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ROOKERY BAY

AND

CAPE ROMANO-TEN THOUSAND ISLANDS

AQUATIC PRESERVES

MANAGEMENT PLAN

JUNE 28, 1988

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1988

THE DEPARTMENT OF NATURAL RESOURCES

AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
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QH91.75.F6 R66 1988

ROOKERY BAY AND CAPE ROMANO-TEN THOUSAND ISLANDS AQUATIC PRESERVES

MANAGEMENT PLAN

June 28, 1988

Tom Gardner

Executive Director

Department of Natural Resources

This plan was prepared by
The Bureau of Aquatic Preserves
Division of State Lands

Preparation of this management plan was partially funded by a grant from the U.S. Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration, and the Florida Department of Environmental Regulation, the Office of Coastal Management, through the Coastal Zone Management Act of 1972 as amended.

Executive Summary

The Rookery Bay and Cape Romano-Ten Thousand Islands Aquatic Preserves, located in Collier County, comprise nearly 60,000 acres of the most pristine submerged lands in Florida.

Cape Romano-Ten Thousand Islands was one of the originally designated aquatic preserves established by the Florida Legislature in October 1969. Rookery Bay was established later in August 1977. These areas were established for the primary purpose of preserving the biological resources of this unique estuarine ecosystem. These preserves consist predominately of fringing mangroves and mangrove islands with some oyster bars, seagrasses, salt marsh and other habitats. The preserves are important in protecting critical habitat to an extensive array of fish, birds and other wildlife. Maintaining the continued health of the preserves will involve minimizing water pollution and losses of wetlands resulting from urban, residential and industrial development in the region.

The major objective of the aquatic preserve management program is to ensure the maintenance of essentially natural conditions. Management will also be directed to ensure public recreational opportunities while assuring the continued propagation of fish, birds and other wildlife resources. This goal will be guided by the identification and mapping of natural resources and habitats necessary to meet these objectives. An additional management objective is to review and comment of applications for the use of state-owned submerged lands. Meeting these objectives will require a fully implemented management program with the continuation of a field staff presence for these aquatic preserves.

STATE OF FLORIDA

BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND

RESOLUTION

WHEREAS, the Board of Trustees of the Internal Improvement Trust Fund is charged with the acquisition, administration, management, control, supervision, conservation, protection, and disposition of all lands title to which is vested in the Trustees under Chapter 253, Florida Statutes; and

WHEREAS, Chapter 258, Florida Statutes, directs that state-owned submerged lands within aquatic preserves be set aside forever in their essentially natural or existing condition for the benefit of future generations; and

WHEREAS, the Trustees are charged with the adoption and enforcement of reasonable rules and regulations to carry out the provisions of Sections 258.35 through 258.46, Florida Statutes, regarding the regulation of human activity within the aquatic preserves so as not to unreasonably interfere with lawful and traditional public uses of the preserves; and

WHEREAS; Section 18-20.13, Florida Administrative Code, mandates the development of management plans for aquatic preserves; and

WHEREAS, the Trustees desire to serve the public by effectively planning, managing and protecting aquatic preserves; and

WHEREAS, the Trustees have recognized the Rookery Bay and Cape Romano-10,000 Islands Aquatic Preserve as a biological/scientific preserve in formal action on June 28, 1988; and

WHEREAS, the Trustees recognize the importance and benefits of protecting the natural resources and preserving the natural ecosystem and aesthetics in the Rookery Bay and Cape Romano-10,000 Islands Aquatic Preserve area; and

NOW THEREFORE BE IT RESOLVED that the Board of Trustees of the Internal Improvement Trust Fund hereby adopts the Rookery Bay and Cape Romano-10,000 Islands Aquatic Preserve Management Plan; and

BE IT FURTHER RESOLVED that the Rookery Bay and Cape Romano-10,000 Islands Aquatic Preserve Management Plan shall serve as a fundamental policy guideline for the Trustees and other state and local agencies having jurisdiction relative to maintaining the natural resources and environmental quality of this aquatic preserve, and shall provide the overall policy direction for the development and implementa- tion of all administrative rules and programs related to the management of state-owned submerged lands within the Rookery Bay and Cape Romano-10,000 Islands Aquatic Preserve; and

BE IT FURTHER RESOLVED THAT the Department of Natural Resources, Division of State Lands, is hereby designated as agent for the Trustees for purposes of aquatic preserve planning and management.

IN TESTIMONY WHEREOF The Board of Trustees of the Internal Improvement

Trust Fund have hereunto subscribed their names and have caused the Official Seal of the Board of Trustees of the Internal Improvement Trust Fund to be hereunto affixed in the City of Tallahassee, The Capitol, on this the twenty-eighth day of June, A.D., 1988.

Governor

(Seal)

Secretary of State

Commissioner of Education

Attorney General

Commissioner of Agriculture

Comptroller

As and Constituting the State of Florida Board of Trustees of the Internal Improvement Trust Fund

Treasurer

Approved as to form and legality

DNR Attorney

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Chapter I

INTRODUCTION

GOAL

Rookery Bay and Cape Romano-Ten Thousand Islands Aquatic Preserves, located in Collier County, are two of 40 officially designated preserves in the statewide system (Figure 1). The goal of the Aquatic Preserve Program is to preserve designated marine, estuarine and freshwater areas in an essentially natural or existing condition so their aesthetic, biologic and scientific values may endure for the enjoyment of future generations.

