of the protest or intervention to the Federal Energy Regulatory Commission, 888 First Street NE., Washington, DC 20426.

This filing is accessible on-line at *http://www.ferc.gov,* using the ''eLibrary'' link and is available for review in the Commission's Public Reference Room in Washington, DC. There is an ''eSubscription'' link on the Web site that enables subscribers to receive email notification when a document is added to a subscribed docket(s). For assistance with any FERC Online service, please email *FERCOnlineSupport@ferc.gov,* or call (866) 208–3676 (toll free). For TTY, call (202) 502–8659.

Comment Date: 5:00 p.m. Eastern time on January 26, 2017.

Dated: January 6, 2017.

Kimberly D. Bose,

Secretary.

[FR Doc. 2017–00560 Filed 1–11–17; 8:45 am]

BILLING CODE 6717–01–P

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

Combined Notice of Filings #2

Take notice that the Commission received the following electric rate filings:

Docket Numbers: ER10–2507–010.
Applicants: Westar Energy, Inc.
Description: Notice of Non-Material Change in Status of Westar Energy, Inc.
Filed Date: 1/6/17.
Accession Number: 20170106–5116.
Comments Due: 5 p.m. ET 1/27/17.

Docket Numbers: ER16–2190–003; ER16–2191–003; ER16–2453–004.
Applicants: Brady Wind, LLC, Brady Wind II, LLC, Brady Interconnection, LLC.
Description: Notice of Non-material Change in Status of Brady Wind, LLC, et. al.
Filed Date: 1/6/17.
Accession Number: 20170106–5093.
Comments Due: 5 p.m. ET 1/27/17.

Docket Numbers: ER17–752–000.
Applicants: PJM Interconnection, L.L.C.
Description: Notice of Cancellation of First Revised Service Agreement No. 2359, Queue No. U3–003 of PJM Interconnection, L.L.C.
Filed Date: 1/6/17.
Accession Number: 20170106–5057.
Comments Due: 5 p.m. ET 1/27/17.

Docket Numbers: ER17–753–000.
Applicants: PJM Interconnection, L.L.C.
Description: § 205(d) Rate Filing: Revisions to OATT Schedule 12—Appendix A re: RTEP Projects Approved in Dec 2016 to be effective 4/6/2017.
Filed Date: 1/6/17.
Accession Number: 20170106–5061.
Comments Due: 5 p.m. ET 1/27/17.

Docket Numbers: ER17–754–000.
Applicants: Southern California Edison Company.
Description: § 205(d) Rate Filing: GIA and Distribution Service Agmt Lendlease California City Solar LLC to be effective 1/7/2017.
Filed Date: 1/6/17.
Accession Number: 20170106–5067.
Comments Due: 5 p.m. ET 1/27/17.

Docket Numbers: ER17–755–000.
Applicants: Midcontinent Independent System Operator, Inc.
Description: § 205(d) Rate Filing: 2017–01–06_MISO Tariff Clean-up filing to be effective 1/7/2017.
Filed Date: 1/6/17.
Accession Number: 20170106–5078.
Comments Due: 5 p.m. ET 1/27/17.

Docket Numbers: ER17–756–000.
Applicants: Midcontinent Independent System Operator, Inc.
Description: § 205(d) Rate Filing: 2017–01–06_SA 2884 Otter Tail-Crowned Ridge 1st Rev GIA (G736) to be effective 1/7/2017.
Filed Date: 1/6/17.
Accession Number: 20170106–5085.
Comments Due: 5 p.m. ET 1/27/17.

Docket Numbers: ER17–756–000.
Applicants: Midcontinent Independent System Operator, Inc.
Description: § 205(d) Rate Filing: 2017–01–06_SA 2884 Otter Tail-Crowned Ridge 1st Rev GIA (G736) to be effective 1/7/2017.
Filed Date: 1/6/17.
Accession Number: 20170106–5086.
Comments Due: 5 p.m. ET 1/27/17.

Docket Numbers: ER17–757–000.
Applicants: Duke Energy Carolinas, LLC.
Description: § 205(d) Rate Filing: Amendment to NCEMC NITSA SA 210 to be effective 1/1/2017.
Filed Date: 1/6/17.
Accession Number: 20170106–5147.
Comments Due: 5 p.m. ET 1/27/17.

The filings are accessible in the Commission's eLibrary system by clicking on the links or querying the docket number.

Any person desiring to intervene or protest in any of the above proceedings must file in accordance with Rules 211 and 214 of the Commission's Regulations (18 CFR 385.211 and 385.214) on or before 5:00 p.m. Eastern time on the specified comment date. Protests may be considered, but intervention is necessary to become a party to the proceeding.

eFiling is encouraged. More detailed information relating to filing requirements, interventions, protests, service, and qualifying facilities filings can be found at: *http://www.ferc.gov/docs-filing/efiling/filing-req.pdf.* For other information, call (866) 208–3676 (toll free). For TTY, call (202) 502–8659.

Dated: January 6, 2017.

Kimberly D. Bose,

Secretary.

[FR Doc. 2017–00564 Filed 1–11–17; 8:45 am]

BILLING CODE 6717–01–P

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Project No. 13102–003]

Birch Power Company; Notice of Technical Meeting

a. *Date and Time of Meeting:* January 23, 2017 at 2:00 p.m. Eastern Standard Time (1:00 p.m. Central Standard Time).

b. *Place:* Telephone conference.

c. *FERC Contact:* Adam Peer at *adam.peer@ferc.gov,* or (202) 502–8449.

d. *Purpose of Meeting:* Commission Staff is hosting a technical meeting to discuss the details of Birch Power's proposed Spoils Disposal Plan filed on May 21, 2014.

e. A summary of the meeting will be prepared and filed in the Commission's public file for the project.

f. All local, state, and federal agencies, Indian tribes, and other interested parties are invited to participate by phone. Please call Adam Peer at (202) 502–8449 by January 17, 2017, to RSVP and to receive specific instructions on how to participate.

Dated: January 6, 2017.

Kimberly D. Bose,

Secretary.

[FR Doc. 2017–00562 Filed 1–11–17; 8:45 am]

BILLING CODE 6717–01–P

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Project No. 1494–437; Oklahoma]

Grand River Dam Authority; Notice of Availability of Draft Environmental Assessment

In accordance with the National Environmental Policy Act of 1969 and the Federal Energy Regulatory

Commission's (Commission or FERC's) regulations, 18 Code of Federal Regulations (CFR) Part 380, the Office of Energy Projects has reviewed an application filed by the Grand River Dam Authority (GRDA) to permanently amend the reservoir elevation rule curve contained in Article 401 of the license for the Pensacola Hydroelectric Project No. 1494. The amendment would allow GRDA to keep water levels in the project's reservoir, Grand Lake O' the Cherokees (Grand Lake), up to two feet higher August 16 through October 31 each year. The project is located on the Grand (Neosho) River in Craig, Delaware, Mayes, and Ottawa Counties, Oklahoma.

Staff prepared a draft environmental assessment (EA) for the application which analyzes the potential environmental effects of approving the requested permanent change to the Article 401 rule curve and concludes that such an approval, with specified environmental protection measures, would not constitute a major federal action that would significantly affect the quality of the human environment.

A copy of the draft EA is available for review at the Commission's Public Reference Room or may it be viewed on the Commission's Web site at *www.ferc.gov* using the ''eLibrary'' link. Enter the docket number P–1494 in the docket number field to access the document. For assistance, contact FERC Online Support at *FERCOnlineSupport@ferc.gov* or toll-free at 1–866–208–3676, or for TTY, 202–502–8659.

You may register online at *www.ferc.gov/docs-filing/esubscription.asp* to be notified via email of new filings and issuances related to this or other pending projects. For assistance, contact FERC Online Support.

Any comments on the draft EA should be filed by February 6, 2017. Comments may be filed electronically via the Internet. See 18 CFR 385.2001(a)(1)(iii) and the instructions on the Commission's Web site at *http://www.ferc.gov/docs-filing/efiling.asp.* Commenters can also submit brief comments up to 6,000 characters, without prior registration, using the eComment system at *http://www.ferc.gov/docs-filing/ecomment.asp.* You must include your name and contact information at the end of your comments. For assistance, please contact FERC Online Support. Although the Commission strongly encourages electronic filing, documents may also be paper-filed. To paper-file, mail a paper copy to: Kimberly D. Bose, Secretary, Federal Energy Regulatory Commission, 888 First Street NE., Washington, DC 20426. The first page of any filing should include the docket number P–1494–437.

For further information, contact B. Peter Yarrington at (202) 502–6129 or *peter.yarrington@ferc.gov,* or contact Jeremy Jessup at (202) 502–6779 or *Jeremy.jessup@ferc.gov.*

Dated: January 6, 2017.

Kimberly D. Bose,

Secretary.

BILLING CODE 6717–01–P

DRAFT ENVIRONMENTAL ASSESSMENT

AMENDMENT OF ARTICLE 401 TO MODIFY RESERVOIR ELEVATION RULE CURVE

PENSACOLA HYDROELECTRIC PROJECT
FERC No. 1494-437
Oklahoma

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Administration and Compliance
888 First Street, N.E.
Washington, DC 20426

January 2017

BILLING CODE 6717–01–C

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Acronyms

ACER U.S. Department of the Interior, Bureau of Reclamation, Assistant Commissioner, Engineering and Research Technical Memorandum No. 11
BIA Bureau of Indian Affairs, Department of the Interior
°C degrees Celsius
cfs cubic feet per second
CWA Clean Water Act
Commission or FERC Federal Energy Regulatory Commission
Corps U.S. Army Corps of Engineers
Drought Plan Drought Adaptive Management Plan
DO dissolved oxygen
EA environmental assessment
EAP Emergency Action Plan
ESA Endangered Species Act
FEMA Federal Emergency Management Act
FPA Federal Power Act
FWS U.S. Fish and Wildlife Service
GIS Geographic Information System
Grand Lake Grand Lake O' the Cherokees
GRDA Grand River Dam Authority; licensee
HPMP Historic Properties Management Plan
incremental increase change in water surface elevation under proposed amendment
Interior Department of the Interior
mg/l milligrams/liter
National Register National Register of Historic Places
NDMC National Drought Mitigation Center
NGVD National Geodetic Vertical Datum
NHPA National Historic Preservation Act
Oklahoma AS Oklahoma Archaeological Survey
Oklahoma DEQ Oklahoma Department of Environmental Quality
Oklahoma DWC Oklahoma Department of Wildlife Conservation
Oklahoma WRB Oklahoma Water Resources Board
Oklahoma SHPO Oklahoma State Historic Preservation Officer
PD Pensacola Datum; PD is 1.07 feet higher than NGVD
Storm Plan Storm Adaptive Management Plan
Section 106 Section 106 of the National Historic Preservation Act
Section 401 Section 401 of the Clean Water Act
Section 7 Section 7 of the Endangered Species Act
USGS U.S. Geological Survey
401 certification Water Quality Certification under Section 401 of the Clean Water Act

ENVIRONMENTAL ASSESSMENT

Federal Energy Regulatory Commission; Office of Energy Projects; Division of Hydropower Administration and Compliance; Washington, DC

Pensacola Hydroelectric Project; FERC No. 1494–437

1.0 Application

Application Type: Amendment of Article 401 reservoir elevation rule curve.

Date Filed: May 6, 2016, supplemented June 2, 2016, and June 30, 2016.

Applicant's Name: Grand River Dam Authority.

Water Body: Neosho (Grand) River.

County and State: Craig, Delaware, Mayes, and Ottawa counties, Oklahoma.

Federal Lands: The project does not occupy any federal lands.

2.0 Purpose of Action and Need for Power

Grand River Dam Authority (GRDA), licensee for the Pensacola Hydroelectric Project, requests a permanent amendment of the reservoir operating rule curve stipulated in Article 401 of the project license.[1] The Article 401 rule curve specifies seasonal water surface elevations that are to be targeted at the project reservoir (Grand Lake) during project operation. GRDA's request involves changes to the rule curve during the period of August 16 through October 31 to reduce the risk of vessel groundings in late summer, improve recreation during the summer/fall peak recreation season and provide storage of additional water to assist in making releases for maintenance of dissolved oxygen concentrations in the river downstream.

3.0 Background

3.1 Pensacola Project Description

The Commission issued a license for the Pensacola Project to GRDA on April 24, 1992.[2] The project is located on the Grand (Neosho) River in Craig, Delaware, Mayes, and Ottawa counties, Oklahoma (Figure 1). Features of the Pensacola Project include: (1) A reinforced-concrete dam consisting of a 4,284-foot-long multiple arch section, an 861-foot-long spillway containing 21 Tainter or radial gates, a 451-foot-long non-overflow gravity section, and two non-overflow abutments, comprising an overall length of 5,950 feet and maximum height of 147 feet; (2) two auxiliary spillways about one mile east of the dam, a 505-foot-long concrete gravity middle spillway containing 11 Tainter gates and a 464-foot-long concrete gravity east spillway containing 10 Tainter gates; (3) a reservoir known as Grand Lake O' the Cherokees (Grand Lake) having a surface area of 46,500 acres and a storage capacity of 1,680,000 acre-feet at a water surface elevation of 745 feet Pensacola Datum (PD);[3] (4) six 15-foot-diameter and one 3-foot-diameter steel penstocks supplying flow to six turbine-generators of 14.4-megawatt capacity each and one turbine-generator of 500-kilowatt capacity located in a powerhouse immediately below the dam; (5) a tailrace about 300 feet wide and a spillway channel about 850 feet wide, both about 1.5 miles long; and (6) appurtenant facilities.

[1] In its request, GRDA also asked that, if the Commission could not process its permanent amendment by August 15, 2016, that it be granted a temporary variance for the period of August 15, 2016, through October 31, 2016, while the Commission processed its request for a permanent amendment. A temporary variance for 2016 was granted in an order issued August 12, 2016. *Grand River Dam Authority,*156 FERC ¶ 61,106 (2016).

[2] The project was originally licensed in 1939 and was relicensed in 1992. *Grand River Dam Authority,* 59 FERC ¶ 62,073 (1992).

