by actual data (and applied averages), with wide disparities for imports and exports. With respect to the South American percentages, with such heavy cargo, you would need to provide a larger number of empty containers to stay within the draft requirements.

760V2-MM-231-EC172

Comment: *The POT assumes that vessels would load to their Max Practical Load Draft Given the volume of empties and average tons per container previously provided, this is not the case. Vessels cube out before reaching MPLD.*

Response: This all depends. Refer to the response to the prior comment. With 30% empties, vessels would certainly cube out early in the loading and never reach their MPLD. The Transportation Cost Savings Model accounts for this as well (which prevents us from over-claiming benefits for those vessels). Each trade route, vessel class, etc. was evaluated separately.

760V2-MM-231-EC173

Comment: *The sailing draft columns seem to be channel depths, but why would they vary by route? Why is max sailing draft 42.8 for ppx1 and 42.7 for ppx2 at 42 and both increase at 44 ft? What is the rational for different Max Practicable Sailing Drafts for the PPX1 and PPX2 well before the channel depths at which the maximum MPSO? An example in the text might be helpful to validate the calculation.*

Response: The Corps has revised the labels in Table 35. The titles now read "project depth alternatives" with the MPSD making up the entries within the table. The Corps considered tracing the savings from loading of vessel, through the MPSD and benefits, but it was unwieldy for this appendix. A more thorough explanation can be found in the TCSM documentation, flow charts and annotated spreadsheets.

Note that there are vessels in the world fleet (and of which were incorporated into the model) that fell under the "Panamax" category, yet have design drafts greater than the Panama Canal. Such vessels have maximum design drafts of 44.02 feet and were applied to routes that bypassed the Canal (ECUS

MED and ECUS EU GULF). Moreover, these vessels are dictated mainly by their dimensions of length and breadth, and less so by draft (which can be adjusted to fit through the Canal).

760V2-MM-231-EC174

Comment: *Is it appropriate to look at costs per ton instead of cost per container? Step 5· Determine Current Cost of Commodity Movements of ER 1105-2-100 seems to also require that costs include transit fees at the Panama Canal. Are these fees, which are $72 per TEU transit, included in the unit costs?*

Response: The $72/TEU fees were not included in the total costs, assuming that tonnage is constant since they are believed to be incurred without and with a harbor deepening. Any increases in marginal costs per TEU that may occur would likely be too small to warrant further investigation.

760V2-MM-231-EC175

Comment: *It would seem that PPX2 vessels would be assigned to the most efficient routes in the world, Where are those? Analysis starts the PPX2 at 44 ft channel. The PPX2 becomes most efficient on the Panama Route at a channel depth less than any other route. Why? Need to explain.*

Response: Right now, the most efficient routes for PPX2 vessels are for the Asia to Europe trade, but over time more routes would be added as the containerized trade continues to grow and PPX2 vessels comprise greater shares of the world fleet. Historically, the newest vessels have been first assigned to the Trans-Med routes, followed by the Trans-Pacific, the Trans-Atlantic, then finally, the North-South American routes. The deployment component of the TCSM applied the reduction of unit costs as a basis for switching from one class of vessel to another. The FE (Panama) trade route contains so much light cargo (readily hung textiles, finished products) and given the low percentage of empties and vacant slots, vessels "cube out" or "volume out" at a low project depth. The savings can be realized with a 44-foot project by switching to PPX2. This is not the case for many of the other routes.

760V2-MM-231-EC176

Comment: *·Upon further discussions with the PDT and reviewers, the POT changed their assumptions slightly by applying a 140 percent replacement ratio of PPX1 vessels.' 140 % does not seem to be a slight change. What is this adjustment as opposed to say 120%, based on? It seems odd that the adjustment is only from PPX2 to PPX1 vessels at 42 ft. This narrative seems unclear and leaves the adjustment seemingly arbitrary.*

Response: The 140% figure was derived by the gain in vessel capacity from a PPX Gen1 vessel to a PPX Gen 2 vessel. There is a range of capacities for each type of vessel, but we took an average TEU capacity (8700 TEUs/6200TEUs) to derive the 1.4 or 140% gain. The 42-foot project represents the without project condition.

760V2-MM-231-EC177

Comment: *What does the 140% replacement ratio mean? In the w/o project condition, (42 ft), w/ no PPX1 vessels, the PPX2 vessels are increased by 5% in 2015 to 24% in 2032. Also, the only difference between the adjustment and no adjustment at 48 ft is 1 fewer PPX1 in 2020 and one fewer PPX2 in 2025.*

Response: We are unsure that the commenter is referring to the correct table. Table 39 shows no PPX2 vessels and numerous PPX1 vessels. The 140% replacement ratio accounts for the change in TEU

capacities between a PPX Gen1 and PPX Gen 2 vessel. For the FE (Panama) ECUS route, the unit cost savings begin at the 44-foot project alternative, so it makes economic sense for a shipper to begin using PPX2 vessels at that point. Subsequent deepenings have no impact on the number of vessel calls. For the ECUS MED route, one in which the cargo is heavier, the savings (and adjustment) does not begin until the 46-foot project alternative (Table 40).

760V2-MM-231-EC178
Comment: *Why are there 279 PPX2 vessels at 44 ft in 2020 and only 276 at 45 and 276 in Table 39? Looks like a typo.*

Response: Concur. The final report includes the correction.

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760V2-MM-231-EC179
Comment: *At certain depths it becomes economically advantageous to switch from a PPX1 vessel to a PPX2 vessel. The number of PPX calls that was predicted by MSI for its unconstrained channel could then be applied. (For the FE (Panama)-ECUS example, once the channel depth reached 44 feel, PPX2 vessels were deployed at Savannah.*

Response: Concur.