This plan outlines four management strategies designed to attain this goal: resource management, environmental impact review, education, and research. The resource management program identifies areas with exceptional natural or cultural resources and determines strategies for their protection. The environmental impact review program develops and implements procedures to assess proposed activities that may threaten the natural and cultural resources of the preserves. The research program is intended to provide insight to estuarine systems and to generate scientific information which can be utilized by coastal zone managers to further enhance resource protection. The education program emphasizes community awareness of estuarine systems by informing the public of the need for protection and preservation of natural areas.

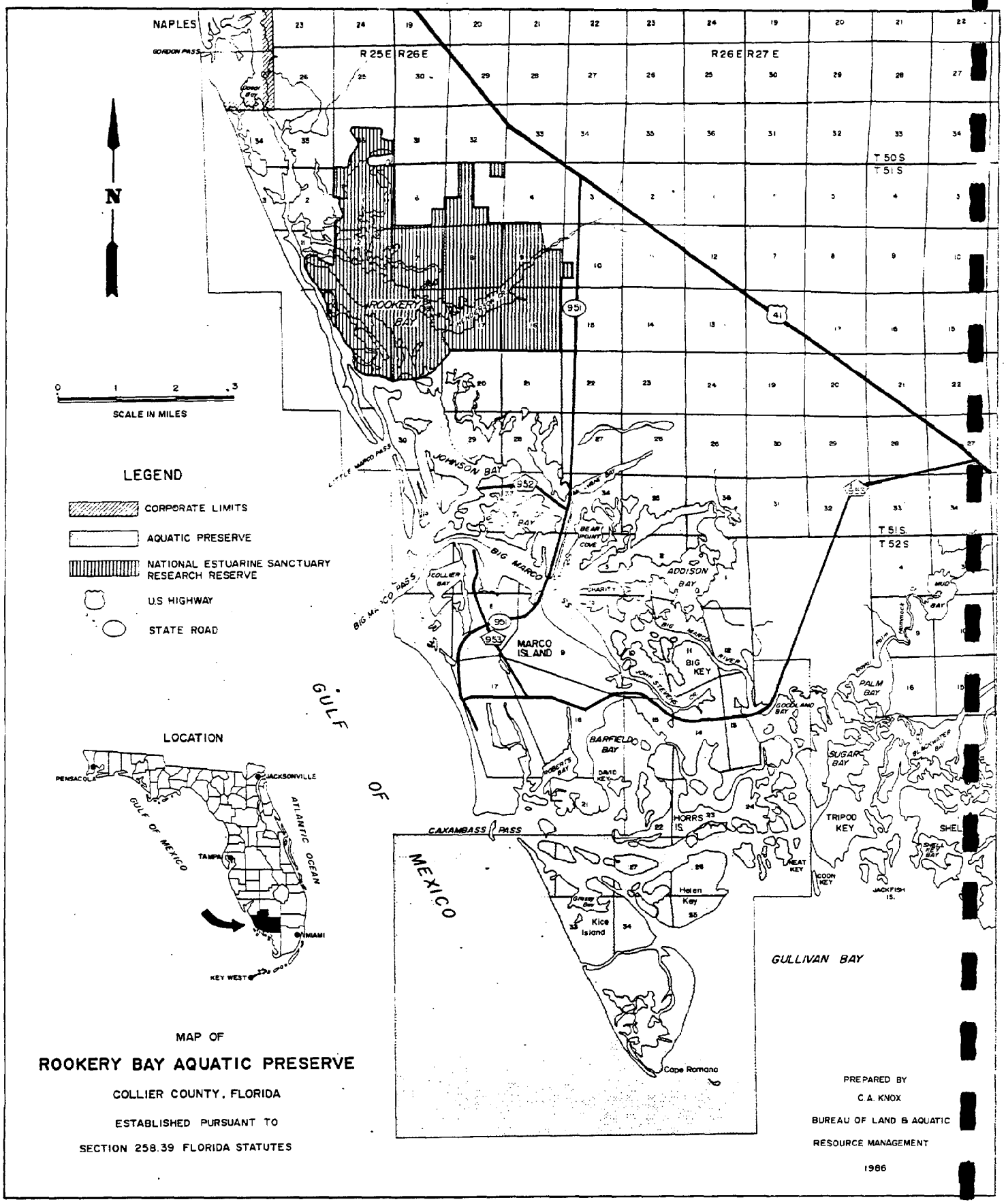
Figure 1. Map of Florida's Aquatic Preserves.

The aquatic preserves will be managed to emphasize maintenance and enhancement of essentially natural conditions. As more information is learned about these areas, existing conditions will be identified and, where appropriate, areas will be restored to natural conditions.

The nearly pristine resources of the Rookery Bay Aquatic Preserve and the Cape Romano-Ten Thousand Islands Aquatic Preserve warrant the maximum protection allowable under the rules and guidelines of the Aquatic Preserves Program. Subsection 18-20.004(2)(a)2, F.A.C., states that proposed projects in less developed aquatic preserves, such as Rookery Bay and Cape Romano-Ten Thousand Islands Aquatic Preserves, shall be subject to a higher standard than the more developed urban aquatic preserves. Stringent resource protection practices in the aquatic preserves will benefit adjacent water and land areas of Collier County, Everglades National Park, Collier-Seminole State Park, Fakahatchee Strand State Preserve, Big Cypress Swamp National Preserve and Rookery Bay National Estuarine Research Reserve.