[3] Pensacola Datum (PD) is 1.07 feet higher than National Geodetic Vertical Datum (NGVD) which is a national standard for measuring elevations above sea level. Elevations discussed in this EA are in PD values unless otherwise stated.

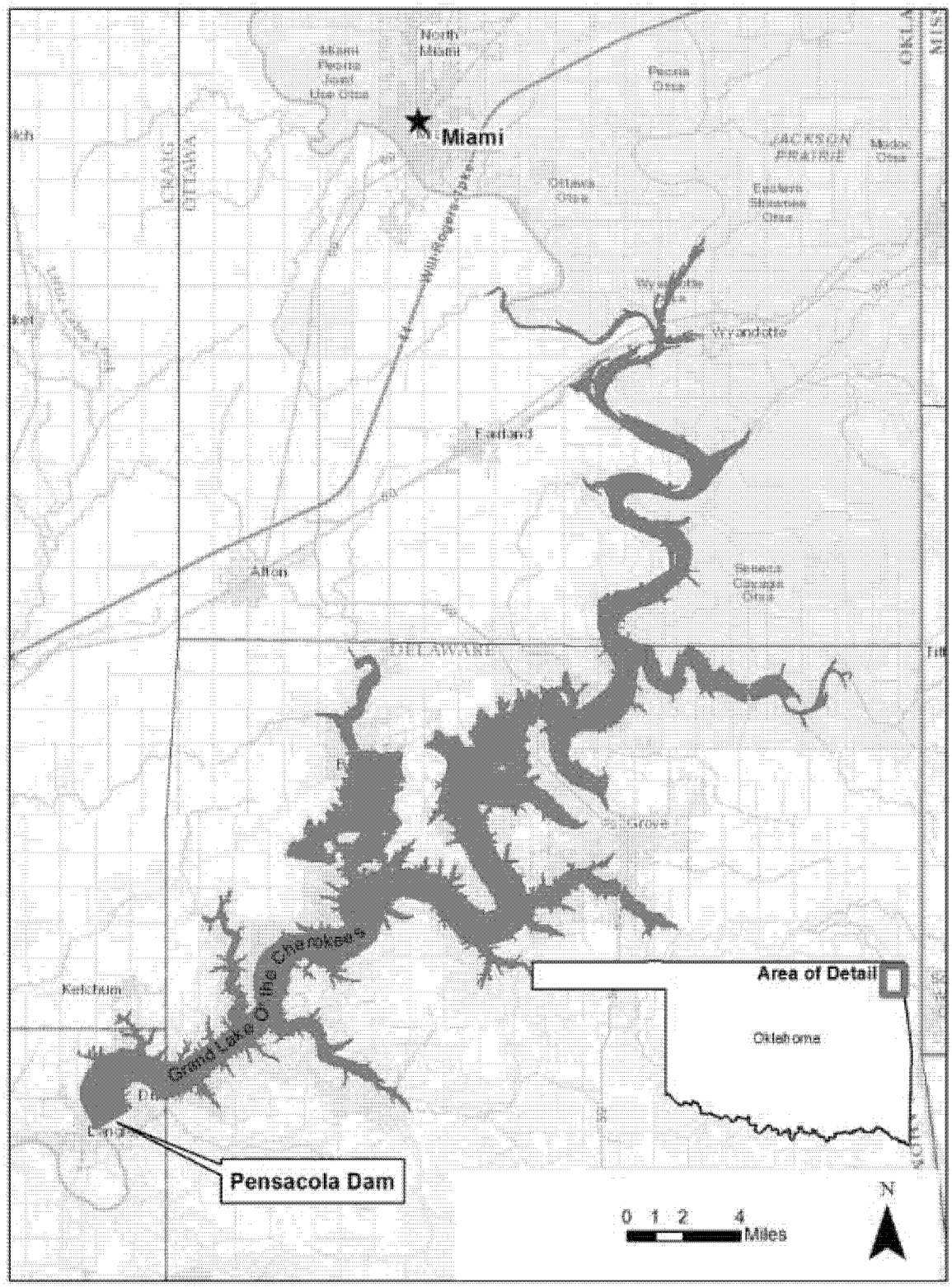

Figure 1. Location Map of the Pensacola Hydroelectric Project (source: U.S. Geological Survey (USGS) and Environmental Systems Research Institute: Geographic Information Systems (ESRI-GIS), 2016).

3.2 Project Operation and Article 401 Rule Curve

Grand Lake is used for multiple purposes including power generation, recreation, wildlife enhancement, and flood control. Dedicated flood storage (the flood pool) is provided between elevations 745 and 755 feet. When reservoir elevations are within the limits of the flood pool, the Tulsa District of the U.S. Army Corps of Engineers (Corps) directs water releases from the dam under the terms of a 1992 Letter of Understanding and Water Control Agreement between the Corps and GRDA that addresses flooding both upstream and downstream of Grand Lake.

When reservoir elevations are below the limits of the flood pool, GRDA operates the project pursuant to Article 401 of the project license, as amended in an order issued December 3, 1996.[4] Article 401 requires GRDA to operate the project to maintain, to the extent practicable, the following target reservoir surface elevations (the set of elevations known as a rule curve), except as necessary for the Corps to provide flood protection:

Period	Reservoir elevation, in feet (Pensacola datum)
May 1 through May 31	Raise elevation from 742 to 744.
June 1 through July 31	Maintain elevation at 744.
August 1 through August 15	Lower elevation from 744 to 743.
August 16 through August 31	Lower elevation from 743 to 741.
September 1 through October 15	Maintain elevation at 741.
October 16 through October 31	Raise elevation from 741 to 742.
November 1 through April 30	Maintain elevation at 742.

Since issuance of the 1996 order, GRDA has filed eight requests for either temporary variances from, or permanent amendments of, the elevations specified in the Article 401 rule curve. Six of those applications were withdrawn by GRDA, denied, or dismissed by the Commission.[5] In July 2012, GRDA filed an application for a temporary variance so that it could operate the project to vary from the rule curve in late summer and early fall in order to alleviate effects of an ongoing regional drought. That application was approved in an order issued August 15, 2012.[6] In July 2015, GRDA applied for a temporary variance primarily to enhance recreational boating in late summer and early fall. That application, which involved the same changes to the rule curve elevations being requested in this proceeding, was approved in an order issued August 14, 2015.[7] As referenced above, a temporary variance for late summer and early fall 2016 was granted August 12, 2016.

4.0 Proposed Action and Alternatives

4.1 Proposed Action

GRDA requests a permanent amendment of the Pensacola Project's Article 401 rule curve that would be followed each year through the remainder of the current license period.[8] GRDA seeks the rule curve change to reduce the risk of vessel grounding at Grand Lake in late summer, improve recreation during the summer/fall peak recreation season, better balance competing stakeholder interests, and provide additional water storage, if necessary, to assist in maintaining DO concentrations in the tailrace and river below the project, and below its Markham Ferry Project (No. 2183), located immediately downstream.[9] GRDA's proposal also includes a Storm Adaptive Management Plan (Storm Plan) and a Drought Adaptive Management Plan (Drought Plan), which provide frameworks for communication and operational decision-making when major weather events may affect GRDA's ability to target elevations on the rule curve.

4.1.1 Rule Curve Modification

Under GRDA's proposal, the Pensacola Project's Article 401 rule curve would be permanently amended for the remainder of the current license period. The elevations along the rule curve would only be changed for the period of August 16 through October 31. Between August 16 and September 15 each year, the project would be operated to target an elevation of 743 feet, which is up to two feet higher than the current rule curve. Between September 16 and September 30, the elevation target would be lowered from 743 to 742 feet. Between October 1 and October 31, operation would target an elevation of 742 feet, which is up to one foot higher than the current rule curve. After October 31, reservoir elevations would follow the project's existing rule curve. GRDA would operate the project to target the elevations along the rule curve at all times, except as provided by the Storm Plan or the Drought Plan, or as necessary for the Corps to provide flood protection. GRDA's proposed rule curve change is shown in Figure 2.

[4] *Grand River Dam Authority,* 77 FERC ¶ 61,251 (1996).

[5] *See* June 26, 2015, Commission staff letter dismissing, for lack of adequate information, May 28, 2015 request for temporary variance to enhance recreational boating and tailwater dissolved oxygen management; July 3, 2013 Commission order denying March 20, 2013 request for temporary variance based on drought forecasts, *Grand River Dam Authority,* 144 FERC ¶ 61,007 (2013), and August 2, 2013 letter denying request for reconsideration; July 25, 2011 Commission staff letter dismissing, for lack of adequate information, April 6, 2011 request for a temporary (two-year) variance to enhance recreational boating; April 4, 2006 Commission staff letter denying March 13, 2006 request for temporary variance to respond to drought conditions, on basis that variance not warranted based on forecasted conditions; June 17, 2004 letter from GRDA withdrawing January 26, 2004 request to permanently amend Article 401 rule curve to enhance recreation, water quality, and wildlife habitat; and August 16, 1999 letter from GRDA withdrawing June 2, 1999 request for temporary variance (for calendar year 1999) to allow for alternative plan for millet seeding.

[6] *Grand River Dam Authority,* 140 FERC ¶ 62,123 (2012).

[7] *Grand River Dam Authority,* 152 FERC ¶ 61,129 (2015) (August 14, 2015 order).

[8] The current license for the Pensacola Project expires in April 2022.

[9] In addition to the temporary variance granted in 2016, in a separate proceeding in 2015, the Commission granted the same temporary variance for the period of August 15, 2015 through October 31, 2015. *Grand River Dam Authority,* 152 FERC ¶ 61,129 (2015).

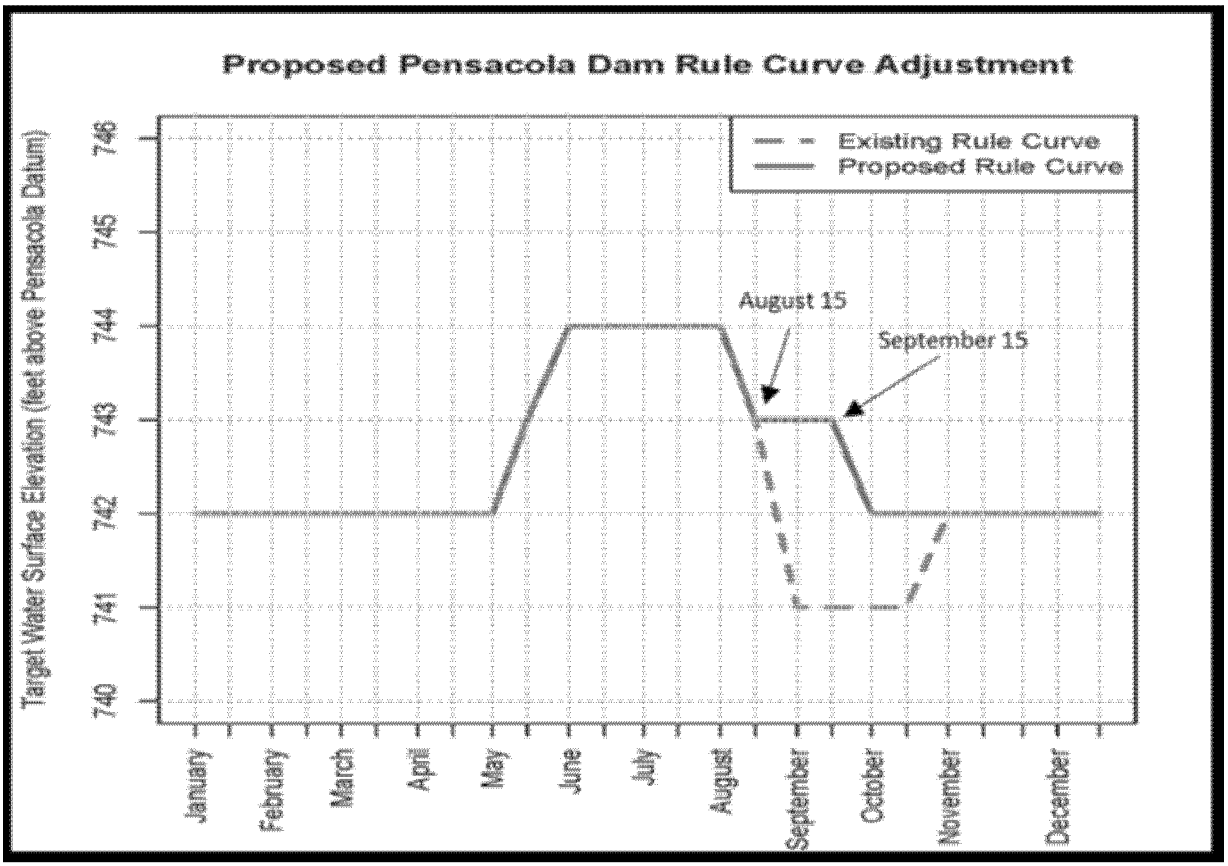

Figure 2. Proposed Changes to Article 401 Reservoir Rule Curve Elevations (source: GRDA, 2016).

4.1.2 Storm Adaptive Management Plan

As part of its permanent amendment request, GRDA proposes to implement a Storm Plan that would be used year-round in anticipation of and during major precipitation events within the Grand/Neosho River basin that might result in high water conditions upstream or downstream of Grand Lake. A Storm Plan was in place during the 2015 and 2016 temporary variance periods. During the 2015 temporary variance period, weekly conference calls between all participants took place to keep all participants informed of potential flood conditions in the river basin. Based on the success of the weekly calls in 2015 and discussions during the December 2015 technical conference,[10] the Storm Plan GRDA includes in its permanent amendment request includes year-round monitoring, with activation of the Storm Plan notifications and conference calls at any time during the year when there is a probability of high water conditions in the Grand/Neosho River basin.

According to the Storm Plan, GRDA would review, at a minimum, on a daily basis the following information: (1) Weather forecasts in the watershed; (2) Grand Lake surface elevation data; (3) data from the USGS gages upstream and downstream of the project; (4) surface elevations at the Corps' upstream John Redmond flood control reservoir and downstream Lake Hudson (part of GRDA's Markham Ferry Project); and (5) other relevant information affecting surface elevations at Grand Lake during the potential flood period.