760V2-MM-231-EC180
Comment: *Comparing table 41 with table 25 P. 42, FE trade looks like about 1300 import TEUs per PPX1 Call and 1800 TEUs per PPX2 call at -48'. Import only. Why no such analysis of exports? Why show Gulf when benefits primarily to Panama and Suez services?*

Response: The numbers should not completely reconcile. MSI prepared their vessel fleet forecast using a different commodity forecast (which was a higher, unconstrained forecast). This was undertaken prior to the release of Global Insight data. The MSI forecast had assumed a constant capacity and a constant share of Savannah cargo. Nonetheless, the Corps was able to use MSI's vessel fleet forecast as a baseline and made adjustments to certain conditions when meshing the: (1) the Load Factor Analysis, (2) share of Savannah cargo allocated to the trade and (3) a different forecast. The District provided two examples Panama and Gulf as a means of allowing the reader to trace routes other than the primary benefits. It also performed an analysis of exports as well, but only displayed the calculations for the imports. The transportation benefits to the Gulf trade route was minor compared to some of the others (See Table 57).

760V2-MM-231-EC181
Comment: *The residual forecasted tonnages left after allocation to the Sub-Panamax and PPX vessel classes were then allocated to the Panamax fleet. The number of vessel calls required by this class was based on historical averages of Savannah's share of vessel capacity for the Panamax vessel class: These statements seem to contradict themselves. How does the residual tonnage magically match the historic share?*

Response: Instead of saying, "historical share" the Corps has revised the text to read, "historical utilization of Panamax vessels". The final report also provides an example for a particular route, e.g.,

Panamax vessel use for imports is 17% to derive the number of Panamax calls." The historical share is one of the assumptions for vessel loading.

760V2-MM-231-EC182

Comment: *Sums are often off by one. Net savings between 46 ft and 47 ft is 0 PX voyage in 2015 (after correcting math), 5 PX In 2020, 9 PX in 2025 (after correcting math), and 11 PX voyages in 2032.*

Response: Concur. The TCSM computed partial vessel calls. When the District removed the decimal places, there were some rounding errors. The final report includes a revised appendix.

760V2-MM-231-EC183

Comment: *1. Not an assumption, but a fact.*
6. Question the need for4+ ft of underkeel clearance.
8. Avg. weight per container should include empties and differentiate between imports and exports. Vessels exceed MPD 85% of time? This should be substantiated by specific examples, as this assumption is critical to determining appropriate drafts for vessels in transit.
15. Does final comment mean that rerouting cost savings exist and benefit model somewhat overstates benefits by not allowing rerouting w/o a project? Under the without project cargo is likely to be rerouted to Charleston and Jacksonville. Likely in the with project condition, cargo would be routed to Savannah from Charleston and Jacksonville. This should be considered when computing benefits. Also, historic growth rates at SAV have been affected by labor lockout on W Coast in 2003, which has already given impetus for shift to SE US ports. Hinterlands are not unique to a given port, especially in SE where CHS is less than 100 miles away and has rail/highway access as well.

Response: Assumption 1. The District believes it is worthwhile to remind the reader that Post-Panamax ships already call at Savannah. The text has been revised to state that they will continue to do so in the future.
Assumption 6. See prior response on underkeel clearance (and freshwater sinkage).
Assumption 8. The 85% figure represents the upper threshold used in the load factor model. This should read that vessels will be at or LESS than their MPDs 85 percent of the time. The District has revised this in the final report.
Assumption 15. Based on the findings of the multi-port analysis as well as dialogues with HQUSACE and reviewers, the assumptions of Savannah's cargo with and without project were found to be reasonable and that most, if not all, of the benefitting cargo claimed in Savannah was due to increased waterborne efficiencies. The West Coast lockout reverberated strongly in the shipping world and may have led to further shifts to the Southeast (we can add that statement on history). The District agrees that hinterlands are not unique to Savannah. Global Insight's commodity forecast contained an implicit hinterland analysis already. Finally, the District acknowledges that some minor cargo shifts are possible (and point it out in the report). However, the strength of the benefit-cost ratio of the overall project does not warrant further investigations of the potential minor shifts that would not change the justification or optimization of the project.

760V2-MM-231-EC184
Comment: *This table seems to be a duplicate of Table 42.*

Response: Concur. Table 42 provides a snapshot of the number of calls, whereas Table 49 was displayed as part of the transportation cost savings analysis.

760V2-MM-231-EC185
Comment: *The % World Fleet looks very high (sometimes 25%) for PPX2 vessels in the out years. At 42 ft, 32% share of PPX1 also looks very significant.*

Response: See the response to prior comments on port rotations. Savannah is one of many stops on a voyage. Without a deepening project, many shippers would rely more on PPX1 vessels instead of switching over to PPX2 vessels, so 32% share is not unreasonable. Some of this share would shift with varying project depths.

760V2-MM-231-EC186
Comment: *'a certain share of each vessel's cargo was exclusive to Savannah." Yes, but how much of the cargo to Savannah is "exclusive to Savannah"? Some could have just as easily gone to Charleston.*

Response: The box was intended to remind the reader that the District was careful not to claim benefits for the entire voyage, and tried to isolate cargo and voyage costs exclusive to Savannah.

760V2-MM-231-EC187
Comment: *The equation is used to calculate Savannah fraction of cargo, but it is not done separately for imports and exports as is appropriate.*

Response: Because the equation is ultimately used in allocating the voyage costs, the District only looked at the share of cargo in Savannah as a percentage of the total cargo for an entire itinerary.