SETTING

Rookery Bay and Cape Romano-Ten Thousand Islands Aquatic Preserves are contiguous coastal estuarine and marine areas located on the southwest Gulf coast of Florida (Figures 2-3). Rookery Bay Aquatic Preserve and Cape Romano-Ten Thousand Islands Aquatic Preserve comprise 32,035 and 27,642 acres of sovereignty submerged lands, respectively. The boundaries of each preserve include all tidal lands and islands, sandbars, shallow banks, submerged bottom and lands waterward of mean high water (MHW) to which the State holds title. Said boundaries extend across the mouths of all artificial waterways, but include all natural waterways tidally connected to these aquatic preserves.



MAP OF

ROOKERY BAY AQUATIC PRESERVE

COLLIER COUNTY, FLORIDA

ESTABLISHED PURSUANT TO

SECTION 258.39 FLORIDA STATUTES

PREPARED BY

C.A. KNOX

BUREAU OF LAND & AQUATIC

RESOURCE MANAGEMENT

1986

Figure 2

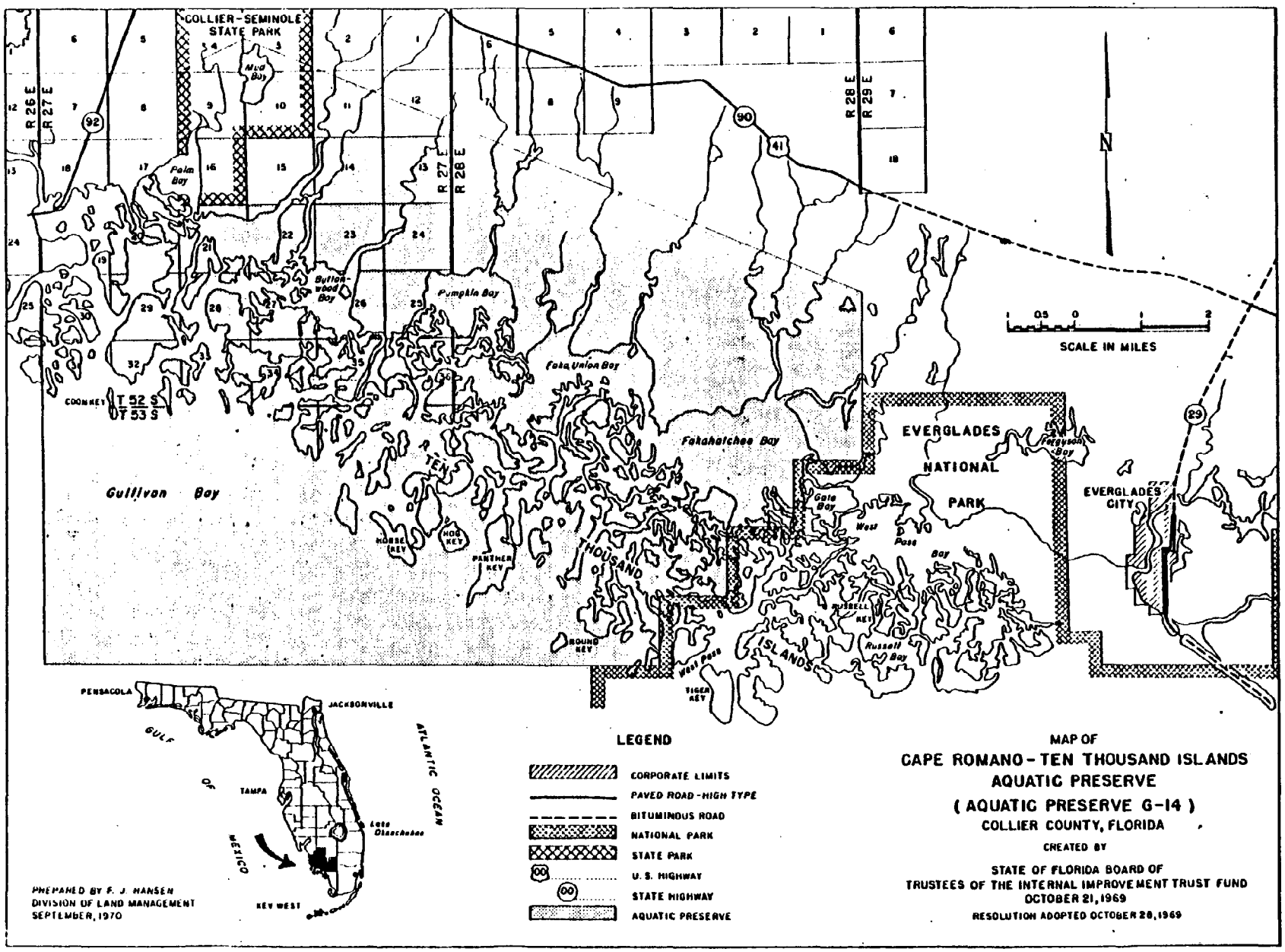

COLLIER-SEMINOLE STATE PARK
Mud Bay
Palm Bay
Buttonwood Bay
Pumpkin Bay
Faka Union Bay
Fakahatchee Bay
Gullivan Bay
COON KEY
T 52 S
T 53 S
R 26 E
R 27 E
R 28 E
R 29 E
TEN THOUSAND ISLANDS
HORSE KEY
HOG KEY
PANTHER KEY
ROUND KEY
TIGER KEY
West Pass
Gale Bay
West Pass Bay
RUSSELL KEY
Russell Bay
EVERGLADES NATIONAL PARK
Ferguson Bay
EVERGLADES CITY
SCALE IN MILES
N
PENSACOLA
JACKSONVILLE
TAMPA
Lake Okeechobee
KEY WEST
GULF OF MEXICO
ATLANTIC OCEAN
LEGEND
CORPORATE LIMITS
PAVED ROAD-HIGH TYPE
BITUMINOUS ROAD
NATIONAL PARK
STATE PARK
U.S. HIGHWAY
STATE HIGHWAY
AQUATIC PRESERVE
MAP OF
CAPE ROMANO-TEN THOUSAND ISLANDS
AQUATIC PRESERVE
(AQUATIC PRESERVE G-14)
COLLIER COUNTY, FLORIDA
CREATED BY
STATE OF FLORIDA BOARD OF
TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND
OCTOBER 21, 1969
RESOLUTION ADOPTED OCTOBER 28, 1969
PREPARED BY F. J. HANSEN
DIVISION OF LAND MANAGEMENT
SEPTEMBER, 1970

Figure 3

Rookery Bay Aquatic Preserve is bounded to the north by the City of Naples and to the southeast by Cape Romano-Ten Thousand Islands Aquatic Preserve. Located entirely outside of the Rookery Bay Aquatic Preserve boundary, but encompassed by the preserve on three sides, lies the residential community of Marco Island.

Located within the boundaries of the Rookery Bay Aquatic Preserve is the Rookery Bay National Estuarine Research Reserve, a State and Federally funded program designed to preserve the environment in a natural state and thus provide a natural laboratory for research activities and educational opportunities. For the common areas of the aquatic preserve and the estuarine research reserve, staff of both programs are working together in research, education, and resource management.

Also, located within the boundaries of the Rookery Bay Aquatic Preserve, but not included in the aquatic preserve, are 13,230 acres of mangrove forested lands acquired by the State in a land exchange with the Deltona Corporation. The planning process to designate this area a state reserve is underway.

Cape Romano-Ten Thousand Islands Aquatic Preserve borders Rookery Bay Aquatic Preserve to the west, Collier-Seminole State Park and Fakahatchee Strand State Preserve to the north, and Everglades National Park to the east.

All of Rookery Bay and Cape Romano-Ten Thousand Islands Aquatic Preserves are now designated Outstanding Florida Waters (OFW) by the Florida Department of Environmental Regulation. The new submerged lands added to the Rookery Bay Aquatic Preserve received designation as an OFW by a unanimous