If GRDA's daily review of the information indicates a probability of high water conditions in the Grand/Neosho River basin in the vicinity of the project, GRDA would immediately provide the information to federal and state resource agencies, local government officials, Commission staff, Tribes, and other interested stakeholders.[11] In conjunction with the distribution of the information, GRDA would also schedule a conference call. Prior to the conference call, GRDA would consult with the Corps to determine whether any reservoir management actions could be taken to avoid, reduce, or minimize high water levels upstream or downstream of the project. During the conference call, GRDA would then notify the participants of any proposal to take action. Participants will then have an opportunity during the teleconference to explore alternative solutions to respond to the forecasted high-flow event, recognizing the Corps' jurisdiction to direct flood control releases for

[10] A Technical Conference was held at the University of Oklahoma in Tulsa, Oklahoma on December 16, 2015, which included GRDA staff, FERC staff, resource agencies, local government entities, and Tribes to discuss modeling needs related to the rule curve amendment.

[11] The Storm Plan contact list includes: GRDA; the Commission; Corps; National Weather Service, Tulsa Forecast Office; Oklahoma Secretary of Energy and Environment; Oklahoma Department of Wildlife Conservation; Oklahoma Water Resources Board; Oklahoma Office of Emergency Management; U.S. Fish and Wildlife Service; City of Miami; Ottawa County Office of the County Commissioner; Ottawa County Emergency Management; Modoc Tribe; United Keetoowah Band of Cherokees; Quapaw Tribe of Indians; Oklahoma State Historic Preservation Office; and Oklahoma Archeological Survey.

purposes of flood risk management once the reservoir elevation is forecasted to exceed a flood pool elevation of 745 feet. GRDA would continue regular communications with all participants during each event in order to keep them informed of prevailing conditions.

GRDA notes that, although the protocols contained in the Storm Plan are separate and distinct from the protocols in its Emergency Action Plan (EAP) for the project, the Storm Plan complements the EAP and involves many of the same entities. According to the Storm Plan, if the EAP is triggered, the communication protocols in the EAP would supersede those included in the Storm Plan until the emergency is resolved.

The Storm Plan also includes provisions regarding historic properties in the project area that could be adversely affected by high water levels. As discussed in Section 6.9 *Cultural and Historic Resources,* the plan specifies that, if the Oklahoma State Historic Preservation Office (Oklahoma SHPO) concludes that any actions to address high water levels at Grand Lake would adversely affect any archaeological site or other cultural resource in the project area, GRDA would consult with the Oklahoma SHPO to develop a site-specific plan for protection or mitigation of the site. The plan also includes a provision for the unanticipated discovery of unidentified burial sites in the project area.

4.1.3 Drought Adaptive Management Plan

As part of its permanent amendment request, GRDA would institute its proposed Drought Plan during any period in which the National Drought Mitigation Center's (NDMC) U.S. Drought Monitor identifies a severe to exceptional drought within the Grand/Neosho River basin. The plan would help guide project operations and flow releases during drought conditions. It's the same plan used in 2016 and is similar to the plan used in 2015. As noted earlier, GRDA must maintain DO concentrations below the Pensacola Project and below its downstream Markham Ferry Project. GRDA states that, during periods of drought, adherence to the Article 401 rule curve could prevent it from releasing water necessary to maintain DO concentrations in these areas. Adherence to the rule curve could also prevent it from maintaining reservoir elevations in the Markham Ferry Project's Lake Hudson, which are necessary to operate GRDA's Salina Pumped Storage Project (No. 2524) as well as meeting other water supply needs.

Under the plan, GRDA would monitor information from the NDMC's U.S. Drought Monitor and information from other generally accepted sources of drought information applicable to the basin. Based on this information, if GRDA determines that drought conditions appear imminent, GRDA would begin weekly teleconferences with, in general, the same federal and state resource agencies, local government officials, Commission staff, Indian Tribes, and other interested stakeholders GRDA intends to consult with under the Storm Plan.[12] In the teleconferences, GRDA would keep these parties informed of prevailing conditions and any plans to begin additional releases in the event the NDMC U.S. Drought Monitor declares a severe to exceptional drought.

Under the plan, if the NMDC U.S. Drought Monitor declares a severe to exceptional drought for the Grand/Neosho River basin, GRDA may, at its discretion and based on input received during the weekly teleconferences, commence additional releases from Pensacola Dam, regardless of the prevailing levels at Grand Lake and Article 401 rule curve target elevations. Such releases would not exceed a rate equal to 0.06 feet of reservoir elevation per day, which is equivalent to approximately 837 cubic feet per second (cfs) per hour over a 24-hour period.

During the drought, GRDA would conduct weekly teleconferences to discuss project operations and would address the following issues in each teleconference: (1) Current and forecasted drought conditions and planned project operation; (2) maintenance of water levels and flows sufficient to maintain downstream DO concentrations for water quality and to prevent fish kills; (3) maintenance of reservoir elevations at the Markham Ferry Project's Lake Hudson sufficient to operate its Salina Pumped Storage Project for system reliability; and (4) based on available information, when the severe to exceptional drought period is expected to end. When severe to exceptional drought conditions are over, GRDA would cease releases under the plan, return to operating the project to target Article 401 rule curve elevations, and notify federal and state resource agencies and other stakeholders involved in the teleconference.

[12] The only participant not listed for both plans is the National Weather Service, Tulsa Forecast Office, which is only included in the Storm Plan.

4.2 Other Action Alternatives

No reasonable action alternatives to GRDA's proposal have been presented by GRDA, identified by Commission staff, or suggested by entities commenting in this proceeding.

4.3 No-Action Alternative

Under the no-action alternative, GRDA's request to permanently amend the Pensacola Project's Article 401 rule curve would be denied. GRDA would therefore continue to operate the project to target elevations along the current rule curve, except as directed by the Corps for flood control, for the remainder of the current license period. Also, GRDA's Storm and Drought Plans would not be approved by the Commission. Environmental resources in the project area would remain the same as they are initially described in *Environmental Analysis* below.

5.0 Consultation and Compliance

5.1 Background and GRDA's Pre-Filing Consultation

GRDA's pre-filing consultation included both its application for a permanent amendment to the Article 401 rule curve and its request for a temporary variance for 2016. GRDA distributed a draft of its application to federal and state resource agencies, Indian Tribes, local governmental authorities, and interested members of the public on March 15, 2016. On that same day, GRDA filed a request to shorten the normal 60-day pre-filing comment period to 30 days to help expedite processing. The Commission approved a reduced pre-filing comment period on April 5, 2016.

GRDA received comments on the draft application from the Delaware County Floodplain Administration, the Oklahoma Water Resources Board (Oklahoma WRB), the Oklahoma Department of Wildlife Conservation (Oklahoma DWC), the Modoc Tribe of Oklahoma, the City of Miami, Oklahoma (City of Miami), plaintiffs in two civil cases,[13] Mr. N. Larry Bork (on behalf of citizens and businesses located in Ottawa County, Oklahoma), the U.S. Fish and Wildlife Service (FWS), and the Oklahoma SHPO. GRDA included copies of these comments and addressed them in a comment/response table.

Substantive issues raised in pre-filing consultation included: (1) The extent and frequency of flooding of upstream areas and interpretation of recent flood studies; (2) progress in recent

[13] The two cases are *City of Miami* v. *GRDA,* Case No. CJ–08–690 (Okla. Dist. Ct.) and *Asbell, et al.* v. *GRDA,* Case No. CJ–01–381 (Okla. Dist. Ct.).

consultation between resource agencies and GRDA on mitigation for fish and wildlife under the current rule curve; and (3) protection of historic properties and archaeological sites. Almost all of the issues raised in pre-filing consultation were relevant to a permanent rule curve change and almost all were repeated in the responses to the Commission's public notice of GRDA's final application, as described below. All substantive issues raised in pre-filing consultation are treated in the resource sections of this environmental assessment (EA).

GRDA also included in its application a summary report on a hydraulic modeling technical conference held December 16, 2015, at the University of Oklahoma, and copies of letters from the University of Oklahoma and the Corps regarding recent flood studies relative to the amendment request.

5.2 Responses to Commission's Additional Information Request

On May 18, 2016, Commission staff issued a letter asking GRDA to provide additional information regarding fisheries and aquatic resources and the results of flooding studies on property and structures. GRDA filed additional information on these issues on June 2 and 30, 2016, respectively.

5.3 Public Notice and Responses

The Commission issued public notice of GRDA's application for a permanent amendment of the Article 401 rule curve on September 22, 2016, which was published in the **Federal Register** on September 29, 2016.[14] The notice established a 30-day deadline for submitting comments, motions to intervene, and protests. The notice was also published in five newspapers in the project area. Responses to the notice are listed in the following table and summarized below. On November 8, 2016, GRDA filed an answer to the comments made in response to the notice. Issues raised in these filings are addressed in this EA.

TABLE 1—RESPONSES TO PUBLIC NOTICE OF GRDA'S AMENDMENT APPLICATION

Entity	Filing date	Filing type
Modoc Tribe of Oklahoma	March 31, 2016	protest and comments[15].
Oklahoma DWC	April 6, 2016	comments[14].
Al Newkirk	October 10, 2016	comments.
U.S. Department of the Interior (Interior), Office of the Secretary, Albuquerque, New Mexico.	October 21, 2016	comments[16].
Interior, Office of the Solicitor	October 21, 2016	notice of intervention.
N. Larry Bork	October 24, 2016	protest and comments.
City of Miami	October 24, 2016	motion to intervene, protest, and comments.
Miami Tribe of Oklahoma, Wyandotte Nation, Ottawa Tribe of Oklahoma, Peoria Tribe of Oklahoma, Eastern Shawnee Tribe of Oklahoma, Seneca-Cayuga Nation (jointly, the Tribes).	October 24, 2016	motion to intervene and protest.
Oklahoma Archaeological Survey	November 7, 2016	Comments.

Al Newkirk

Al Newkirk states that his house and commercial pecan grove are located across the Neosho River from the City of Miami. Mr. Newkirk indicates that the frequency and duration of flooding of his property have increased over the years, with flooding in the pecan grove already occurring three times this year, and with floods previously lasting a day or two but now extending to a week to 10 days. Mr. Newkirk indicates that approximately 20 acres of his land cannot be accessed when the lake is at an elevation of 744 feet and there are flows of 5,000 to 6,000 cfs in the river. Mr. Newkirk writes that flooding results in financial harm to him and other people in the area. Regarding the timing of the annual lake drawdown in the fall, Mr. Newkirk indicates that boat traffic on the lake drops off significantly by September 15, and higher levels are not needed for safety past that time.

U.S. Department of the Interior

Interior reviewed the role of its Bureau of Indian Affairs (BIA) in working with federally recognized American Indian Tribes stating that it is clear that higher water elevations would affect Tribal lands and resources. Interior indicated that the Inter-Tribal Council[17] and several of its member Tribes informed the BIA that backwater flooding is affecting Tribal lands, communities, financial enterprises, infrastructure, and cultural resources. Interior indicated that these Tribes are concerned that amending the rule curve may increase adverse impacts. Interior noted that there is currently no agreement on the level of effects on Tribal lands and resources and until information to support appropriate mitigation for adverse effects is identified, Commission action on GRDA's amendment application would be premature.

Interior indicated that, as currently defined, the project boundary does not occupy Indian lands, but that BIA is in the process of establishing the boundaries and legal definitions of all affected Indian lands in the project area, with a number of Tribes having documented impacts to Tribally-owned lands and resources. Interior stated that it intends to more fully evaluate the project boundary issue during relicensing.[18] Interior also stated that lands and resources held in trust by the federal government are subject to its jurisdiction under section 4(e) of the Federal Power Act (FPA) and to restitution under FPA section 10(e).

Interior indicated that the relicensing process is the appropriate forum to discuss these and all other issues associated with continued project operation. Interior and BIA object to the amendment until project impacts and mitigation can be evaluated and negotiated during the re-licensing

[14] 81 FR 66,957 (Sept. 29, 2016).

[15] Filings made in response to the Commission's March 16, 2016, public notice of GRDA's request to reduce the public comment period from 60 to 30 days on GRDA's March 15, 2016 draft application.

[16] Interior indicated in its comments that its letter superseded a letter it had filed October 19, 2016.

[17] The Inter-Tribal Council is a Tribal intergovernmental body that is comprised of nine sovereign Tribal governments whose seat of government is located in and around Ottawa County, Oklahoma: the Miami Tribe of Oklahoma, the Wyandotte Nation, the Ottawa Tribe of Oklahoma, the Peoria Tribe of Oklahoma, the Eastern Shawnee Tribe of Oklahoma, the Shawnee Tribe, Modoc Tribe, Quapaw Tribe, and the Seneca-Cayuga Tribe.

[18] GRDA must file its Notice of Intent and Pre-Application Document to begin the relicensing process no later than March 31, 2017.

process, and jurisdictional issues between the Corps and the Commission are better understood.

Indian Tribes

The Tribes, which comprise six of the nine sovereign, federally-recognized Tribal governments whose respective seats of government are located in and around Ottawa County, Oklahoma, state that operation of the project has adversely affected their lands, facilities, and resources. In their comments, and during Government-to-Government Consultation with the Commission (discussed below), the Tribes assert that flooding due to project operation has increased in elevation, frequency, and duration, resulting in extensive property damage, closure of Tribal business enterprises and facilities, and impairment to essential services. The Tribes write that the proposed amendment would increase risks to health and human safety. The Tribes state that the Commission cannot determine what constitutes an ''incremental'' increase in flood effects and evaluate the impacts of such an increase, where the Commission has not yet evaluated the impacts of current operations.