760V2-MM-231-EC188
Comment: *All of the cargo does not go the entire length of the voyage because of interim port calls en route. There should be a factor applied to account for cargo with origins or destinations other than the terminus nodes of the vessels' routes.*

Response: The District applied a factor based on the proportion of share for total tonnage carried by itinerary to determine the percentage for Savannah. For example, Savannah may comprise 20% of tonnage on a vessel. How shippers decide to allocate costs is based on the cargo value and its perishability.

The Load Factor Analysis necessitated the use of averages to estimate the amount of cargo (and drafts) since containerships carry cargo destined for multiple ports loaded onto a vessel at a given time. Performing a true directional deployment analysis would require knowing the "vessel manifests" for an entire journey. This information is proprietary. The study team knew was what loaded and unloaded at Savannah. By applying average empties, bunkerage, and other factors, the study team could estimate the aggregate tonnage on a vessel at a given time given the vessel's draft.

760V2-MM-231-EC189
Comment: *Just a 1 % reduction in the commodity growth reduces vessel cost savings benefits by $30 million (almost 30%). Also, a 1% increase adds fewer benefits than a 1% decrease. So, the economic analysis does not seem to be symmetrically sensitive 10 the commodity forecast.*

Response: Concur. The benefits are not symmetrically sensitive to changes in the commodity forecast since the growth rates vary widely by region and corresponding impacts differ (Load Factor Analysis, baseline number of calls, savings, etc.. Some routes are more sensitive to growth rate changes).

760V2-MM-231-EC190
Comment: *A 25% reduction in PPX calls reduces benefits even more than a 1% decline in commodity growth.*

Response: Concur. The number of PPX calls is a bigger driver in the overall benefits calculations, as demonstrated by the sensitivity analysis.

Page 3-11

760V2-MM-231-EC191
Comment: *Actually, the most successful greening initiative to dale seems to be the slowing of vessel cruising speeds 10 save fuel and reduce emissions.*

Response: Concur. This particular sensitivity (loading containers more fully to maximize space) was suggested by one of the ATR reviewers. The District failed to find any literature surrounding this potential change in vessel packaging, but we still performed the sensitivity analysis to identify its potential effect. You are correct in saying that one way of reducing emissions is by running vessels at slower speeds. The Corps is in the process of developing vessel operating costs for a variety of vessel speeds, which will lead to greater precision in the future.

760V2-MM-231-EC192
Comment: *No growth scenario. Vessels transportation cost savings benefits decline by more than half. While the b/c ratio is over 4 for the project as a whole and justification of a project is not sensitive to the forecast the size of the optimal plan certainly is. The NED plan is sensitive to the assumption that the forecasted commodities 'Hill move through SAV, regardless of the actual Garden City capacity.*

Response: Concur. GPA has specific measures identified that would expand the capacity of its Garden City Terminal over time up to its 6.5 million TEU capacity to keep ahead of the expected demand. The Corps expects GPA to be able to expand the terminal's capacity as needed to meet demand.

760V2-MM-231-EC193
Comment: *·overall results of the sensitivity analyses confirm that there is a strong likelihood that improvements 10 Savannah Harbor are well Justified economically and that the NED plan for Savannah Harbor is 47 feet." Disagree. There is no discussion of the relative likelihood of these sensitivity scenarios. The discuss focuses on the overall BIC ratio and the relevant discussion should be on the optimal channel depth. The sensitivity analysis does not conform to the requirements of ER 1105-2- 100 E-l0.e. (4)(b) to consider alternative user fees. Total TEUs in the future rely on cargo moving from west coast to east*

coast destinations after the Panama Canal is enlarged. However, as stated in the NYT (12 Dec 2010), ·Officials in Panama are also expected to charge higher lolls for the canal to pay off the national loan that is financing the expansion, Those costs 10 shippers could offset potential savings in improved logistics.

Response: Reviewers requested "plausible" future conditions when developing each sensitivity analysis. The conclusions are meant to inform the reader that under most of the "plausible" sensitivities, project improvements would be economically justified and that the NED plan would be the -47 foot depth most of the time.

760V2-MM-231-EC194

Comment: *What units correspond to the Y-axis? They appear to be seconds, which seems an unimaginable level of detail. This model estimates the number of seconds? If so, then most iterations are within a minute of each other. The discussion of the Harbor Sym model does not list all specific variables or their distributions. If indeed the output variable is seconds, the average vessel IS in the system just under 35 hours. This computes. based upon 2032 vessel calls to just Garden City (over 3000) This would put 12 vessels In the system every moment of every day on average trying to use only 9 berths at Garden City. If the outputs are measured in hours, hours of vessel time in harbor? Transiting channel? For what year? With or without which meeting areas?*

Response: The Y-axis displayed on Figure 34 is in hours. The HarborSym model calculates the average time for the entire vessel fleet in the system as a whole for each iteration through the model. At the end of the iteration, an average time in the system is provided for the fleet. After running multiple iterations, an average time in the system can be calculated by evaluating the results for each model iteration. Figure 34 demonstrates the similarity for the average time in the system through model runs 30 through 100. Therefore, 50 iterations was chosen for the calculations provided in the Economic Appendix.