vote of the Environmental Regulation Commission on September 22, 1987 and became effective on November 24, 1987. The regulatory significance of the OFW designation is that the DER cannot issue permits for either direct discharges which would lower ambient water quality or for indirect discharges which would significantly degrade water quality. Permits for new dredging and filling projects must clearly be in the public interest.

Recognized as nearly pristine areas, these aquatic preserves support a diverse flora and fauna. Most notable is the extensive mangrove community which is part of the largest mangrove forested area in the New World. Red mangroves are common on the islands and along the mainland shoreline. Black and white mangroves form dense forests landward of the red mangroves. A variety of submerged and intertidal habitats, including soft bottoms, oyster bars, seagrasses, brackish marsh, and vermetid mollusc reefs are associated with the mangrove forest.

The ecological significance of estuaries like Rookery Bay and the Ten Thousand Islands have only recently begun to be extensively studied and appreciated. Estuaries provide shelter and food for a wide range of animals. Phytoplankton and zooplankton are suspended in the water column. Feeding on these organisms are numerous small crustaceans, polychaetes, and molluscs. Larval and juvenile fish feed on these and other food items in shallow mangrove and seagrass biotopes. Open waters and submerged bay bottoms of estuaries support numerous species of commercially and recreationally important finfish and shellfish such as snook, mullet, whiting, flounder, sheepshead, spotted

seatrout, oyster, stonecrab, and shrimp. Manatees feed on seagrasses and algae growing on estuarine bottoms. At the top of the food chain, porpoise, osprey, bald eagle, and man (through recreational and commercial fishing) feed on finfish and shellfish from the open waters.

HISTORY

Unlike most of South Florida, Collier County's estuarine areas remained virtually unaltered until the 1960's when severe pressures for residential and agricultural development arose. Extensive construction of canals to drain upland watersheds and the dredging and filling of mangrove areas to create residential sites hit a feverish pace. Without the intervention of private groups and governmental agencies this kind of development would have decimated the estuarine resources of Collier County (Clark, 1974).

In October 1969, the Governor and Cabinet of the State of Florida, recognizing the need to protect the State's vulnerable aquatic resources, adopted by resolution 18 waterbodies as aquatic preserves including Cape Romano-Ten Thousand Islands Aquatic Preserve. The Rookery Bay Aquatic Preserve was established by resolution of the Governor and Cabinet in August 1977. Additions to the original Rookery Bay Aquatic Preserve were adopted in 1985.

As early as 1964, the need to protect the relatively unspoiled estuaries of south Collier County was apparent. At that time, mangrove vegetated areas surrounding Rookery Bay were targeted for residential development. Environmental groups, including The Conservancy, Inc. (formerly the Collier

County Conservancy), the National Audubon Society, and the Nature Conservancy, began efforts to rally public concern. Between 1966 and 1974, the National Audubon Society, and The Conservancy, Inc. purchased 4,000 acres of wetlands around Rookery Bay and designated the area an Audubon Wildlife Sanctuary. In 1978, the Audubon Sanctuary was designated the Rookery Bay National Estuarine Sanctuary which, in 1986, was renamed the Rookery Bay National Estuarine Research Reserve (Department of Natural Resources, 1986).