The Tribes indicate that they oppose GRDA's proposal and urge the Commission to deny it based on unauthorized project-related flooding of federal trust lands. The Tribes believe that the Commission should defer any action pertaining to the rule curve until project relicensing and indicate that, alternatively, the Commission should condition any approval on GRDA's prior fulfillment of a series of requirements, including: (1) completing comprehensive upstream and downstream flood routing studies; (2) acquiring all necessary property rights within 12 months of completing studies; (3) investigating and reporting the extent of its use and occupancy of Tribal trust lands and filing an amendment application for authorization for any such occupancy as required under sections 4(e), 10(a), and 10(e) of the FPA; (4) identifying, in consultation with the Tribes and the Oklahoma SHPO, any archaeological sites, historic properties, or Tribal cultural properties that could be adversely impacted by the project, including those outside the current project boundary and above existing flowage easements; (5) conducting surveys of any such sites to determine eligibility for inclusion on the National Register of Historic Places (National Register); and (6) developing, in consultation with the Tribes and the Oklahoma SHPO, a plan for protection of, or mitigation of damage to, such sites, and submitting it to the Commission after approval by the Tribes.

N. Larry Bork

N. Larry Bork, in comments on behalf of 493 citizens and businesses in Ottawa County, asks the Commission to deny the amendment application. Mr. Bork asserts that the Commission is allowing GRDA to violate its license when unauthorized flooding occurs, and asks the Commission to ensure that GRDA purchases necessary easements before approving any amendment to the rule curve. Mr. Bork references recent studies finding a decrease in the flood storage capacity of Grand Lake caused by accumulation of sediments over time, and gives examples of times Grand Lake was below an elevation of 743 feet and high flows still flooded the City of Miami. Mr. Bork also provides a list of legal actions related to flooding upstream of the project.

Additionally, Mr. Bork asserts that past increases in the rule curve have led to flooding and economic decline of the City of Miami. Also, he indicates that backwater flooding can increase exposure to contaminants from the closed Tar Creek Superfund Site and Spring River. Lastly, Mr. Bork expressed concern that higher water levels would cause more pressure on Pensacola Dam, when 907 earthquakes occurred in Oklahoma last year.

City of Miami

The City of Miami asks the Commission to deny the permanent amendment to the rule curve, or in the alternative, condition any approval by requiring a comprehensive upstream and downstream flood routing study followed by the acquisition of all necessary property rights. Citing recently-completed flood studies, the City states that project operations have resulted in increased flooding in the City and surrounding region. The City believes that GRDA's failure to acquire necessary flowage easements makes unauthorized flooding illegal under the project license and state and local laws, and that it puts the health and safety of people and property at risk. The City indicates that the proposed rule curve amendment would only make this situation worse.

The City of Miami does not believe that analyzing only the incremental effects of the proposal is appropriate and that the Commission cannot and should not ignore existing conditions in rendering a decision on the amendment. The City says the Commission has a responsibility to ensure that GRDA operates the project in the public interest and references prior cases in support of the Commission not ignoring existing conditions. The city also references the Commission's authority under the license and under the FPA related to the protection of life, health, and property.

Finally, the City of Miami believes that the Commission must evaluate flooding in its EA, including impacts and the adverse socioeconomic impacts from unauthorized project-related flooding, and impacts to Tribal lands and resources that have been identified through consultations with the Inter-Tribal Council. The City also requests that the Commission consider the Inter-Tribal Council's concerns prior to issuing a decision on the rule curve proposal.

Oklahoma Archaeological Survey

The Oklahoma AS states that, although the Commission did not require GRDA to develop a project-wide Historic Properties Management Plan (HPMP) for the temporary variance, as recommended by the Oklahoma SHPO, the Commission should require a HPMP for the permanent amendment. The Oklahoma AS is concerned that changes in reservoir elevations have the potential to substantially impact historic properties, including archaeological sites, that are located along and near the shore of Grand Lake, by eroding the sites and by exposing them to looting and vandalism. Further, the Oklahoma AS does not accept the premise that GRDA's HPMP for the Markham Ferry Project is an adequate framework for the Pensacola Project since Markham Ferry has its own project setting and cultural resources. Therefore, the Oklahoma AS requests that a HPMP be developed specifically for the Pensacola Project's proposed rule curve amendment.

GRDA's Answer to Interventions and Comments

On November 8, 2016, GRDA filed an answer to the comments filed by Interior, the Tribes, Mr. Bork, and the City of Miami regarding flood effects, indicating that these entities' comments are without merit and outside the scope of the Commission's statutory responsibilities. GRDA argues that it and the Commission are not authorized to address flood control and flowage rights at Pensacola Dam because flood control is not a project purpose under the FPA, and Congress has tasked the Corps with these responsibilities. GRDA next states that during the temporary variances in 2015 and 2016, its Storm Plan successfully reduced the risk of flooding at the project. Lastly, GRDA states that the Tribe's allegation that the

Commission has failed to meet its responsibilities under section 106 of the National Historic Preservation Act (NHPA) are without merit. GRDA avers that it has consulted with the appropriate agencies and Tribes and that water levels under its proposal would not be outside the range of the current rule curve, and that any impacts to historic properties from flood control are beyond the scope of the undertaking and the Commission's jurisdiction. GRDA indicated that, while the Tribes have asserted that project operation is causing flooding of Tribal trust lands, the Tribes have not identified properties listed or eligible for listing in the National Register that would be affected by the proposed action.

5.4 Comments on Flooding and the Scope of This Environmental Assessment

The majority of the comments filed in response to the Commission's public notice concern flooding in the upper reaches of Grand Lake. These comments, summarized above, primarily focus on the degree to which the presence of the project and GRDA's operation of the project has contributed to the frequency, duration, and magnitude of flooding. In addition, comments were filed on the effects of the proposed rule curve change on flooding, the accuracy of the project boundary, and the adequacy of GRDA's property easements in relation to flooding. Commenters also address the adequacy of input data and the methodology of several flood routing studies presented by GRDA, the City of Miami, Commission staff, and others in this and earlier proceedings. Further, commenters questioned the accuracy and interpretation of the results of those studies.

These same issues were raised in the Commission's 2015 and 2016 proceedings for GRDA's temporary variances. In those proceedings, staff carefully examined hydraulic modeling studies and the results of those studies and summarized its findings which were then addressed in the Commission's orders issued August 14, 2015 and August 12, 2016. In the *Water Quantity and Flows* section of this EA, staff summarizes those studies and results as needed, in order to address the flood-related comments received in this proceeding.

In their comments, Interior, the Tribes, Mr. Bork, and the City of Miami raise the issue of flooding and adverse socioeconomic effects to property in the City of Miami and Tribal trust lands and resources. The extent to which the proposed amendment would aggravate flooding and affect property is discussed in the *Water Quantity and Flows* section. The information in that section includes modeled effects to areas and structures in the City and surrounding lands. Pursuant to our statutory responsibilities under section 106 of the NHPA, we address comments specific to Tribal lands and resources in the *Cultural and Historic Resources* section and in the summary of our Government-to-Government consultation with the Inter-Tribal Council. To the extent the above commenters address flooding concerns that are not related to the pending amendment, the Commission will perform a comprehensive review of the project and any proposed future operation in the upcoming relicensing proceeding. That proceeding is the appropriate forum to identify and address issues that are separate from GRDA's amendment application.

5.5 Government-to-Government Consultation

Commission staff met with the Inter-Tribal Council on August 3, 2016, in Miami, Oklahoma to hear the Council's concerns and gather any additional information the Council or its member Tribes wish to present for Commission consideration. In summary, the Inter-Tribal Council reiterated its concerns that the project already floods Tribal trust lands and other areas in the Miami region. The Inter-Tribal Council provided more detailed information concerning the whereabouts of individual Tribal lands and facilities affected by flooding, their desire to be compensated for flooding effects, and their concerns about the project in general. Commission staff's August 3rd meeting with the Inter-Tribal Council and its member Tribes was transcribed and the transcripts were filed with the Commission's Secretary. All comments presented at the August 3, 2016 meeting have been made a part of this proceeding and are publicly available. Further information concerning cultural and historic resources and the Commission's consultation with the Tribes is discussed in Section 6.9 *Cultural and Historic Resources.*

5.6 Statutory Compliance

5.6.1 Section 401 Water Quality Certification

The Clean Water Act (CWA) gives authority to each state to issue a section 401 Water Quality Certification (401 certification) for any FERC-licensed project that requires a permit pursuant to section 404 of the CWA. Additionally, an applicant must obtain a 401 certification for any activity that may result in a new discharge into navigable waters. The 401 certification is a verification by the state that a proposed project would not violate water quality standards.

On June 30, 2016, the Oklahoma Department of Environmental Quality (Oklahoma DEQ) issued a 401 certification for GRDA's permanent amendment request, subject to four conditions: (1) The certification does not authorize any discharge or dredging; (2) the reservoir will be maintained between elevations 742 and 744 feet as requested by GRDA; (3) emergency and routine maintenance will be as permitted by the Corps; and (4) the results of ongoing testing of DO mitigation measures under the project license shall be submitted annually to Oklahoma DEQ. These conditions are included in our analysis of effects to water quality in Section 6.4 *Water Quality.*

5.6.2 Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure their actions are not likely to jeopardize the continued existence of federally listed threatened or endangered species, or result in the destruction or adverse modification of the critical habitat of such species. Several federally listed species are known to use the Pensacola Project area. The gray bat (*Myotis grisescens*) and the Neosho mucket (*Lampsilis rafinesqueana*) are listed as endangered, while the Ozark cavefish (*Amblyopsis rosae*) and the Neosho madtom (*Noturus placidus*) are listed as threatened.

In its April 21, 2016 comments on GRDA's application, FWS states that GRDA's proposal would not adversely affect any listed species. Information on listed species is discussed further in Section 6.8, *Threatened and Endangered Species.* However, in summary, no further consultation pursuant to the ESA is required for this proceeding.

5.6.3 National Historic Preservation Act

Under section 106 of the NHPA,[19] and its implementing regulations,[20] federal agencies must take into account the effect of any proposed undertaking on properties listed or eligible for listing in the National Register and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on the undertaking. GRDA's proposed amendment would not cause Grand Lake to exceed its normal

[19] 54 U.S.C. 300101 *et seq.* (2014).

[20] 36 CFR part 800 (2011).

maximum (or minimum) water surface elevations under the rule curve specified by Article 401. Water levels would remain within existing fluctuation limits within the rule curve. Also, the proposed amendment does not involve any land-clearing or land-disturbing activities. Therefore, we find that the proposed amendment would not affect cultural resources and historic properties. Further information is discussed in Section 6.9 *Cultural and Historic Resources.*

6.0 Environmental Analysis

6.1. Scope of the Analysis

The geographic scope of this analysis is Grand Lake, its shoreline areas, and flows immediately upstream and downstream. As appropriate, discussions of cumulative environmental effects are incorporated into the resource sections in this document.

The temporal scope of this environmental analysis focuses on the period from now until when the current project license expires in April 2022. The environmental effects of any proposed rule curve changes made during the relicensing period will be evaluated as part of the relicensing docket.

6.2 General Description of the Project Area

The Pensacola Project and its reservoir, Grand Lake, are located on the Neosho River in the northeast corner of Oklahoma, in Craig, Delaware, Mayes, and Ottawa counties. Downstream of the project, the Neosho River is locally known as the Grand River. Much of the land surrounding Grand Lake is privately owned and many areas along its shorelines have become highly developed with commercial resorts, private homes and condominiums, municipal and state parks, marinas, and private docks.

6.3 Geology and Soils

6.3.1 Affected Environment

Limestone bluffs and steep rocky beaches characterize much of the southern and eastern shorelines at Grand Lake. Soils in these areas are mostly cherty material that is not highly erodible. In contrast, the northern and western areas of the lake are surrounded mostly by rolling plains with occasional hills and ridges with gentle slopes. These shorelines generally feature more erodible loamy soils with mud substrates, silt deposits, and wetlands at inlets and coves associated with numerous small tributaries. These mud substrates and silt deposits provide good conditions for the growth of certain wetland vegetation (FERC 1996; FERC 2009 (SMP EA)).

6.3.2 Environmental Effects

Under the proposed rule curve, water levels would not be lowered three feet from elevation 744 to 741 feet in August, as is currently done. Instead, the draw down would stop after one foot at elevation 743 feet until September 15, then drop an additional foot to elevation 742 feet, and remain at that level until October 31 (see Figure 2). This stepped reduction in water levels, combined with eliminating the last foot of drawdown from September 15 to October 31, would likely result in only minor changes in erosion patterns that occur under the current rule curve. These changes would likely include minor decreases in shoreline erosion, although erosion from wind and waves at the waterline would be expected to continue regardless of water levels. Reductions in erosion rates over sequential years could enhance revegetation of some shallow water, near-shore areas over time, leading to increases in substrate and soil stabilization that could be beneficial.

6.4 Water Quantity and Flows

6.4.1 Affected Environment

Grand Lake is impounded by Pensacola Dam on the Neosho River, which has a basin covering 12,110 square miles in Kansas, Oklahoma, Missouri, and Arkansas. The Neosho River originates in the Flint Hills of east central Kansas, then flows southeasterly and easterly until it enters the 66-mile-long Grand Lake. Below Pensacola Dam, the Neosho flows approximately 77 miles to its confluence with the Arkansas River. Significant tributaries of the lake include Spring River, Elk River, Tar Creek, and Duck Creek.

Flows in the Neosho River downstream of Pensacola Dam to the head of Lake Hudson are controlled by operation of the Pensacola Dam. USGS gage 07190500, Neosho River Near Langley, OK, is located approximately 3.6 miles below the dam, and has been in operation 1939. According to records collected at that gage for water years 1940 through 2015, the historic highest daily mean flow was 287,000 cfs, recorded May 20, 1943. The lowest daily mean flow for that period was 9 cfs, recorded March 25, 1940, four days after initial filling of Grand Lake began. The historic annual mean flow was 7,601 cfs. In water year 2015, the highest daily mean flow of 86,900 cfs was recorded at the gage on May 30, and the lowest daily mean flow of 84 cfs was recorded November 20, with an annual mean flow of 9,169 cfs (USGS, 2016).

Grand Lake is one of the largest lakes in Oklahoma with approximately 522 miles of shoreline. At the time of project was relicensed in 1992, Grand Lake was recorded as having a surface area of approximately 46,500 acres at elevation 745 feet. At elevation 745.1 feet, the mean depth of the reservoir is about 36 feet while the maximum depth is 164 feet (FERC, 2007; FERC 2009). As shown in Table 2, results of recent surveys have updated the calculation of the surface area of Grand Lake at an elevation of 745 feet, as well as the surface area at other elevations relevant in this EA.