760V2-MM-231-EC195

Comment: *"The Pilots indicated that they currently -can meet all vessel classes using the harbor now including two post Panamax vessels'. Does the model ever allow vessels to meet w/o project? If not, it overestimates benefits.*

Response: The pilots have indicated that two light loaded Post-Panamax vessel could meet within the current channel configuration under pristine channel conditions. However, the proposed deepening would maintain the current side slopes of the existing channel, thereby reducing the channel width for each additional foot of depth. The harbor pilots indicated that with the channel deepening, the conditions required for two light loaded Post-Panamax vessels to meet would become extremely rare. The HarborSym model assumes that two Post-Panamax vessel would not be able to pass within the system without including a meeting area within the inner harbor.

760V2-MM-231-EC196

Comment: *Do LNG vessel restraints account for 90,000' clearance as required? What about advance shutdown of channel in advance of LNG arrivals/departures to insure safety range of vessels? Berthing duration assumptions are crucial for terminal capacity analysis.*

Response: The Georgia Ports Authority and the harbor pilots indicated when a loaded LNG vessel is in transit, the remaining transiting vessels are delayed until the LNG vessel has reached the Elba Island terminal. The HarborSym model is not capable of delaying other class vessels due to the transit of a particular vessel class. Therefore, the 90,000 foot safety zone was included so that when a transiting LNG vessel entered the system, all other traffic would be delayed until that vessel reaches the terminal.

760V2-MM-231-EC197

Comment: *Why does one meeting area need to be 4.000 ft long and the other 8.000 ft long?*

Response: As stated in the Engineering Appendix Section 6.3.3, there are two meeting areas included in the project designed for two SHEP design vessels (Susan Maersk) to meet. Meeting areas provide locations for the design vessels to be able to meet in transit to avoid delays that would otherwise be incurred if a vessel had to either wait in the entrance channel or at dock until a design vessel had exited the channel. For Savannah Harbor all "passing" lanes are defined as meeting areas. "Passing" is typically defined as ships overtaking each other. "Passing" in this sense is not practiced in Savannah Harbor, therefore any subsequent reference to "passing" shall be understood as "meeting". The two meeting areas are located at Long Island Range and Oglethorpe Range. At the Long Island Range, ERDC determined through model runs and pilot input that a 100-foot wide and 8,000 foot length meeting area would be required for vessels to meet safely with 1,000-foot transitions back to the navigation channel width. The final location (center of range) was determined by consultation with the pilots. The location was determined to be from Station 14+000 to 22+000 for the full 100-foot wide meeting area (Station 13+000 to 23+000 including transitions).

For the Oglethorpe Range, a width of 100 feet from Station 54+800 to 58+800 (Station 54+800 to 60+700 with transitions) was used in the ship simulation runs and determined to be adequate. Ship simulation track plots showed that pilots could operate within that 4,000-foot length (but required the full length), so no further restriction in length was evaluated. Details of ship simulation for these two meeting areas can be found in the March 2009 document titled "Memorandum Subject: Savannah Harbor Simulations Study 2009" which is included in the Supplemental Materials of the Engineering Appendix to the GRR..

760V2-MM-231-EC198

Comment: *The bigger the ship, the longer time it spends at the dock. Container fleet averages may be 16 hours currently, but they will increase significantly with larger vessels. The 16 hours claimed needs to be substantiated.*

Response: Currently, the average Container vessel remains at the dock for approximately 16 hours. The Georgia Port Authority indicated that as container traffic increases, they would continue to add additional cranes at the Garden City Terminal to offset the added work that would be required to offload larger container vessels.

760V2-MM-231-EC199

Comment: *Calls to the LNG terminal forecasted to increase from 1 every 3 days to 1 every other day. Each vessel stop involves two 4 hr periods of an essentially closed the harbor. In the future, that's 4 hrs a day that the harbor will be closed to other traffic. Text notes that the number of LNG vessel calls may reach 200 annually.*

Response: The report states that 200 calls might occur if the facility operates at 100% capacity. The estimated increase in calls used in the HarborSym analysis begins at 60% in 2015 to 80% in 2030, or 167 annual calls. The 167 annual calls equates to one call for every 2.2 days. As of 2008, no domestic LNG facility operates greater than 50% of its facility capacity.

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760V2-MM-231-EC200

Comment: *Why end the growth in 2030 and not 20657 Harbor Sym should have growth beyond 2030 inputted. This anticipates about 10 vessel calls dally over and above the containers going to Garden City, In total, there win be about two transits an hour for each hour the channel Is not closed due to LNG movements. One would expect more of the unexpected and more variability in the system time than illustrated in Figure 34, and therefore we also question whether only 50 iterations is sufficient. Given 3000 container calls to Garden City in 2030, 3000 general cargo calls in 2030, and 200 LNG calls in 2030, a total of 6200 vessel calls equates to about 35 vessel transits daily at Savannah Harbor, not including traffic on the Intercoostal Waterway.*

Response: The future fleet forecast ends when container volume at Garden City is estimated to reach the terminal's capacity. A total of 50 iterations was run in the HarborSym model after an initial 100 iterations was run demonstrating that the total costs for each vessel class remained consistent after about 40 iterations. The total number of calls in the general cargo class includes all traffic entering Savannah Harbor, including traffic associated with the AIWW.

760V2-MM-231-EC201

Comment: *What is the purpose of analyzing observed sailing drafts limited to tide delay and meeting areas? Assume it also relates to the vessel cost savings.*

Response: The TCSM estimates ocean voyage costs and savings. Sailing drafts of container ships vary considerable throughout their voyage. To measure ocean voyage costs, forecasts of sailing drafts are not necessary; however estimates of total cargo carried and Savannah import and export amounts are needed. Analysis of sailing drafts when vessels called Savannah was performed and used to make estimates of total cargo carried and Savannah's cargo share of vessel utilization. To reasonably estimate in-harbor costs of operations and delays, analysis of historical sailing drafts and predictions of future sailing drafts were performed, as they are necessary variables in the calculations.