Efforts to acquire additional lands adjacent to the aquatic preserves and the research reserve have continued. In 1982, the Florida Department of Natural Resources operating under the Conservation and Recreation Land (CARL) acquisition program began negotiations with the Deltona Corporation to acquire mangrove forested wetlands surrounding Marco Island. By 1984, 13,230 acres of wetlands had been transferred to State of Florida Trustees of the Internal Improvement Trust Fund (Charles Hardee, DNR, personal communication).

Due primarily to its inaccessibility, the Cape Romano-Ten Thousand Islands Aquatic Preserve has remained relatively unaltered. Title to a portion of the islands and uplands within the aquatic preserve boundaries is held by the State of Florida Trustees of the Internal Improvement Trust Fund. Other portions of the islands and uplands are owned by the private sector. Efforts are in progress by the United States Fish and Wildlife Service to acquire the private uplands for designation as a National Wildlife Refuge.

Public ownership of critical shoreline and upland areas is vital to the long-term protection of Rookery Bay and Cape Romano-Ten Thousand Islands Aquatic Preserves. Additional land acquisition by governmental agencies and

private conservation groups will benefit adjacent water and land areas of Collier County, Everglades National Park, Collier-Seminole State Park, Big Cypress Swamp National Preserve, and Rookery Bay National Estuarine Research Reserve.

This plan was written by the Department of Natural Resources (DNR), Division of Recreation and Parks, Bureau of Aquatic Preserves staff. Partial funding for the plan was provided by a coastal management grant (CM-158) through the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Ocean and Coastal Pesource Management, and the Florida Department of Environmental Regulation (DER), Office of Coastal Management. Coastal management grant funding for the plan applies only to those areas within the aquatic preserves which are outside the Rookery Bay National Estuarine Research Reserve.

Chapter II

MANAGEMENT AUTHORITY

The primary laws providing management directives for aquatic preserves are Chapters 258 and 253, Florida Statutes (F.S.). These authorities establish the proprietary management overview role of the Governor and Cabinet, sitting as the Board of Trustees of the Internal Improvement Trust Fund and are variously referred to as the "Trustees" or the "Board". Management responsibilities assigned to the Trustees by this plan may be fulfilled directly by the Governor and Cabinet or indirectly by staff acting as "agents" of the Trustees, pursuant to delegations of authority, management agreements, or other legal mechanisms. All subsequent references to the Board of Trustees will include staff as designated agents in addition to the Governor and Cabinet.

The staff of the Division of State Lands, Bureau of Aquatic Preserves, in addition, serve as site managers for the "Trustees", and review requests for uses affecting state-owned sovereignty submerged land within the aquatic preserves. The staff conduct project site reviews to evaluate the environmental consequences of proposed uses. Project assessments and reviews are evaluated in accordance with the criteria in Sections 258.35-42, F.S., (Florida Aquatic Preserves Act) and 18-20, F.A.C., (Rules of Florida Aquatic Preserves).

Review comments are prepared by the Bureau of Aquatic Preserves for consideration in staff recommendations for agenda items presented to the

Trustees. This mechanism allows the Trustees, owners of the land, to evaluate public interest and project merits within the context of potential environmental impacts upon the aquatic preserves. Any activity located on sovereignty submerged lands will require consent from the Board of Trustees. This consent may be in the form of written consent from the Division of State Lands in accordance with the authority delegated by the Board.

BACKGROUND

The laws supporting aquatic preserve management are the result of the public's awareness of the importance of preserving Florida's coastal environment caused by the extensive dredge and fill activities of the late 1960's.

In 1967 the Florida Legislature passed the Randall Act (Chapter 67-393, Laws of Florida), which established procedures regulating previously unrestricted dredge and fill activities on state-owned submerged lands. That same year the Legislature also provided statutory authority (Section 253.03, F.S.) for the Trustees to exercise proprietary control over state-owned lands. Also in 1967, governmental focus on protecting Florida's productive estuaries from development led to the Trustees' establishment of a moratorium on the sale of submerged lands to private interests. In the same year, an interagency advisory committee on submerged land management was created. In late 1968, that committee issued a report recommending the establishment of twenty-six aquatic preserves. Also in 1968, the Florida Constitution was revised, declaring in Article II, Section 7, the State's policy of conserving and protecting the natural resources and scenic beauty. That constitutional provision also established the authority for the Legislature to enact measures for abatement of air and water pollution.

On October 21, 1969 the Governor and Cabinet acted upon the recommendations of the Interagency Advisory Committee and adopted by resolution 18 of the waterbodies, including Cape Romano-Ten Thousand Islands Aquatic Preserve, as aquatic preserves. Other preserves were similarly adopted at various times through 1971. Prior to the October 1969 action by the Governor and Cabinet, the Legislature had created the Boca Ciega Bay Aquatic Preserve. Subsequent legislation in 1972, 1973, and 1974 created the Pinellas County, Lake Jackson, and Biscayne Bay Aquatic Preserves, respectively.

In 1975, the Legislature established the Florida Aquatic Preserve Act (Chapter 258, F.S.), bringing all existing preserves under a standardized set of maintenance criteria.

Subsequent acts added the Cockroach Bay Aquatic Preserve in 1976, the Rookery Bay Aquatic Preserve in 1977, and the Gasparilla Sound-Charlotte Harbor Aquatic Preserve in 1978.