Except during flood events, when releases are directed by the Corps for flood control, GRDA operates the Pensacola Project to target seasonal water elevations at Grand Lake varying from elevation 741 to 744 feet in accordance with the Article 401 rule curve. As shown in Figure 2, a lake elevation of 742 feet is maintained November 1 through April 30. In May, the lake is raised to a summer elevation of 744 feet. In August, the level is then reduced to a low point of 741 feet and then held there for six weeks from September 1 through October 15. It is then returned to an elevation of 742 feet by November 1. While targeting the elevations on the rule curve, GRDA also manages releases to provide water to operate GRDA's downstream Markham Ferry Project and its Salina Pumped Storage Project. In addition, during summer and fall, calculated releases are made to help maintain DO concentrations in the tailrace and downstream river, as discussed further under *Water Quality* below.

Grand Lake is also a significant local water supply. GRDA indicates in its application that approximately 25 wholesale customers currently withdraw water from Grand Lake and that the lake is used by approximately 21,000 residential households and 500 commercial customers. GRDA issues yearly permits for domestic water use.

TABLE 2—GRAND LAKE ELEVATION AND SURFACE AREA

[Source: Oklahoma WRB, 2009]

Surface elevation (feet PD[21])	Surface area (thousands of acres)
740	36.58
741	37.52
742	38.83
743	39.98

[21] Elevations converted from NGVD to PD.

TABLE 2—GRAND LAKE ELEVATION AND SURFACE AREA—Continued

[Source: Oklahoma WRB, 2009]

Surface elevation (feet PD[21])	Surface area (thousands of acres)
744	40.60
745	41.11

6.4.2 Environmental Effects

Project operation using the proposed rule curve would increase the elevation, volume, and surface area of Grand Lake in late summer and early fall. It would therefore, allow GRDA to store more water each year during that period for the duration of the current license term. As shown in Figure 2, water levels would no longer be lowered all the way from elevation 744 to 741 feet in August, but instead would be reduced to 743 feet and held at that elevation from August 16 through September 15. The elevation would then be lowered to 742 feet, eliminating the deepest part of the drawdown, and held at that elevation until the following spring. Also, as shown in Figure 2, the overall length of the drawdown period between summer and winter elevations would be reduced from 12 to 8 weeks. GRDA would continue to target the rule curve at all times, except as necessary for the Corps to provide flood protection, or during any periods in which the proposed Storm or Drought Plans might be utilized.

The increase in lake elevations under the proposed rule curve would primarily benefit boating on Grand Lake in late summer and early fall each year, as described in *Recreation* below. The increase in storage would also provide a buffer for local entities that utilize Grand Lake for water supply, because more storage would be available during what is typically the hottest and driest time of the year. This coincides with the season when the population around the lake is highest, with the highest local water demand. The higher reservoir elevation in late summer and fall would also help ensure GRDA has sufficient water for releases to maintain downstream DO in hot and dry years, as described further in *Water Quality,* and would decrease the chances of Grand Lake water levels falling below the rule curve during periods of drought. If drought conditions cause water to fall below elevations on the rule curve, GRDA would, under its proposed Drought Plan, regardless of reservoir elevations, make releases that would not exceed a flow rate equal to 0.06 feet of reservoir elevation per day, which is equivalent to approximately 837 cfs per hour over a 24-hour period.

The reduction in the total drawdown depth and the stepped reduction to winter elevations should also provide some benefits to other resources, primarily near-shore and shoreline habitat for fish and wildlife, as described in sections below.

Flooding Impacts

There have been several hydraulic studies prepared that assess the affects the proposed rule curve amendment would have on flooding. Key studies, as well as submitted reviews of those studies, were evaluated for this environmental analysis, they include:

- A 2014 study performed by Alan C. Dennis (2014 Dennis Study);[22]
- an independent modeling analysis performed by Commission staff as part of its review of GRDA's 2015 temporary variance request (2015 Staff Analysis);[23]
- a hydraulic modeling study conducted by Tetra Tech dated February 3, 2016 (2016 Tetra Tech Study);[24]
- a May 2016 review by Mead & Hunt of the 2016 hydraulic modeling study conducted by Tetra Tech;
- letters dated July 23, 2015 and May 2, 2016 from the University of Oklahoma regarding the 2014 Dennis Study and the differences between the 2014 Dennis, 2015 Staff, and 2016 Tetra Tech studies;
- a letter dated February 20, 2015 from the Corps regarding the 2014 Dennis Study; and
- a summary report on a hydraulic modeling technical conference held December 16, 2016 in Tulsa, Oklahoma.[25]

In support of its permanent amendment request, GRDA relies primarily on the 2014 Dennis Study which analyzed the upstream flooding impacts, particularly in the area of Miami, which would occur as a result of the proposed rule curve modification. The study determined that the proposed rule curve modification would have a minimal impact on upstream flooding; concluding that the incremental[26] increase in water surface elevations would be less than 0.2 foot[27] at Miami.

In review of the GRDA 2015 temporary variance request, Commission staff performed an independent analysis on the potential flooding impacts of the rule curve change. Commission staff gathered available pertinent data, including but not limited to, stream flows, reservoir elevations, spillway gate operations, and other data from historic storms to build the input files for the independent verification model which also extended downstream to assess potential flooding impacts from Pensacola Dam to the USGS Gage No. 07190500, Neosho River near Langley, Oklahoma (Langley gage).

While the 2014 Dennis Study only considered storm events from August 15 to September 15, Commission staff reviewed historic storms during the August 16 to October 31 time period for its independent analysis. Staff selected the October 1986, September 1993, and October 2009 storms for use in the hydraulic model because they are large historic storms from the time of year corresponding to the proposed change in the rule curve. Staff concluded that historic large spring or early summer storms were not appropriate for this analysis since they occur outside of the proposed rule curve amendment period.[28] Using flow data from USGS Gage No. 07185000, Neosho River near Commerce, Oklahoma (Commerce gage), along with the Federal Emergency Management Act (FEMA) flood frequency curve prepared for that gage,[29] Commission staff determined that the flow recurrence intervals for the Neosho River for the October 1986, September 1993, and October 2009 storms are 17-year, 8-year, and 3-year events, respectively. The results of the Commission staff independent analysis concluded that the maximum incremental increase is approximately 0.1 foot if the reservoir starting elevation is raised from 741 to 742 feet and approximately 0.2 foot if the reservoir starting elevation is raised from 741 to

[22] The 2014 Dennis Study is a graduate thesis submitted to the University of Oklahoma graduate program in 2014 by Alan C. Dennis. *Floodplain Analysis of the Neosho River Associated with Proposed Rule Curve Modifications for Grand Lake O' the Cherokees,* Docket No. P–1494–432 (filed May 29, 2015).

[23] Commission staff's independent analysis performed for GRDA's temporary variance request was filed under Docket No. P–1494–432 on August 31, 2015.

[24] The 2016 Tetra Tech Study was completed for the City of Miami, Oklahoma. *Hydraulic Analysis of the Effects of Proposed Rule Curve Change at Pensacola Dam on Neosho River Flooding in the Vicinity of Miami, Oklahoma,* Docket No. P–1494–433 filed April 14, 2016 and July 22, 2016 (2016 Tetra Tech Study).

[25] Attendees of the conference included representatives from GRDA and its consultants, Commission staff, the City of Miami, the Corps, the Modoc Tribe of Oklahoma, and the University of Oklahoma.

[26] In this document, incremental refers to the change in water surface elevation due to the proposed rule curve amendment.

[27] 0.2 foot is equivalent to 2.4 inches.

[28] Generally, storm intensity and duration vary seasonally throughout the year with larger events occurring in the spring and early summer for this river basin.

[29] FEMA, Task Order HSFE06–11–J–0001 for Grand Lake O' the Cherokees Watershed (Nov. 15, 2013).

743 feet. However, a precise number of additional structures impacted by the maximum incremental increase of 0.2 foot in the vicinity of Miami could not be determined due to the lack of surveyed structure data (*e.g.*, first floor elevation or lowest adjacent grade to the structure) and the coarseness of the available topographic data. Staff's review of aerial photographic data in the vicinity of Miami indicated that there would be increased flooding of 11 structures already inundated with a reservoir starting elevation of 741 feet. An additional 22 structures that are located within a 30-foot horizontal buffer of the inundation zone could also be impacted. Nonetheless, many inundated structures are located at the edge of the inundated area where flood depths are minor and the incremental flooding impacts are minimal.

The maximum incremental increase in water surface elevation downstream of Pensacola Dam, at the Langley gage, also occurs during the October 2009 storm event and is approximately 0.3 foot if the reservoir starting elevation is raised from 741 to742 feet and approximately 0.7 foot if the reservoir starting elevation is raised from 741 to 743 feet.[30] With the same topographic limitations found in the vicinity of Miami, a specific number of additional structures impacted by the maximum incremental increase of 0.7 foot could not be determined. Review of aerial photographic data indicated that there would be increased flooding of 12 structures already inundated with a reservoir starting elevation of 741 feet. An additional 7 structures that are located within a 30-foot horizontal buffer of the inundation zone could also be impacted. If GRDA is proactive in its adaptive management procedures, using technical experts to continually assess the potential for storm events and reacting quickly when necessary by notifying downstream residents using EAP procedures that have been developed for the project, there would be at most minimal increases in incremental flooding.

The City of Miami filed comments on July 22, 2016, which included a new study performed by Tetra Tech dated April 26, 2016, that evaluated the effects of the proposed rule curve change on structure inundation (2016 Tetra Tech Study). The 2016 Tetra Tech Study evaluated the effects of the proposed rule curve on flooding upstream of Grand Lake, specifically in the vicinity of Miami, that would occur during the October 1986, September 1993, and October 2009 historic storm events. The study was performed using a HEC–RAS hydraulic model and incorporated new bathymetric survey data to account for sedimentation that has occurred in the Neosho River channel upstream of the reservoir. The 2016 Tetra Tech Study indicates that the water surface elevations at Miami during the modeled historic flood events are higher than determined in the 2015 Staff Analysis for both the 741 and 743 feet Grand Lake elevations. The study confirmed that during the three modeled storm events, the maximum incremental increase in water surface elevation at Miami, which occurs during the October 2009 storm, is less than 0.2 foot if the Grand Lake reservoir elevation is raised from 741 to 743 feet. The 2016 Tetra Tech Inundation Study concluded that the 2015 Staff Analysis underestimated the number of structures inundated under the current rule curve, due to the staff's lower computed water surface elevations, but that no additional structures would be impacted by the proposed rule curve change.

On June 30, 2016, GRDA filed a response to Commission staff's May 18, 2016 request for additional information. The response included a review, prepared by GRDA's consultant Mead & Hunt, of the 2016 Tetra Tech Study and an evaluation of the effects to property, structures, and human life as a result of the higher water surface elevations indicated in the 2016 Tetra Tech Study. Mead & Hunt found that all three of the most recent hydraulic model studies of the Neosho River upstream of Pensacola Dam conducted by Tetra Tech, FERC, and Dennis agree that the incremental change in water surface elevations due to the requested variance is 0.2 feet (2.4 inches) or less at the Miami gage. The difference in water surface elevations at the Miami gage between the latest Tetra Tech model and the FERC model are primarily due to a difference in the downstream boundary conditions/starting water surface elevations, and the bathymetry data gathered in April 2015 that results in higher predicted channel elevations. Mead & Hunt concluded that the Tetra Tech modeling cannot be relied upon for future studies until it has been verified that the model configuration, parameters, calibration results, and overall results are accurate and recommended that further investigation be completed before relying on the higher water surface elevations determined in the study.

In order to determine the effects to property and structures that could result from the higher water surface elevations indicated in the 2016 Tetra Tech Study, Commission staff also requested that GRDA evaluate the impact to structures that would occur with and without the proposed rule curve change for the three historic storm events (October 1986, September 1993, and October 2009) modeled in the 2016 Tetra Tech Study and 2015 Staff Analysis. Even though Mead & Hunt recommended further investigation before relying on the 2016 Tetra Tech Study results, it prepared inundation mapping for the three historic storm events based on the elevations in the 2016 Tetra Tech Study. The results of the inundation mapping, which used the 2016 Tetra Tech Study water surface elevations, show no additional structures would be impacted by the proposed rule curve change.

To quantify any increased physical danger to residents due to the incremental increase in inundation as a result of higher water surface elevations computed by Tetra Tech's model, Mead & Hunt conducted a hazard analysis for the three historic storm events using the ACER 11 procedure.[31] The analysis indicates that there would be no increased danger under October 1986 and October 2009 storm conditions. Under September 1993 storm conditions, two structures, a commercial building and a recreational building, may experience an increase in danger. For the commercial building, the ACER 11 danger zone would change from the low danger zone to the judgment zone; however, the hazard increase is due to a slight increase in flood depth of 0.1 foot. For the recreational building, the ACER 11 danger zone would change from the judgment zone to the high danger zone; however, the hazard increase is due to a slight increase in flood depth of 0.1 foot. Therefore, despite the change in danger zone classification for these two structures, the actual change in hazard is insignificant and there would be no increased risk to human life.

In addition to Mead & Hunt, others reviewed and commented on the three separate hydraulic analyses. University of Oklahoma professors, who were on Mr. Dennis' thesis committee, issued a letter on July 23, 2015, that responded to comments directly related to his Master's thesis work. The professors commented on the modeling protocols, the boundary conditions, and the time frame of modeling for the 2014 Dennis Study. In addition, the professors stated that the 2014 Dennis Study used the

[30] 0.3 and 0.7 foot are equivalent to 3.6 and 8.4 inches, respectively.