760V2-MM-231-EC202

Comment: *By definition, a Panamax vessel can only draft 39.5 feet. Panamax vessels are designed to transit the canal under loaded conditions at this draft. To claim that Panamax drafts significantly greater that this depth limitation does not make sense.*

Response: Many vessels in the world fleet are classified as "Panamax vessels" but have design drafts beyond 39.5 feet. In fact, there was a sizable number of Panamax vessels used in the TCSM with design drafts up to 44 feet. The dimensions of a Panamax vessel are dictated mainly by length and breadth of the Canal, since those characteristics are fixed and not often adjustable (a vessel's draft can be adjusted to safely transit the canal). The 44-foot design draft vessels would need to sail light loaded through the Canal.

760V2-MM-231-EC203
Comment: *Why would this be sensitive data?*

Response: It is considered proprietary information by the companies supplying the data.

760V2-MM-231-EC204
Comment: *There is no obvious reason why the Panamax sailing drafts below 38 ft would change as channel depths increase. These are unaffected by the channel constraint. Those are 86% of traffic al Savannah and 61% elsewhere. The historical data in Table 105 indicates aboul2100 Panamax Vessel transits annually in or out of Garden City. Then, Table 106 relies on a subset of data covering only two carriers responsible for only about 300 transits (?) annually. The smaller subset represents a significantly lower percentage of Panamax vessels sailing at or below 38 It. This equation makes litlle sense. Other Harbors Panamax /Some Savannah Panamax • All Savannah Panamax = Other Harbors Panamax • All Savannah Panamax/Some Savannah Panamax = Future Savannah Panamax It would make more sense to hold the percentage of Panamax vessels drafting at or below 38 ft constant as channel depth increases. Then that percentage may decrease as more Panamax vessels are expected to arrive over the time. This would have been an ideal assumption for sensitivity testing.*

Response: Many vessels in the world fleet are classified as "Panamax vessels" but have drafts beyond 39.5 feet. A sizable number of Panamax vessels used in the TCSM have design drafts up to 44 feet. The dimensions of a Panamax vessel are dictated mainly by length and breadth of the Canal, since those characteristics are fixed and not often adjustable (a vessel's draft can always be adjusted to safely transit the canal). The 44-foot design draft vessels would need to sail light loaded through the Canal.

760V2-MM-231-EC205
Comment: *This equation could not be understood. However, the net effect seems to be directly using the percentages from Table 111 for all drafts greater than 40 ft for a 45 ft channel. This makes sense and no-one should care about shallower drafts for that depth of channel. So is this methodology, applying world-wide sailing draft distributions used throughout the spectrum of alternative channel depths considered?*

Response: Yes. Worldwide sailing drafts (empirical data) were used in the development of sailing draft distributions for incremental channel deepening at Savannah.

760V2-MM-231-EC206
Comment: *Says from IWR with Pilots assistance. Main report says used assertions from the Pilots. What input did IWR have to this assumption?*

Response: The determination or measure of underkeel clearance (UKC) applied in economic studies follows planning guidance that mandates evaluation of actual vessel operator and pilot practice, with adjustment as appropriate or practical for with-project conditions. General "rules of thumb" such as allowing 10 percent of the transit draft for clearance have been long superseded with efforts to evaluate actual practice because such guidelines tended to be conservative and overly generous in allowance compared to what is often actually employed or needed. With respect to reviewer concerns that the allowances of 4.0 feet seem more than needed or excessive, it may be of value to present a general discussion of allowances for underkeel clearance. Generally, practices for underkeel clearance are

determined through review of written pilotage rules and guidelines, interviews with pilots and vessel operators, and analysis of actual past and present practices based on relevant data for vessel movements. With regard to evaluation of data concerning actual practices, typically underkeel clearance is benchmarked or measured relative to measured immersed vessel draft in the static condition (i.e., motionless at dockside). Consideration of when a vessel is moved or initiates transit relative to immersed draft, tide stage and commensurate water depth allows one to reasonably evaluate vessel clearance throughout the duration of vessel transit within a given waterway. When clearance is measured in the static condition, explicit estimation or allowances for squat, trim, and sinkage are unnecessary as the pilot or vessel operator has already accounted for such influences within allowances observed. Alternatively explained, if a pilot or vessel operator is willing to move a vessel with three feet of clearance as measured in the static condition, this indicates that net clearance in the dynamic (moving condition) may be actually one and a half (1.5) to two (2.0) feet given allowances of perhaps as much as a foot to 1.5 feet for squat relative to speed, net changes in trim, and degree of influence for sinkage (where applicable). Evaluation of all movements renders a distribution of underkeel clearances, with many observations or vessel movements employing more than is needed simply due to timing and varying degree of unconstrained drafts for relatively smaller vessels. Evaluation of minimized clearance (i.e., some level of clearance below which operators or pilots will not move a vessel due to concerns for insufficient safety) helps to quantify the window(s) of time each day a given vessel with a specified immersed draft can be moved relative to tide. Given the measurement of clearance in the described manner combined with input from pilots on their practices has revealed that underkeel clearance in Savannah is slightly more than many US coastal ports.