The Charlotte Harbor Aquatic Preserve Management Plan, approved by the Trustees on May 18, 1983, was the first management plan for an aquatic preserve. The following Aquatic Preserves have approved plans: Estero Bay--September 6, 1983; North Fork-St. Lucie--May 22, 1984; Loxahatchee River-Lake Worth Creek--June 12, 1984; Indian River Lagoon--January 22, 1985; Banana River--September 17, 1985; Indian River-Malabar to Vero Beach--January 21, 1986; Nassau River-St. Johns River Marshes and Fort Clinch State Park--April 22, 1986; Alligator Harbor--September 23, 1986; Terra Ceia and Cockroach Bay Plans--April 21, 1987; St. Joseph Bay--June 2, 1987; Wekiva River--August 25, 1987 and St. Martins Marsh--September 9, 1987.

In June 1985, the Legislature passed Senate Bill 762 which expanded the boundaries of the Rookery Bay, Banana River, Malabar to Vero Beach, Loxahatchee River-Lake Worth Creek, Wekiva River Aquatic Preserves, and created Guana River Marsh and Big Bend Seagrasses Aquatic Preserves. Lemon Bay and Rainbow Springs were added as aquatic preserves by SB 607 in 1986.

The Conceptual State Lands Management Plan, adopted on March 17, 1981 and amended by the Trustees on July 7, 1981 and March 15, 1983, established policies for the management of spoil islands, submerged lands leases, "Outstanding Native Florida Landscapes", unique natural features, submerged grassbeds, archaeological and historical resources, and endangered species. The policies provide management criteria for the Aquatic Preserve Program.

Administrative Rules

Chapters 18-20 and 18-21, Florida Administrative Code (F.A.C.), are rules adopted by the Trustees designating the allowable uses of aquatic preserves and other submerged lands. Chapter 18-20, F.A.C. addresses the aquatic preserves specifically and derives its authority from Sections 258.35, 258.36, 258.37 and 258.38, F.S. The intent of this Chapter is contained in Section 18-20.001, F.A.C., which states:

> "(1) All sovereignty lands within a preserve shall be managed primarily for the maintenance of essentially natural conditions, the propagation of fish and wildlife, and public recreation, including hunting and fishing where deemed appropriate by the Board and the managing agency.

(2) The aquatic preserves which are described in 73-534, Laws of Florida, Sections 258.39, 258.391, 258.392, and 258.393, F.S., future aquatic preserves established pursuant to general or special acts of the legislature, and in Rule 18-20.002, F.A.C., were established for the purpose of being preserved in an essentially natural or existing condition so that their aesthetic, biological and scientific values may endure for the enjoyment of future generations.

(3) The preserves shall be administered and managed in accordance with the following goals:

(a) to preserve, protect, and enhance these exceptional areas of sovereignty submerged lands by reasonable regulation of human activity within the preserves through the development and implementation of a comprehensive management program;

(b) to protect and enhance the waters of the preserves so that the public may continue to enjoy the traditional recreational uses of those waters such as swimming, boating, and fishing;

(c) to coordinate with federal, state, and local agencies to aid in carrying out the intent of the Legislature in creating the preserves;

(d) to use applicable federal, state, and local management programs, which are compatible with the intent and provisions of the act and these rules, to assist in managing the preserves;

(e) to encourage the protection, enhancement or restoration of the biological, aesthetic, or scientific values of the preserves, including but not limited to the modification of existing manmade conditions toward their natural condition, and discourage activities which would degrade the aesthetic, biological, or scientific values, or the quality, or utility of a preserve, when reviewing applications, or when developing and implementing management plans for the preserves;

(f) to preserve, promote, and utilize indigenous life forms and habitats, including but not limited to sponges, soft coral, hard coral, submerged grasses, mangroves, salt water marshes, fresh water marshes, mud flats, estuarine, aquatic and marine reptiles, game and nongame fish species, estuarine, aquatic and marine invertebrates, estuarine, aquatic and marine mammals, birds, shellfish and mollusks;

(g) to acquire additional title interests in lands wherever such acquisitions would serve to protect or enhance the biological, aesthetic, or scientific values of the preserves, and

(h) to maintain those beneficial hydrologic and biologic functions, the benefits of which accrue to the public at large."

Chapter 18-21, F.A.C., controls activities conducted on sovereignty submerged lands in general and is predicated upon the provisions of Sections 253.03 and 253.12, Florida Statutes (F.S.). These rules are supplemental to Chapter

18-20, F.A.C., in the regulation of activities in aquatic preserves. The stated intent of this administrative rule is:

"(1) to aid in fulfilling the trust and fiduciary responsibilities of the Board of Trustees of the Internal Improvement Trust Fund for the administration, management and disposition of sovereignty lands;

(2) to insure maximum benefits and use of sovereignty lands for all the citizens of Florida;

(3) to manage, protect, and enhance sovereignty lands so that the public may continue to enjoy traditional uses including, but not limited to, navigation, fishing, and swimming;

(4) to manage and provide maximum protection for all sovereignty lands especially those important for the supply of potable water, shellfish harvesting, public recreation, and fish and wildlife propagation and management;

(5) to insure that all public and private activities on sovereignty lands which generate revenues or exclude traditional public uses provide just compensation for such privileges; and,

(6) to aid in the implementation of the State Lands Management Plan."

OTHER DEPARTMENT OF NATURAL RESOURCES MANAGEMENT AUTHORITY

Other Department of Natural Resources management authority applicable to aquatic preserve management includes fisheries and marine mammal management and protection, and beach and shore preservation programs outlined in Chapters 370 and 161, Florida Statues (F.S.), respectively. Land acquisition programs conducted under the Environmentally Endangered Lands authority of Chapter 259, F.S. or the Conservation and Recreation Lands Program authorized by Chapter 253, F.S., will enhance the protection of the natural resources within the aquatic preserves.