[31] U.S. Department of the Interior, Bureau of Reclamation, Assistant Commissioner, Engineering and Research Technical Memorandum No. 11 (ACER 11), Downstream Hazard Classification Guidelines (December 1988). The ACER 11 procedure describes the danger posed to inundated structures based on flood depth and velocity.

most current bathymetric and topographic information that was available. In particular, the lake bathymetry, which was called into question by the City of Miami in their June 26, 2015 letter, is based on data collected by the Oklahoma Water Resources Board in 2009, so it would certainly represent sedimentation that occurred between construction of the dam and 2009. Then, in a letter filed May 2, 2016, the same University of Oklahoma professors commented on the 2014 Dennis Study, the 2015 Staff Analysis, and the 2016 Tetra Tech Study and stated that the three different studies, each using different approaches, have all reached a nearly identical result, and that the predicted difference is within the expected bounds of model accuracy due to numerical errors and parameterization of physical processes.

The Corps, Tulsa District reviewed the 2014 Dennis Study and found the study to be of high quality and consistent with previous studies that were completed by the Tulsa District (1998) and Dr. Forrest Holly (2004). The Corps said that although a more diverse set of calibration storms would have been preferable, the results of this study are consistent with previous efforts, and the Corps concurred with the findings that were presented. In a July 24, 2015 letter, the Corps states that it had performed an analysis of the 2015 temporary variance request and determined that the variance would have negligible impacts on downstream flooding. Furthermore, the Corps states that its model results showed a discharge of around 100,000 cfs while adverse impacts (*i.e.,* flooding) did not begin until 130,000 cfs at the Highway 82 Bridge. The Corps also notes that properties outside of existing flowage easements are not affected until the discharge exceeds 230,000 cfs.

The City of Miami's July 22, 2016 comments argue that the 2015 Staff Analysis underestimates the number of structures impacted during the historic storm events. Although both the 2016 Tetra Tech Study and the inundation mapping conducted by Mead & Hunt show a greater number of structures impacted, both studies also determined that no additional structures would be impacted by increased flooding due to the proposed rule curve change. Further, as discussed above, the Mead & Hunt hazard analysis using the 2016 Tetra Tech Study found no additional risk to human life.

Finally, Mr. Bork commented regarding the capability of GRDA to timely open spill gates in advance of a predicted storm event. According to the Supporting Technical Information Document for the project that is filed with the Commission, the time required to position a gate hoist above a spillway gate and then raise or lower that gate is typically in the range of 15 to 20 minutes, which is adequate to respond to storm events. Mr. Bork also expressed concern regarding the number of earthquakes in Oklahoma and the additional pressure that higher water levels would place on Pensacola Dam. Because the proposed rule curve change does not include any water levels higher than those on the current rule curve, and because there is no reason to expect that the rule curve change would significantly affect high-water events, we do not anticipate any dam safety concerns regarding GRDA's proposed amendment.

6.5 Water Quality

6.5.1 Affected Environment

Grand Lake

The designated beneficial uses for Grand Lake include public and private water supply, fish and wildlife propagation as a warm water aquatic community, Class 1 irrigation, and primary body contact recreation (GRDA, 2008b). Oklahoma state water quality standards require the following in order to protect the warm water aquatic community designation: Dissolved oxygen (DO) concentrations maintained at or above 6.0 milligrams per liter (mg/l) at 25 degrees Celsius (°C) from April 1 to June 15 (for fish early life stages); at or above 5.0 mg/l at 32 °C from June 16 to October 15 (summer conditions); and at or above 5.0 mg/l at 18 °C from October 16 to March 31 (winter conditions) (GRDA 2008b).

Grand Lake was recently listed on Oklahoma's 303(d) list for organic enrichment/low DO levels and color.[32] Water quality in the lake is affected primarily by heavy recreational use and shoreline development, but also by heavy metal contamination from acid mine drainage originating upstream along the Neosho River and Spring River, and possibly by trace metal contamination from local surface mining (GRDA 2008a). These sources include the Tar Creek Superfund Site, a former mining area known to release acid mine drainage containing heavy metals such as lead, cadmium, and zinc into the Tar Creek system, the Neosho River and Grand Lake (Oklahoma WRB, 2012).

Generally, surface water temperatures in Grand Lake range from between 4 and 28 °C annually. The reservoir typically begins to exhibit thermal stratification in May, with anoxic conditions forming in the deep waters of the hypolimnion several weeks later. Across Grand Lake, the extent of stratification varies, with downstream portions of the reservoir exhibiting stronger stratification than the upstream sections of the reservoir. Sampling conducted in 2003 and 2004 found that stratification was strongest during the summer, with approximately 38 percent of the water column having DO concentrations below 2.0 mg/l in the lower portion of the reservoir (GRDA, 2008a).

GRDA currently works to mitigate water quality issues through lake-wide sanitation regulations, shoreline use classifications and management of shoreline development, water quality monitoring, and other measures included in its approved Shoreline Management Plan.

Downstream

The Oklahoma WRB has designated the Neosho River below the project as a warm-water aquatic community, with minimum DO standards of 6.0 mg/l from October 16 through June 15, and 5.0 mg/l from June 16 through October 15. A 1.0 mg/l DO deficit is allowed for not more than 8 hours in a 24-hour period April 1 through October 15.

Water quality in the project tailrace and the river downstream is dependent on releases through generation. The powerhouse draws water from relatively deep in the reservoir where water can have very low DO concentrations when the lake stratifies in summer and into the fall. In the past, release of this DO-deficient water, combined with the hot and dry conditions that regularly occur in late summer and fall, has led to violations of Oklahoma water quality standards and fish kills. GRDA now manages downstream releases during this period to maintain water quality criteria for DO pursuant to plans approved under license Article 403.[33]

6.5.2 Environmental Effects

Grand Lake

Normal project operation under the proposed rule curve would not have any significant negative effects on water quality in Grand Lake and may provide some minor benefits to water quality by reducing the magnitude of water level changes that may contribute to exposure

[32] Under section 303(d) of the CWA, states are required to develop lists of impaired waters that don't meet the state's water quality standards for their designated beneficial uses.

[33] *See Grand River Dam Authority,* 151 FERC ¶ 62,098 (2015) (Order Modifying and Approving Dissolved Oxygen Mitigation Plan Pursuant to Article 403).

of shallow substrates, rates of shoreline erosion, resuspension of sediments, and near-shore turbidity. Reduction in substrate exposure and erosion rates would also reduce resuspension of pollutants, such as heavy metals, where they are present in substrates in the lake. Mr. Bork raised the issue of backwater flooding under the proposed rule curve change allowing increased exposure to contaminants from the Tar Creek Superfund Site or Spring River. Based on the discussion of flooding effects above in the *Water Quantity and Flows* section, we do not believe the proposed rule curve change would cause any measurable changes in release of, or exposure to, contaminants from those sources.

Downstream

The additional water that would be stored in Grand Lake under the proposed rule curve would help ensure water is available for making releases to maintain downstream DO concentrations during late summer and fall. Additionally, the proposed Drought Plan would help GRDA to maintain downstream DO concentrations in the event that a severe to exceptional drought is declared for the river basin and reservoir elevations fall below the elevations on the rule curve.

GRDA indicates that releasing water pursuant to the Drought Plan should also help ensure that it has sufficient water for DO maintenance in the river below its downstream Markham Ferry Project, while maintaining lake elevations at that project's Lake Hudson necessary for operation of its Salina Pumped Storage Project, which is important to local electric system reliability.

Water quality downstream of the project could be negatively affected if the higher water levels on the proposed rule curve lead to any increase in upstream flood conditions and therefore more flood flow releases. Increases in flood flow releases could increase rates of downstream river bank erosion, resulting in increases in water turbidity. However, based on studies to date, it is unlikely any such effects to downstream flows and erosion would be significant, or predictable in frequency or severity.

Oklahoma DEQ's 401 certification for GRDA's permanent amendment request includes a condition requiring GRDA to provide it with annual reports of the results of ongoing testing of downstream DO mitigation measures performed under plans that have been approved under license Article 403. The Commission included this requirement as a condition of its approval of GRDA's temporary variance for 2016. The Commission added a requirement that GRDA notify Oklahoma DEQ at the same time it notifies other agencies pursuant to the plan of any significant DO deficiencies or DO mitigation, so that Oklahoma DEQ can track GRDA's progress in maintaining state water quality standards. Inclusion of the same requirement in any approval of a permanent amendment would allow Oklahoma DEQ to continue to track GRDA's progress in maintaining state water quality standards through the remainder of the current license period, and help ensure water quality below the project is protected.

Based on our review, operation using the proposed rule curve modification would not result in any material adverse impacts to water quality.

6.6 Fisheries and Other Aquatic Resources

6.6.1 +Affected Environment

Grand Lake

Grand Lake supports a robust warm water fishery for largemouth and smallmouth bass, white bass, striped bass and hybrid striped bass, crappie, several species of sunfish and catfish, and paddlefish. It also supports populations of a number of species of suckers, minnows, and darters. Gizzard and threadfin shad are important forage species that help sustain the sport fishery in Grand Lake. Grand Lake is one of the top bass fishing destinations in the nation, consistently attracting national fishing tournaments (FERC, 1996; GRDA 2016).

Largemouth bass and many other fishes present in Grand Lake spawn in springtime in relatively shallow waters. Through the summer and fall, the young of these fishes then use shallow areas with aquatic and emergent vegetation or other structure as primary nursery habitat and for cover and feeding as they mature (FERC, 1991; FERC, 1996).

Water level fluctuations that occur under the current rule curve, which was approved in the order issued December 3, 1996, do not allow the establishment of significant areas of shallow-water emergent and submergent aquatic plants. Juvenile fishes that would use such areas for cover and feeding in summer and fall therefore utilize other types of cover, including woody debris and other natural features, and man-made structure such as docks, and artificial reefs. Current work on artificial reefs is described below.

Fish Habitat Mitigation for Effects of Current Rule Curve

A significant amount of effort has been expended to mitigate the effects of water level fluctuations under the rule curve on shallow-water fish habitat at Grand Lake. The Article 401 rule curve in the 1992 license included a stepped 15-week drawdown and partial refill in late summer and fall, with a low-elevation of 741 feet that was maintained for a period of 8 weeks. The drawdown over that period was intended, in part, to enhance fish habitat by exposing mudflats for natural revegetation, and revegetation through annual millet seeding. When the rule curve was amended to its current form in a Commission order issued December 3, 1996, the drawdown was reduced to 12 weeks, and the period of lowest drawdown was reduced to 6 weeks. The Commission acknowledged that the shortened drawdown period would reduce the effectiveness of annual millet seeding and negatively affect fish and waterfowl. Therefore, Article 411 was added to the license to require a Fish and Waterfowl Habitat Management Plan, to include establishment of a mitigation fund and formation of a technical committee to administer the fund to design, implement, and evaluate work to enhance fish and wildlife habitat. GRDA's Article 411 plan was approved, and the requirement to seed millet every year was deleted, in an order issued May 22, 2003.[34] Work under the plan can include, at the technical committee's discretion, seeding of at least 1,000 acres of millet, at a rate of 15 pounds per acre in any given year for which favorable conditions were forecast. However, millet seeding was seldom performed under the plan because the reduced duration of the drawdown period prevented germination over large enough areas to provide significant benefits.[35]

Since approval of the mitigation plan in 2003, the primary shallow-water fish habitat work completed has been the deployment of approximately 14,000 ''spider block'' artificial reef structures. These structures attract adult gamefish for the purpose of improved sport fishing. They may also provide rearing and feeding habitat for fry and fingerlings and cover from predators.

Downstream

The tailrace area below the Pensacola Project and the reach of river

[34] *Grand River Dam Authority,* 103 FERC ¶ 62,102 (2003) (Order Approving Fish and Waterfowl Habitat Management plan Under Article 411 and Deleting Article 404).

[35] Since 2003, millet seeding under the plan has only been attempted several times, most recently in 2011. Seeding has resulted in limited germination and plant growth adequate to benefit fish and waterfowl habitat.

downstream to Lake Hudson supports a popular fishery that includes many of the species found in Grand Lake. As explained above in *Water Quality,* water in these areas can be low in DO, especially in late summer and fall, which has led to fish kills below the dam. However, GRDA is currently successful in mitigating this problem through managed releases under an approved DO mitigation plan.

6.6.2 Environmental Effects

Grand Lake

On an annual basis, maintaining higher water surface elevations in Grand Lake from August 15 and October 31 using the proposed rule curve would result in less fluctuation during late summer and early fall, providing young fishes, and other aquatic organisms, with more stable shallow-water habitat and cover. The decrease in fluctuation should allow better colonization of emergent and submerged vegetation in these areas, further improving habitat for young fishes. Over the remainder of the license term, this should allow aquatic vegetation to more successfully colonize and return to suitable areas, increasing shallow-water habitat and benefitting young fishes and the macroinvertebrates they prey upon.

The proposed rule curve change should not affect any fish habitat mitigation work under the Article 411 mitigation plan over the remaining term of the project license. As described above, annual millet seeding is no longer performed under the plan and GRDA is pursuing other mitigation options (*i.e.,* land acquisitions) under the Article 411 plan beyond continuing placement of artificial reef structures. Therefore, we cannot review any other fish habitat mitigation work at Grand Lake at this time, although we assume that any such work would take the effects of the water elevations under the proposal into account.

It is not possible to predict the effects to fisheries and aquatic resources from any changes to frequency or intensity of periods of high water, or periods of low water resulting from drought, that may occur under the proposed rule curve, or any mitigative effects of the proposed Storm and Drought Plans. However, there is no reason to expect that there would be any significant effects on these resources in Grand Lake.

Based on the above, the proposed rule curve change should have minor positive effects on fisheries and aquatic resources in Grand Lake.

Downstream

As described above under *Water Quality,* the proposed rule curve would allow GRDA to store more water during late summer and early fall, increasing the volume of water available for release to maintain DO concentrations in the tailrace and river downstream. This would help to protect fisheries and other aquatic resources in downstream areas in years when inflows are low and reservoir levels may be difficult to maintain. Further, as also described under *Water Quality,* the proposed Drought Plan would help to ensure water is available for maintenance of DO concentrations and fish protection in the event that drought conditions cause reservoir elevations to fall below the rule curve. It is not possible to predict effects to downstream aquatic resources that could occur from any increases in flooding under GRDA's proposal, or effects of GRDA's proposed Storm Plan.