General evaluation of practices for underkeel clearance at most coastal ports in the United States has revealed that clearances for all vessel types are often 2.0 to 3.0 feet measured in the static condition for many historical fleets having Panamax or lesser service, with an average of approximately 2.7 feet for vessels of Handymax up through about Panamax size. Most coastal ports also have comparatively limited runs or distances between ocean approaches and dock facilities (i.e., less than 20 miles) so loss of tidal advantage during transit is less of a concern compared to that at Savannah. Regarding vessel size under with-project conditions, it is understood that most post-Panamax vessels need more clearance depending on blockage factors, currents, and relative confinement of the waterway with most post-Panamax containerships needing about 3.3 to 3.6 feet for vessels with breadths of 120 to nearly 150 feet, lengths overall (LOA) approaching 1,150 feet and summer loadline drafts of 46 to approximately 49.0 feet. At Savannah, the required clearance for vessel sizes of Panamax and up through the first generation of post-Panamax hulls (approximately 123 feet in breadth and up to approximately 1,120 feet in length) based on pilot guidance and actual experience is approximately 4.0 feet. The additional margin above 3.3 to 3.6 feet is due to time for the relatively long run upriver and downriver between the ocean approach and dock facilities (about 25 miles), currents and blockage, and the notable change in salinity and resulting influence for sinkage associated with the more prevalent freshwater environment upriver. During the course of studies, it was discussed with the pilots whether the larger classes of containerships (beyond first generation post-Panamax hulls) would require more clearance. The pilots indicated that larger hulls would likely require some increase in underkeel clearance to maintain an acceptable level of safety, though how much had not been determined. Given experience with hydraulics of the waterway, past traffic, and the relative stability in clearance allowances based on size progression from Handymax and Panamax through first generation post-Panamax, the Corps asked if another quarter of a foot would be sufficient. The pilots indicated this would be acceptable for study purposes, with the estimate rounded up to the nearest tenth of a foot (to

4.3 feet) as ultimately applied for analysis of second generation post-Panamax containerships. Given the preceding discussion concerning distance for transit and freshwater influence characteristic of Savannah Harbor, the allowances for underkeel clearance applied for studies of Savannah Harbor are considered reasonable and consistent when compared to other deep-draft harbors situated along the coastline of the United States.

760V2-MM-231-EC207
Comment: *This model, unlike the vessel cost model, is run for 2030.*

Response: The transportation cost saving model and the HarborSym model were run for the year 2030.

760V2-MM-231-EC208
Comment: *There seem to be 7 existing turning basins. Can these ever be used as meeting areas?*

Response: The lengths of the existing turning basins do not provide the required distance necessary for two Post-Panamax vessels to meet within the system.

760V2-MM-231-EC209
Comment: *These tables need more descriptive titles. For 135 LNG & Panamax. why do avg. transit costs go down from 2015 to 2020 and up for other vessels? The costs are transit costs and they are multiplied by the number of calls. Is there a misnomer, or should these values be doubled to reflect transits instead of calls?*

Response: The numbers provided in the tables display the number of calls, not transits, for each vessel class. The final reports include revised table headings to indicate that the numbers provided or for annual calls. The average cost for the Panamax class decreases due to the reduction of the total number of annual calls.

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760V2-MM-231-EC210
Comment: *Meeting area benefits are at FY2010 costs. Report does not seem to mention the price level that Transportation costs savings were estimated at. All tables displaying benefits should always display price levels and, if applicable, the discount rate.*

Response: The numbers provided in the draft report for the transportation cost saving model were at the FY2010 price level. The numbers in the final report are at FY2011 price levels.

760V2-MM-231-EC211
Comment: *Meeting area costs are al Oct 09 price levels. So, FY 10 means Oct 09?*

Response: The fiscal year for the Federal government begins 1 October for each year. Therefore, the beginning of Fiscal Year 2010 is October 1, 2009.

760V2-MM-231-EC212

Comment: *Why do the meeting area benefits go down after 2030? Why does the ratio of benefits for two areas to the sum of benefits for individual areas steadily decline from 2016 to 2030? See Meeting Area Benefits table below.*

Response: The ratio of benefits varies based on the arrival of the anticipated calls. The HarborSym model was set up so that each call is based on a random date and time for each scenario run. The calls are random to account for uncertainty in operation of the future fleet.

760V2-MM-231-EC213

Comment: *The Incremental costs do not seem intuitive because they have no consistent trend. The same can be said about O&M in Table 127.*

Incremental Cost Of Meeting Areas	
45 ft	$278,253
46 ft	$159,339
47 ft	$413,956
48 ft	$389,723

Response: This table has been updated in the final reports. However, there is still not a consistent incremental change in costs between channel depth alternatives. This is the result of differences in unit dredging prices resulting from differences in bank height and efficiencies in dredging thicker layers of sediment.

760V2-MM-231-EC214

Comment: *·Operations and Maintenance was considered negligible. This Is due to the harbor being in equilibrium, meaning that there will be no increase in the amount of dredged material within the harbor due to the deepening. If the aerial extent of the channel is enlarged, the meeting areas widen the channel and the sides lopes where cost effective advance dredging occurs wilt be reduced.*

Response: The Corps evaluated the effects on maintenance dredging as a result of the meeting areas. The analysis is contained within the GRR-Engineering Appendix, but is summarized as follows: The total shoaling volume for the harbor has remained essentially constant for many years, through several enlargements of the cross-section (both deepening and widening). The Corps believes that trend would continue with the proposed harbor improvements. As a result, it does not expect an increase in total shoaling volume if the meeting areas are constructed. It does expect the location of the shoaling to shift, with the shoaling that presently occurs in the navigation channel in those reaches to instead, occur in the meeting area where channel velocities would be lower than average.