OTHER MANAGEMENT AUTHORITY

The Marine Fisheries Commission (MFC) was established as a rulemaking authority pursuant to Section 370.027, F.S. Seven members are appointed by the Governor and are delegated full rulemaking authority over marine life (subject to approval by the Governor and Cabinet), except for endangered species.

DER's administrative rules significant to the aquatic preserve management program are Chapters 17-3, 17-4, and 17-12, Florida Administrative Code (F.A.C.), which are based upon the authority of Chapter 403, F.S. Chapter 17-3, F.A.C. addresses water quality standards and establishes a category with stringent use criteria called "Outstanding Florida Waters" (OFW). The inclusion of aquatic preserve waters within this classification greatly enhances the management of the aquatic preserves. Chapter 17-4 outlines permit requirements and Chapter 17-12 addresses dredge and fill activities.

Chapter 17-27, F.A.C. specifically addresses mangrove trimming under DER's regulatory criteria.

Section 253.77, F.S., as amended by the Warren S. Henderson Wetlands Protection Act of 1984, requires that any person requesting use of state-owned land shall have prior approval of the Trustees. An interagency agreement between DNR and DER provides for DNR staff comments regarding the environmental impacts of projects in aquatic preserves in the DER permitting process.

Chapter 403, F.S. governs the State's regulatory programs affecting water quality and biological resources. The Department of Environmental Regulation administers these programs through a permitting and certification process.

Authorized by Section 380.06, F.S., the Department of Community Affairs (DCA) and the Southwest Florida Regional Planning Council (SFRPC) are responsible for administering the Development of Regional Impact (DRI) process. The DRI process was established to provide a review and monitoring procedure for development projects potentially affecting more than one county.

Chapter 267, F.S. establishes the State policy regarding the preservation and management of Florida's archaeological and historical resources. This responsibility is assigned to the Department of State, Division of Historical Resources (DHR), which holds title to those cultural resources located on state-owned lands including aquatic preserves and other sovereignty submerged lands.

Each of the above referenced programs assist in protecting the aquatic preserves and their ecologically sensitive resources.

Chapter III

MAJOR PROGRAM POLICY DIRECTIVES

This plan contains a number of management policy issues. This section highlights those major policy areas that comprise the basic impetus of this management effort. Adoption of these policies will provide specific staff direction for implementing the day-to-day aquatic preserve management program. Major program policy directives are:

(A) Manage all submerged lands within the aquatic preserve to ensure the maintenance of essentially natural conditions to ensure the propagation of fish and wildlife, and public recreation opportunities.

(B) Prohibit the disturbance of archaeological and historical sites within the aquatic preserve, unless prior authorization has been obtained from the Trustees and DHR, and such disturbance is part of an approved research design or authorized project.

(C) Develop a resource inventory and map natural habitat types within the aquatic preserve, with an emphasis on those habitat types utilized by threatened, endangered, or species of special concern.

(D) Protect and where possible, enhance threatened, endangered and species of special concern habitats within the aquatic preserve.

(E) Limit development activities within the aquatic preserve that adversely impact saltmarshes and other valuable intertidal, submerged, and emergent habitats unless a prior determination has been made by the Board of overriding public importance and that no reasonable alternatives exist.

(F) Limit the trimming and/or removal of saltmarsh vegetation and other natural shoreline vegetation within the aquatic preserve, except for legally authorized projects.

(G) Provide and actively encourage research and educational opportunities for scientists and other interested researchers within the framework of a planned research program in the aquatic preserve.

(H) Acquire, where feasible, privately owned submerged lands and adjacent lands and islands located within the boundaries of the aquatic preserve pursuant to the authorities contained in Section 253.02(4), F.S.

(I) Discourage storage of toxic, radioactive, or other hazardous materials within the aquatic preserve. Any hazardous waste dumps now located within the aquatic preserve should be closed and eliminated.

(J) Discourage arthropod control practices in the aquatic preserves that require habitat modification or manipulation (i.e., ditching and diking) or aerial spraying of pesticides and biocides, except when there is a declared public health hazard pursuant to Section 388.45, F.S.

(K) Discourage the construction of new deep water ports within the aquatic preserve boundaries.

(L) Insure that artificial reef construction does not adversely impact environmentally fragile areas within the aquatic preserve and that the construction will maintain the essentially natural condition while enhancing the quality and utility of the preserve.

(M) Manage existing spoil islands within the aquatic preserve as bird rookeries and wildlife habitat areas, and for public recreational use where compatible.

(N) Encourage public utilization of the aquatic preserve, consistent with continued maintenance of its natural values and functions.

(O) Develop a well coordinated aquatic preserve management mechanism that recognizes and utilizes local government programs and authorities.

(P) Encourage, through the efforts of DER and the Water Management District, the maintenance and upgrading of the water quality of the estuary, and ensure the natural seasonal flow fluctuations of freshwater into the estuary.

(Q) Apply the management criteria contained in the adopted Rookery Bay/Cape Romano-Ten Thousand Island Aquatic Preserve Management Plan to all subsequent legislative additions of land to the aquatic preserve.

(R) Encourage the assistance of federal, state, and local government agencies in implementing the aquatic preserve management plans, especially in areas of protection of natural and cultural resources and the enforcement of applicable resource laws and ordinances.