Based on the above, the proposed rule curve change would have positive effects to fisheries downstream of the project during late summer and fall by helping to ensure maintenance of DO concentrations, and use of the Drought Plan would help to avoid fish kills in the event of significant drought conditions.

6.7 Terrestrial Resources

6.7.1 Affected Environment

Vegetation

Grand Lake is located in a transitional zone between the Ozark Highlands and Central Irregular Plain eco-regions of northeast Oklahoma. In the Ozark Highlands eco-region, which characterizes most of the project area, oak-hickory and oak-hickory-pine are the primary forest types. Typical canopy species on dry uplands and ridgetops include black oak, white oak, blackjack oak, post oak, winged elm, and numerous hickories. Shortleaf pine also occurs in oak-hickory-pine stands. Mesic forests containing sugar maple, white oak, and northern red oak are typical of north-facing slopes and ravines of more rugged, deeply dissected sites. Willows, bottomland oaks, maples, hickories, birch, American elm, and sycamore are typical on floodplains and low terraces. Most level sites in the region have been converted to haylands or pasturelands.

In the extreme northern portion of project, primarily the Neosho River arm of Grand Lake, the oak hickory forests of the Ozark Highlands give way to the tall grass prairies of the Central Irregular Plains. Typical dominants of tall grass prairie sites include big bluestem, little bluestem, switchgrass, and indiangrass. Dry upland forests, similar to the oak-hickory forests of the Ozark Highlands to the south and east, are common on the low rocky hills of the region. Most of this habitat, approximately 61,462 acres, occurs above 755 feet. Riparian corridors typically are forested, with canopy dominants that include American elm, oaks, hackberry, black walnut, sycamore, and pecan. Much of this region has been converted for agriculture, with rangeland occupying steeper slopes and croplands on nearly level plains. Common crops include sorghum, alfalfa hay, wheat, and soybeans.

Wildlife

Raptors, such as barred owl, red-tailed hawk, and red-shouldered hawk occur in both upland and bottomland forests. Song birds of the wooded lots include tanagers, nuthatches, warblers, and woodpeckers typical of the eastern deciduous forests. Grassland birds present in the prairie habitat include horned lark, grasshopper sparrow, meadowlark, dickcissel, and bobolink. Predatory birds in the grasslands consist of short-eared owl, northern harrier, and rough-legged hawk. Bald eagles over-winter at Grand Lake. Game birds found at Grand Lake include bobwhite quail, wild turkey, mourning dove, and waterfowl.

Grand Lake is also important as an over-wintering and migratory stop for shorebirds and waterfowl; however, the over-wintering habitat is limited by the lack of submerged aquatic vegetation. Cormorants, pelicans, egrets, and herons are among the non-game birds that seasonally inhabit the Grand Lake area. A diverse array of game waterfowl such as geese and dabbling, diving, perching, sea, and stiff-tailed ducks also occur on Grand Lake during migration. Mallards are the only dabbling duck that over-winter on Grand Lake. Mallards are the most abundant duck seen on the reservoir with numbers peaking in December. Canada geese and wood ducks live on the reservoir throughout the year.

Common mammals in the project area include white-tailed deer, striped skunk, raccoon, fox squirrel, Virginia opossum, eastern cottontail, armadillo, and red fox. These species inhabit the upland deciduous forest surrounding the project. The bottomland forests contain all of these species, plus muskrat and beaver. Common species associated with the grassland/savannah are the least shrew, deer mouse, black-tailed jack rabbit, and badger. Bats are of ecological concern in the area and the endangered gray bat is particularly notable (discussed under Threatened and Endangered Species).

A variety of frogs, toads, salamanders, lizards, turtles, and snakes comprise the

local herpetofauna. The amphibians include species such as the American toad, spadefoot toad, and tree frogs. The turtle community includes snapping turtles, mud turtles, softshell turtles, and a diversity of slider, map, and box turtles. With the exception of the box turtles, most of the turtle community is highly aquatic. Representative lizard species include the western slender glass lizard, collard lizard, Texas horned lizard, and diversity of skinks. Common snakes include species such as rat snakes, water snakes, bull snakes, and venomous snakes such as copperheads, western cottonmouths, timber rattlesnakes, and western pygmy rattlesnakes.

Grand Lake is an important wintering area for bald eagles. Most of the wintering eagles use a large communal roost located on a small island near Twin Bridges State Park at the north end of the reservoir. Blackbirds represent a large part of the diet for eagles wintering on Grand Lake due to presence of a large blackbird roost near Twin Bridges State Park. The bald eagle can be expected to forage throughout the project area.

6.7.2 Environmental Effects

The proposed permanent amendment of rule curve would not impact vegetation or wildlife resources located above normal reservoir rule curve elevations. The change would not likely cause any negative impacts to vegetation and wildlife resources located at and below normal reservoir rule curve elevations, because water levels would remain within the range of the current rule curve.

In its letter dated March 29, 2016, the Oklahoma DWC states that it supports the amendment request and agrees that no additional mitigation for fish and wildlife resources be required through the remainder of this license. The Oklahoma DWC indicated that its support is based on a recently-finalized Interagency Agreement between Oklahoma DWC and GRDA in which mitigation for wildlife resources would be addressed through adjacent-site restoration and management.

6.8 Wetlands and Riparian Resources

6.8.1 Existing Environment

Grand Lake and the surrounding areas contain numerous wetlands. Wetlands are most abundant along the upper, shallow reaches of the reservoir. In the reservoir's lower reaches, shoreline areas consist primarily of limestone bluffs, with wetlands restricted to coves and backwaters of inundated tributaries. The project supports about 18,318 acres of wetland habitats, primarily at elevations of 735 to 745 feet. Wetland habitat areas have been broken down by type, resulting in the following approximations: Palustrine forested, 11,649 acres; mudflats, 5,662 acres; scrub/shrub, 526 acres; ponded water, 247 acres; and emergent, 234 acres (GRDA 2008a).

As described under Fisheries and Aquatic Resources above, GRDA may, in some years, seed millet on mudflat areas in Grand Lake to benefit shallow-water waterfowl and fish habitat in accordance with its approved Article 411 Fish and Waterfowl Habitat Management Plan. This is performed in the late summer and fall when lake elevations are at their lowest point along the current rule curve. However, because millet seeding under the plan is seldom attempted or successful, it is not a significant factor in the natural resources of Grand Lake.

6.8.2 Environmental Effects

Implementation of the proposed rule curve would not likely cause any negative impacts to existing wetland resources at Grand Lake because water levels would remain within the range of the current rule curve. The change may provide minor benefits by reducing the water level fluctuations that occur under the current rule curve, allowing some degree of increased growth and establishment of riparian and shallow-water vegetation, which could benefit both fish and wildlife that utilize these areas. The change would eliminate the deepest part of the annual drawdown, a six-week period from September 1 through October 15 when elevations are held at 741 feet, reducing or eliminating exposure of mudflat areas previously used for millet seeding in some years. However, as noted, millet seeding is not currently a significant factor in Grand Lake's natural resources.

In its letter dated March 29, 2016, the Oklahoma DWC states that it approves of GRDA's request to amend its rule curve for the remainder of its license. The Oklahoma DWC granted its support because of a recently-finalized Interagency Agreement between Oklahoma DWC and GRDA in which mitigation for wildlife resources would be addressed through adjacent-site restoration and management, thereby negating the need to lower the lake level to seed mudflats for millet.

6.9 Threatened and Endangered Species

6.9.1 Existing Environment

Several species listed under the ESA have been identified in the Pensacola Project area. The gray bat (*Myotis grisescens*) and the Neosho mucket (*Lampsilis rafinesqueana*) are listed as endangered, while the Ozark cavefish (*Amblyopsis rosae*) and the Neosho madtom (*Noturus placidus*) are listed as threatened.

Gray bats use two caves that are located in the Grand Lake project area: Beaver Dam Cave and Twin Cave. The Beaver Dam Cave is located adjacent to Drowning Creek, a tributary of Grand Lake and the Twin Cave is located more than a mile from Grand Lake and at an elevation of 840 feet. Of these, only the Beaver Dam Cave is affected by Grand Lake levels. Inundation of the cave begins when Grand Lake reaches 746 feet and the cave entrance is completely blocked when Grand Lake reaches 751 feet. Between elevations 756 and 757 feet Grand Lake levels cause water to reach the ceiling of the cave, drowning any bats inside. Bats in the cave can only survive one or two days without food due to the high energy demands of raising young from May through August. Further, if adults are trapped out of the cave then the young will die. The stress of being trapped may also result in aberrant behavior, causing bats to fall into the water. However, this concern has been addressed in that the Nature Conservancy and GRDA enlarged two high passage areas near the entrance of Beaver Dam Cave in 2008 and 2013. This work allows bats to access Beaver Dam Cave during periods of high water although the exact elevation of complete inundation is not in any records filed with the Commission.

Annual surveys of the gray bat population have been conducted at caves within the project area including Beaver Dam Cave since 2007. Based on these surveys, most bats vacate the cave by mid-August. Only in one survey conducted in 2007 have bats remained in the cave through August and into September.

The Neosho mucket is a freshwater mussel native to streams and rivers, which lives in nearshore habitat and does not occur in inundated areas, *i.e.,* lakes and ponds. Critical habitat for this species has been designated in the Elk River and in the vicinity of Grand Lake; however, areas designated as critical habitat occur only in stream channels and not in areas inundated by lakes or reservoirs.

The Ozark cavefish is a small fish with no eyes or pigmentation and lives strictly in subterranean waters. Cave ecosystems depend on bats (especially gray bats) as a source of energy and nutrients. The Ozark cavefish is found in Jailhouse Cave and Twin Cave near Grand Lake.

The Neosho madtom is a small catfish that feeds at night on the bottom of rivers and streams. The madtom only occurs within a 14-mile reach of the Neosho River well upstream of Grand Lake near the Oklahoma/Kansas state line. Neosho madtom habitat is periodically affected by the operation of several Corp's flood control structures on the Neosho River.

6.9.2 Environmental Effects

None of the threatened and endangered species identified at the project would be affected by the rule curve change. In its April 21, 2016 comments on GRDA's application, FWS states that GRDA's proposal would not adversely affect any listed species. FWS further explained that the increased risk of flooding at Beaver Dam Cave is not a concern because listed bats are not using the cave at that time. Therefore, no further consultation is needed pursuant to the ESA.

6.10 Cultural and Historic Resources

6.10.1 Existing Environment

Native Americans in the historic period and Euro-American settlers in the modern period leading up to Oklahoma's statehood have made extensive use of the Grand River Valley as a place of settlement and transportation. This pattern of use creates a high probability within the project area for intact cultural resources dating from prehistoric eras, periods of early European contact, the nineteenth century, and the Civil War. In addition to historical evidence supporting the likelihood of intact archeological deposits, the topography of the region lends itself to the preservation of archaeological resources. While much of the land in the downstream portion of the project near the dam rises in steep bluffs from the shoreline, the upriver portions of Grand Lake feature a shallow, more riverine topography that has the potential to contain intact archaeological resources. In addition, there are a number of tributaries that feed into Grand Lake that have a high potential for intact resources (GRDA, 2008).

GRDA maintains data supplied by the Oklahoma SHPO and the Oklahoma Historical Society that has identified potential and significant cultural resource sites in the project area. Approximately 50 cultural sites are known to exist within the project area (GRDA, 2008).

Currently there is risk of exposure of archaeological resources and potential historic properties during drawdown and drought. In addition to the discovery provisions in the Storm Plan and Drought Plans discussed in Section 5.5.3, Article 409 of the project license requires GRDA to immediately cease work and to develop a cultural resource management plan in consultation with the Oklahoma SHPO if GRDA discovers previously unidentified archeological or historic properties during the course of constructing or developing project works or other facilities. The plan must include a description of each discovered property indicating whether it is listed on or eligible to be listed on the National Register, a description of the potential effect on each discovered property, proposed measures for avoiding or mitigating effects, documentation of the nature and extent of consultation, and a schedule for mitigating effects and for conducting any needed additional studies.

6.10.2 Environmental Effects

Operation under the proposed amendment would maintain Grand Lake from August 16 through October 31 at levels that are neither higher nor lower than maximum and minimum levels currently experienced throughout the year. GRDA is not proposing to change maximum water surface levels and therefore, no new lands would be affected by the amendment.

On March 15, 2016, GRDA provided the Oklahoma SHPO a draft copy of its application containing its draft Storm Plan and draft Drought Plan. In an April 22, 2016 letter to GRDA, the Oklahoma SHPO recommended GRDA develop an HPMP to address potential impacts to archeological sites located along and near shorelines and recommended GRDA add the Oklahoma SHPO to the list of consulting parties for the Storm Plan and Drought Plan. GRDA added the Oklahoma SHPO to the consulting party lists for both plans and, rather than developing an HPMP, added provisions in each plan for consulting with the Oklahoma SHPO about potential impacts to cultural resources when the plans are in effect. On April 29, 2016, GRDA provided updated versions of both plans to the Oklahoma SHPO for review and comment.

In an email to GRDA dated May 2, 2016, the Oklahoma SHPO reiterated its recommendation for a project-wide HPMP saying GRDA's proposal to develop an HPMP during a storm or drought event, as described in the revised plans, would be difficult. The Oklahoma SHPO also recommended adding the Oklahoma AS to the consulting party lists for both plans and recommended GRDA include a provision for addressing any unanticipated discoveries of human remains or burials in accordance with state law. GRDA incorporated these additional recommendations into its two plans and stated that it would be able to handle potential difficulties arising from an emergency situation by using the Commission-approved HPMP for its Markham Ferry Project as a framework to address any effects to historic properties.

Furthermore, GRDA agreed that if Oklahoma SHPO or Oklahoma AS determines that reservoir conditions during the rule curve amendment period adversely affect historic properties, GRDA would develop a site-specific plan to address these agencies' concerns. This provision for a site-specific plan, along with the consultation and unanticipated discovery provisions added to the Storm and Drought Plans, provides additional protection.