760V2-MM-231-EC215

Comment: *In modern times, ships should know well in advance when they can take advantage of the tide. Then they can slow to economic speed from service speed (Table 115) while in transit to minimize the cost of tide delays. This seems especially important for the PPXs which represent well over half the benefits in every decade.*

Response: As demonstrated in Table 115 of the Economic Appendix, the hourly vessel operating cost of economic speed for a vessel at sea is higher than the hourly vessel operating cost within a harbor/channel. Vessel costs within the port are used in the HarborSym model. Therefore, if the costs

are associated with an increase in the overall transiting time of a vessel rather than once the vessel arrived at Savannah, the benefits generated would increase.

760V2-MM-231-EC216
Comment: *Why are benefits so often negative for the LNG vessels?*

Response: LNG transiting costs increase due to the safety zone required when this class vessel calls on Savannah Harbor. As the number of container vessel increase, the delay times associated with the LNG class increase.

760V2-MM-231-EC217
Comment: *Do meeting area benefits assume tide delay? Do tide delay benefits assume cannot meet? If the answer to both is yes, you can't sum them. The must be done incrementally.*

Response: The tide and meeting area benefits are calculated incrementally. The tide benefits are calculated assuming that two Post-Panamax vessels cannot meet within the channel. The meeting area benefits are calculated independent of the tide delay at each proposed channel depth.

760V2-MM-231-EC218
Comment: *This should include a discussion of distribution centers*

Response: Additional information has been added to the text to describe the distribution centers located in Savannah. However, the intent of Section 7 is to summarize the efforts performed for the GEC evaluation. Accordingly, distribution center information has been added to Section 2 of the Economics Appendix.

760V2-MM-231-EC219
Comment: *RED is limited to the entire State of Georgia while South Carolina is on the other side of the river.*

Response: The study team has rerun the EIFS model to include the State of South Carolina. The final reports include an explanation of the model and the results.

760V2-MM-231-EC220
Comment: *This relationship should not be considered as the impact of traffic on income because the model does not explicitly reveal the causal relation." If the same amount of tonnage moves with or without project, then there seems to be no RED benefit. If delays are reduced, then local pilot hours will decrease, so the REO impact may slightly increase GSP.*

Response: A revised regional economic development analysis has been provided in the revised report.

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760V2-MM-231-EC221
Comment:

Table 3-3:
Meeting Area Benefits ($)
(RE: Comment on p. 155, Table 124)

Yr	Long Island	Oglethorpe	Long Island/ Oglethorpe	LI&O (LI +O)
2015	7,699	20,861	24,792	87%
2016	57,150	63,305	105,597	88%
2017	106,601	105,748	186,403	88%
2018	156,051	148,192	267,209	88%
2019	205,502	190,636	348,015	88%
2020	254,953	233,079	428,821	88%
2021	306,608	274,069	501,972	86%
2022	358,263	315,058	575,123	85%
2023	409,918	356,047	648,274	85%
2024	481,573	397,037	721,426	84%
2025	513,228	438,026	794,577	84%
2026	604,649	515,518	917,184	82%
2027	696,070	593,010	1,039,791	81%
2028	787,491	670,502	1,162,398	80%
2029	878,912	747,995	1,285,005	79%
2030	970,333	825,487	1,407,612	78%
2031	916,739	730,351	1,336,737	81%
2032	863,144	635,215	1,265,863	84%

Response: The ratio of benefits varies based on the anticipated arrival of the vessel call. The HarborSym model was set up so that each call is based on a random date and time for each scenario run. The calls are random to account for uncertainty in operation of the future fleet.

760V2-MM-231-EC222, 760V2-MM-231-EC223
Comment: *The Corps Study explores the impact of port operations in Savannah, however the methodology is weak and the region of study is improperly defined. Although the report does include a brief discussion of planned port improvements, it does not provide insights or analyses with respect to the stimulative economic impact of construction and equipping of new port facilities that have been planned by the Georgia Ports Authority (GPA) in connection with the Savannah dredging project.*

Response: The Economic Analysis was performed under Corps guidelines and regulations, such as ER1105-2-100 and the more recent requirements for Independent External Peer Review. The commodity and fleet forecasts have recently been updated and incorporated into the final report. Given the uncertainty surrounding some of the variables in the transportation cost savings model, the study team performed 11 separate sensitivity analyses. All of the sensitivity tests show that project deepening is economically justified and, for most of the time, the project optimizes at the 47-foot depth alternative. The region defined in the study may have some slight overlaps with other ports, but as was explained in the response to Comment 760-JK-400-EC-100, potential shifts in cargo with or without a project would not be large enough to change the project's overall justification or optimization.

The Corps evaluates its water resource projects from the National Economic Development (NED) perspective, which comprises the Federal objective and is defined as the gain in the national benefits. All economic benefits from navigation improvements ultimately accrue to individual entities. No

attempt is made to identify the distribution of these benefits in accordance with their geographic location or the extent of their participation in the economic cycle. Production, transportation, distribution, wholesale and retail selling, and consumption are all elements in this cycle. In performing NED analysis, Corps analysts are mindful not to claim benefits if a project transfers business from one port to another (as that would not be considered a gain to the nation, but merely a transfer from one region to another).

In recent years, the Corps has undertaken additional analyses which focus on the Regional Economic Development account. In doing so, Corps analysts calculate the economic impacts to the region resulting from the influx of construction funds. The primary effects measured in an RED analysis include jobs and income.