Because GRDA's amendment would keep Grand Lake within existing fluctuation limits and given the additional consultation and site-specific provisions added to the Storm Plan and Drought Plan, we do not recommend developing a project-wide HPMP at this time. Both the Oklahoma SHPO and Oklahoma AS raised concerns that it would be difficult to develop site-specific plans during a storm or drought event. GRDA responded that it would use the approved HPMP for the Markham Ferry project as a framework for the agencies and GRDA to jointly address any effects to historic properties during such an event for the proposed amendment period. The Oklahoma AS also pointed out that the Pensacola project has a different project setting and different cultural resources than the Markham Ferry project. However the Markham Ferry HPMP does contain provisions for inadvertent discovery of cultural resources and human remains that could be equally applied in an appropriate timeframe during a storm or drought event that would help avoid or minimize effects to cultural resources.

At the Commission's August 3, 2016 Tribal consultation meeting and in their filings with the Commission, the Tribes asserted that any rule curve change, whether temporary or permanent, would increase flooding and adversely affect Tribal lands, including cultural properties. The Tribes stated that backwater flooding from the project, which they said occurs throughout the year, would be exacerbated by the proposed rule curve change. The Tribes also stated that flooding has impaired access to important Tribal facilities, including ceremonial grounds, educational and assistance services, recreational facilities, Tribal

government offices, and casinos, and has had negative social and economic impacts on Tribal communities. In addition, the Tribes have stated that GRDA's consultation for this amendment, which included sending the draft application for Tribal review and comment, is inadequate and that they support others' recommendations for a project-wide HPMP for the proposed amendment.

As stated above, GRDA's proposed changes are within Grand Lake's normal maximum and minimum fluctuation limits, therefore, no new lands would likely be affected and we do not recommend an HPMP. If anything, the proposed changes would reduce fluctuating water levels within Grand Lake and cultural and historic properties located on or near the shoreline would be less affected and would not be subject to additional exposure, looting, or vandalism, as asserted by the Oklahoma AS. Moreover, sites are vulnerable to erosion at any level, but approval of this amendment does not exacerbate those effects since the difference in water elevations would be smaller during this period.

Concerning flooding of Tribal lands, the Pensacola project boundary, as currently defined, does not occupy federal Tribal lands held in trust. Moreover, the proposed amendment would not change the overall range of water surface elevations currently approved for project operations. However, regardless of the current boundary or range of operations, the socio-economic impacts identified by the Tribes at the consultation meeting and in their filings are an important consideration in the Commission's comprehensive review of the project. We believe the upcoming relicensing proceeding is the appropriate forum to review any flood effects cause by current operations and to evaluate any new information that shows there are Tribal lands held in trust within the project boundary.

6.11 Recreation

6.11.1 Affected Environment

Grand Lake is a major recreation resource in northeastern Oklahoma, providing over a million recreation user days during 2014. Boating, fishing, and waterfowl hunting are popular recreation activities conducted on the lake. Recreational access to Grand Lake is provided through public, commercial, and private facilities such as boat ramps, marinas, and boat docks. Grand Lake has 5 state parks and approximately 14 municipal parks, which collectively provide approximately 22 public boat ramps. In addition, there are approximately 439 private boat ramps, 53 commercial boat ramps, 4,021 commercial boat slips for rent, and 7,761 permitted private boat slips on the lake (GRDA, 2015).

Boating on Grand Lake occurs year-round, although the primary recreation season extends from April 1 until October 1. Fishing is a year-round activity on Grand Lake and an average of 117 fishing tournaments were held on the lake each year between 2009 and 2014. Waterfowl hunting occurs from September through January primarily in the riverine (*i.e.,* uppermost) sections of the lake (GRDA, 2015).

GRDA indicated in its application that hazards that lead to boats running aground exist more often at lower lake levels. For example, nearly 80 percent of all boat groundings during the high recreation season (May 1 until September 30) in 2013–2014 occurred while the lake was being drawn down pursuant to the rule curve or maintained at elevation 741 feet. GRDA reports that, in contrast, despite more boats using the lake in 2015 than in 2014,[36] substantially fewer boats ran aground during the August 16 to October 31, 2015 timeframe during the 2015 temporary variance compared to the same timeframe in 2013 and 2014 (GRDA, 2016).[37]

6.11.2 Environmental Effects

Operation under the proposed rule curve would increase water elevations at Grand Lake by one to two feet from August 15 to October 31 each year over the remainder of the current license period. These higher elevations would greatly improve public and private access at numerous boat ramps and docks around Grand Lake, and increase the total water surface area available for boating, significantly enhancing recreation opportunities during the popular late summer/early fall recreation season.[38] Higher reservoir elevations would also likely decrease boating hazards in Grand Lake. Based on the information provided by GRDA, the vast majority of boat groundings in 2013 and 2014 occurred during the tail end of the high recreation season when high recreational boating use coincided with periods of lowest water elevations pursuant to the current rule curve. Such a pattern did not occur in 2015, when Grand Lake was held to 742 feet or above. Therefore, operation using the proposed rule curve in 2017 and future years should contribute to a decrease in boat groundings at Grand Lake in the late summer early fall.

6.12 Land Use and Aesthetics

6.12.1 Affected Environment

Grand Lake has approximately 522 miles of irregular shoreline, which is characterized by narrow channels and many coves. The shoreline of Grand Lake ranges from forested areas with a mixture of vegetative cover types to contiguous manicured lawns, residential housing, and commercial development. The lands adjacent to the northern and western shores of the project consist primarily of rolling plains with occasional hills and ridges and gently sloping shoreline. The lands adjacent to the southern and eastern shores are characterized by deep ravines and narrow valleys separated by broad, gently rolling uplands, with shorelines consisting primarily of steep rocky beaches and bluffs. The upper section of Grand Lake is primarily undeveloped with a more natural aesthetic, while the majority of the shoreline of the lower section of Grand Lake is primarily highly developed.

About 50 percent of land within the project boundary comprises deciduous forest, followed by cropland and pasture lands comprising about 35 percent of the project lands. Residential, commercial, and other development accounts for about 11 percent of total land area within the project boundary. The Grand Lake area is popular for recreation and residential development, particularly summer homes. GRDA manages the reservoir's shorelines via a permitting system and operates a lake patrol to monitor and inspect permitted shoreline uses and enforce its boating regulations (FERC, 2009).

6.12.2 Environmental Effects

Operation under the proposed rule curve would allow GRDA to maintain higher reservoir elevations from August 15 to October 31, which would increase the amount of project lands under water by up to approximately 2,000 acres during this timeframe compared to current project operations.[39] As noted

[36] GRDA's aerial boat counts on Labor Day weekend counted nearly 2,000 boats during Labor Day weekend 2015 compared with fewer than 500 boats during Labor Day weekend 2014.

[37] In 2013 and 2014 combined, 75 percent (*i.e.,* 24 of 32 reported incidents) of all reported boat groundings throughout the year occurred during the August 16 to October 31 timeframe. In 2015, 29 percent (*i.e.,* 2 of 7 reported incidents) of all reported boat groundings throughout the year occurred during the August 16 to October 31 timeframe.

[38] In its December 23, 1985 license application for the Pensacola Project, GRDA estimated that each additional foot of water surface elevation would result in an additional 1,000 acres of surface area.

[39] In its December 23, 1985 license application for the Pensacola Project, GRDA estimated that each

above under *Recreation,* the higher water levels would increase the amount of area available for boating in the reservoir and improve public and private access to numerous boat ramps and docks located at the project, which would result in moderate benefits to these land uses adjacent to the project.

In addition, the higher water levels under the proposed rule curve would likely improve the scenic quality of the areas of reservoir shoreline that would have otherwise been dewatered and devoid of vegetation during this timeframe. Such beneficial effects on aesthetics of the project would be minor.

7.0 Conclusions and Recommendations

7.1 Comprehensive Development and Staff-Recommended Measures

Sections 4(e) and 10(a)(1) of the FPA require the Commission to give equal consideration to all uses of the waterway on which a project is located. Therefore, when we review a hydropower application, we consider power and non-power development, to include the protection of, mitigation of damage to, and enhancement of fish and wildlife; the protection of recreational opportunities; and other aspects of environmental quality. In deciding whether, and under what conditions, to approve hydropower applications, we must determine that the project would be best adapted to a comprehensive plan for improving or developing the waterway. This section summarizes our findings in this EA and reviews our recommendations for conditions to be included in any approval of the proposed permanent amendment.

Based on our independent review of the licensee's proposed amendment, agency and public comments filed on the licensee's proposal, and our review of environmental effects, we believe approval of GRDA's proposal, with Oklahoma DEQ's mandatory WQC conditions, is the preferred alternative. We recommend this alternative because, based on the information reviewed and analysis performed in this EA, it would provide several significant benefits with few measurable negative impacts.

Operation of the Pensacola Project using the proposed rule curve would allow more water to be stored in Grand Lake, with less fluctuation in water levels, from August 15 through October 31 each year for the remainder of the current license term. Operation under the proposed rule curve would likely result in minor reductions in shoreline erosion rates and could promote revegetation of some shallow shoreline areas that could further reduce erosion over time. This change would not result in any material adverse impacts to water quality. In hot dry years, higher water levels in late summer and early fall would make more water available for releases to maintain downstream DO and avoid fish kills. During any periods of declared severe to exceptional drought, GRDA's proposed Drought Plan would provide additional protection for downstream water quality. A reduction in water level fluctuations in Grand Lake should have positive effects on fisheries and other aquatic resources by providing more stable shallow-water habitat and cover, especially for juvenile fishes, and through increased plant growth and establishment in wetland areas, including emergent and submerged vegetation. Fish occupying the project tailwater and river downstream would likely benefit from water quality improvements in hot, dry years and during any declared severe to exceptional drought as discussed above.

Higher elevations at Grand Lake in late summer and early fall would provide a significant benefit to recreation by increasing the water surface area available for boating, improving access at public and private launching facilities, and likely decreasing shallow-water boating hazards. Higher seasonal water elevations would likely provide minor aesthetic improvements in some areas that were dewatered and devoid of vegetation in the past.

While we have not identified any definitive significant short-term or long-term negative effects to resources that would likely occur with operation under the proposed rule curve, commenters have expressed concern regarding flooding effects and affects to cultural and historic resources.

Flood-related issues. As discussed earlier, most flood-related issues raised by commenters in this proceeding were reviewed during the Commission's processing of GRDA's temporary variance requests in 2015 and 2016 which involved the same changes in reservoir elevations. Staff's findings on the flood-related issues were presented in the temporary variance orders. In the *Water Quantity* section above, staff summarizes those findings that would allow the same rule curve change each year for the remaining term of the license. To the extent commenters address flooding concerns that are not related to the pending amendment, the Commission will perform a comprehensive review of the project and any proposed future operation in the upcoming relicensing proceeding. That proceeding is the appropriate forum to identify and address issues that are separate from GRDA's amendment application.

Cultural and historic resource protection. We found in our analysis that the proposed permanent rule curve change would occur within the project's existing fluctuation limits and therefore, would be unlikely to affect any new lands. No land-clearing or land-disturbing activities would be required for this amendment. In addition, less fluctuating water levels should reduce the chances of erosion affecting cultural or historic resources in near-shore areas. Cultural and historic properties located on or near the shoreline would potentially be inundated for a longer period during the amendment, providing more cover and helping to prevent exposure. If anything, keeping water levels higher during the late summer and early fall period, when more people are present, would reduce the potential for artifact collection or looting. GRDA's agreement to prepare specific plans in consultation with the Oklahoma SHPO and Oklahoma AS if either agency determines that historic properties might be affected would further protect cultural and historic resources.

7.1.1 Staff-Recommended Measures

Along with its proposed changes to the rule curve, GRDA proposes a Storm Plan that would provide for assessment of risks of upstream and downstream flooding during high precipitation events and a process to proactively and collaboratively manage these events. A Storm Plan was in place during the 2015 and 2016 temporary variance periods, and was successful in aiding communication related to high precipitation events within the basin and managing project facilities during those events. Under the current proposal, the Storm Plan would be in effect each year for the remainder of the license period. We recommend that any approval of GRDA's proposed amendment incorporate the Storm Plan.

GRDA also proposes a Drought Plan that would help protect downstream water quality and fisheries, as well as generation at its downstream Markham Ferry Project and Salina Pumped Storage Project if a severe to exceptional drought is declared and reservoir elevations fall below the rule curve. The Drought Plan would be in effect each year for the remainder of the license period. We recommend that any approval of GRDA's proposal incorporate the Drought Plan.

additional foot of water surface elevation would result in an additional 1,000 acres of surface area.

We recommend that any approval of GRDA's proposal incorporate the annual reporting requirement that is a condition of Oklahoma DEQ's June 30, 2016 401 certification. The requirement should mirror paragraph (E) of the Commission's August 12, 2016 order approving the temporary rule curve variance for 2016, which required GRDA to notify Oklahoma DEQ, at the same time it notifies other agencies pursuant to DO mitigation plans approved under Article 403, of any significant DO deficiencies or DO mitigation, so that Oklahoma DEQ can track GRDA's progress in maintaining state water quality standards. In addition to Oklahoma DEQ's ongoing annual reporting requirement, Oklahoma DEQ also included three other mandatory WQC conditions: (1) that the certification does not authorize any discharge or dredging; (2) that the reservoir be maintained between elevations 742 and 744 feet as requested by GRDA; and (3) that emergency and routine maintenance will be as permitted by the Corps. We have no objections to these conditions being added to the license in any order approving the proposed amendment.

7.2 Consistency With Comprehensive Plans

Section 10(a)(2) of the FPA, 16 U.S.C. 803(a)(2)(A), requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. We reviewed 6 qualifying comprehensive plans that are applicable to the proposed action at the Pensacola Project No. 1494, located in Oklahoma. The proposed action is consistent with all of the reviewed comprehensive plans.

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8.0 Finding of No Significant Impact

Based on information, analysis, and evaluations contained in this EA, we find that approval of the proposed rule curve amendment, to include the mandatory conditions stipulated by Oklahoma DEQ in its 401 certification, would not constitute a major federal action significantly affecting the quality of the human environment.

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