760V2-MM-231-EC223, 760V2-MM-231-EC224

Comment: *"An impact report addressing Savannah Port operations should include the impact upon Chatham County (GA) and its surrounding communities, inducling those in South Carolina. Further, and as an extension to the work done by Wilber Smith, a separate and distinct report should be generated to understand the regional impact of a large capital investment like the proposed Savannah dredging project."*

Response: The Corps evaluates its water resource projects from the National Economic Development (NED) perspective, which comprises the Federal objective and is defined as the net gain in the national benefits. The NED benefits are comprised primarily of the reduced transportation costs as a result of project improvements. In performing NED analysis, Corps analysts are mindful not to claim benefits if a project shifts business from one port to another (as that would not be considered a gain to the nation, but merely a transfer from one region to another).

In recent years, the Corps has undertaken additional analyses which focus on the Regional Economic Development account. In doing so, Corps analysts calculate the economic impacts to the region resulting from the influx of construction funds. The primary effects measured in an RED analysis include jobs and income.

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760V2-MM-231-EC225

Comment: *On the cover of the report by the US Army Corps of Engineers it is explicitly stated that the expansion project is in Chatham County, Georgia and Jasper County, South Carolina. However, the report ignores any economic impact that would occur in South Carolina, thereby telling me that the economic analysis is seriously flawed.*

Response: The Corps evaluates the feasibility of its civil works projects using procedures established by Water Resources Council. It must determine the benefits to the Nation that would accrue from a proposed action, not on benefits that may accrue to individual communities, states, or regions. The final reports include the Corps's evaluation of Regional Economic Development effects in South Carolina. Section 8 of the GRR-Economic Appendix is titled "Socioeconomic and Regional Analyses". Page 170 starts a section that discusses regional economic impact modeling that was performed using the RECONS (Regional ECONomic System) model. The model identifies the likely economic effects of a given

sized construction project. It estimates regional and national job creation and retention, and other economic effects such as income, value added, and sales. The analysis was performed at three geographical levels: Local, Bi-State and National. The local level consists of the area within a 40-mile radius around the project area. The Bi-State level includes the states of Georgia and South Carolina.

760V2-MM-231-EC226

Comment: *The Corp's methodology uses a multivariate least-squares regression analysis to forecast impacts. It argues that additional tonnage at the port should generate additional income.*
While there is correlation with the activity, it is difficu.lt to reach a reasonable conclusion about impacts in this manner due to the oversimplification that is inherent in the authors' approach. Realistically, the growth of income (or Domestic Product) should be highly correlated with additional tonnage but with variations that reflect local conditions, such as workforce make-up, availability of transportation and the presence or lack thereof of certain industries. Thus, an increase in tonnage mayor may not have an impact upon the state or substate areas. The economic impacts of a project will be determined by the mix of activity within a study area - which is the reason most economists use an input-output model such as IMPLAN to measure operational impacts.
From this economist's point of view, the inherent weaknesses of data, scope and analytical focus contained in the report make it impossible to obtain a reasonable understanding of the economic impact of pan operations at Savannah on the affected communities from a reading of either document. The Corps Study has not done an adequate job of assessing the operational economic impacts of the Savannah Pan or the construction and installation-related economic impacts of the planned dredging-dependent port facilities improvements at Savannah.

Response: There are many models that are all capable of measuring RED impacts; the models mentioned EIFS and IMPLAN are only two of these. IMPLAN can return more output on a micro level than EIFS for instance, but the choice of which RED model to use is a Corps option. The District is not directed by our guidance to use any specific model. There are more sophisticated models that can render still further detailed output about economic impact; for example, input-output analysis and econometric models. The costs of data collection and model specification, is at times a high penalty when choosing to use these more sophisticated approaches. EIFS, an economic base model, yields a very good estimate of changes in business volume, employment, income and population, based on regional economic theory. In over three decades of use, EIFS analyses are, in aggregate, comparable with more expensive, time consuming, and complex approaches.

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Comment: *The Corps Study makes an attempt to look at the regional impact of the dredging project. However, the methodology is weak and that the regional definition is inappropriate -especially given the fact that the Savannah Port expansion will physically affect Jasper County. Additionally, any impact model should include the impacts of capital investment. Although Section 3 of the Corps Study contains a description of planned improvements that go hand-in hand with the proposed dredging project, there is no discussion of the stimulative economic impact of such investments in that document or the impact on the tax bases of the impacted South Carolina communities.*

Response: See responses to previous comments on this issue.

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Comment: *See Section beginning with "This analysis evaluates the assumed capacity of Garden City Terminal to determine baseline conditions under the Without Project condition. The Without Project condition at Savannah Harbor relies on several assumptions to define the baseline case, under which NED impacts as a result of improvements to the navigation features of the Savannah River up to Garden City Container Terminal and the Kings Island Turning Basin are determined."*

Response: Under both the without and with project conditions, the Garden City Terminal will reach its build-out capacity [annual] in about 2030 at 6.5 million TEUs per year. This is the maximum number of containers that could reasonably be processed, based factors such as the size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the container cranes, the number of jockey trucks that move the containers within the terminal, how the containers are stacked within the terminal, and the number of railroads that service the terminal and the frequency of their trains. It is predicted that without deepening, more vessels will be required to transport the cargo that transits the port. With deepening, the total number of vessels decreases as they will be able to load/unload without the current constraints of draft. The firm Moffatt & Nichol conducted an analysis in 2011 which concluded that it is reasonable for the Garden City Terminal berth to achieve a 6.5 million TEUs throughput. The berth productivity required would not need to be particularly exceptional in that time frame.

FOR CONTINUATION OF HOUSE DOCUMENT 112-153

SAVANNAH HARBOR EXPANSION PROJECT
CHATMAN CO., GEORGIA & JASPER CO., S. CAROLINA:
FINAL GENERAL RE-EVALUATION REPORT AND
ENVIRONMENTAL IMPACT STATEMENT

SEE PART 12