(S) Prohibit Marinas and associated construction activities in Resource Protection Areas 1 and 2, except as provided for under Section 18-20.004(5)(d) 3, F.A.C.

(T) Identify and document any problems caused by fishing, shellfishing, and collecting activities and report them to the Marine Fisheries Commission.

(U) Insure consistency with the intent of the aquatic preserve designation in the resolution of inconsistencies between the adopted aquatic preserve management plan and any state or local planning processes or plans that may affect the aquatic preserves.

(V) Recognize that successful shellfish culture and harvesting efforts in the aquatic preserve are dependent upon pollution prevention and abatement and careful comprehensive planning.

Chapter IV

RESOURCE DESCRIPTION

Natural and cultural resources warrant careful consideration in the development of successful management strategies for the aquatic preserves. To introduce the Management Plan, an overview of the aquatic preserves' environment is presented.

A. Regional Context

1. Resource Setting

The aquatic preserves are located in south Collier County, the second largest county in Florida with a land and water expanse of 2,119 square miles (1,305,400 acres). The Rookery Bay Aquatic Preserve (Figure 2) and Cape Romano-Ten Thousand Islands Aquatic Preserve (Figure 3) extend 35 linear miles from Gordon Pass in the north to the Everglades National Park in the south and comprise 93 square miles of sovereignty submerged lands.

Over 49 percent of the total land and water area in Collier County has been set aside as public or private preserves dedicated to natural resource conservation. Other areas in proximity to the aquatic preserves, include the Rookery Bay National Estuarine Research Reserve, the National Audubon Society's Corkscrew Swamp Sanctuary, Big Cypress Swamp National Preserve, Everglades National Park, Fakahatchee Strand State Preserve, Delnor-Wiggins State Recreation Area, and Collier-Seminole State Park (DNR, 1987).

The aquatic preserves are composed of marine and estuarine waters, inlets, bays, tidal creeks and rivers, intertidal oyster reefs, mudflats, sand bars, beaches, salt flats, soft bottom communities, grassbeds and countless mangrove islands. With the exception of some small isolated areas, the majority of the estuarine shoreline within the Preserves' boundaries and adjacent wetlands remain undeveloped.

Rookery Bay is the northern most part of the Ten Thousand Islands Region which is unique in being the largest continuous mangrove forested area in the New World. Located adjacent to the City of Naples' southern limits and surrounding Marco Island, Rookery Bay Aquatic Preserve is subjected to high public use.

The majority of the shoreline is in public domain. The Rookery Bay National Estuarine Research Reserve encompasses 8,400 acres of tidal creeks, mangrove forests, islands, and uplands within and adjacent to the Rookery Bay Aquatic Preserve. An additional 13,230 acres of mangrove forested lands contiguous with the aquatic preserve were acquired by the State from the Deltona Corporation.

The digging of canals to drain agricultural and residential areas and the construction of major highways have altered the quantity, quality, and timing of freshwater entering the Rookery Bay system (Thoemke, 1985). Effective watershed management is fundamental to the continued health of the estuarine system.

Due to inaccessibility and public ownership of a portion of the islands, the Ten Thousand Islands Aquatic Preserve has minimal development within its boundaries. Alteration of the Preserve's watershed is the overriding environmental concern. The creation of South Golden Gate Estates, the Faka Union-Remuda Ranch Canal system and the construction of U.S. Highway 41 have altered the quality, quantity, and timing of freshwater entering the system.

2. Access

Major highways into the area are Interstate 75 from the north and State Road (S.R.) 84 (Alligator Alley) and U.S. 41 (Tamiami Trail) from the east (Figures 2 and 3).

Road access to Rookery Bay Aquatic Preserve is available by S.R. 951 from the west and S.R. 92 from the east. Access by water may be obtained from the intracoastal waterway running south from Naples or north from Coon Key Pass, or via Henderson Creek from the east. Entry from the Gulf of Mexico on the west is via Gordon, Hurricane, Big Marco, Caxambas, and Coon Key Passes. There are a number of marinas and boat launching ramps in Naples, Marco Island, Isles of Capri, and Goodland to facilitate boat access into the preserve.

There is no direct access to the Cape Romano-Ten Thousands Islands Aquatic Preserve by land. Access to the preserve's waters occurs via the intracoastal waterway through Coon Key Pass from the west. Access from the north is via Blackwater River through Collier-Seminole State Park and via the Faka Union

Canal. Entry from the Gulf of Mexico and Gullivan Bay on the south is via Dismal Pass, Fakahatchee Pass, and numerous inlets. There is a boat ramp at Collier-Seminole State Park, a marina at Port-of-the-Islands on the Faka Union Canal and boat ramps and marinas at Everglades City and Chokoloskee to facilitate boat access to the preserve.

3. Demography, Land Use, and Coastal Infrastructure

Collier County is the fastest growing metropolitan area in the United States (Miami Herald, July 30, 1986). The population increased 180% from 1970 to 1982 and is expected to exceed 180,000 by the year 1995 (Naples Area Chamber of Commerce, 1986). Seasonal visitors and tourists total approximately 750,000 people each year. Rapid growth and the influx of seasonal visitors has resulted in high density development along portions of the Collier County coastline. From the northern boundary of the Rookery Bay Aquatic Preserve northward to Lee County, there is extensive residential and commercial development including the City of Naples. South of the City of Naples, the major population center is on Marco Island. The majority of the coastal areas south of Marco Island remain undeveloped.

The shoreline of the Rookery Bay Aquatic Preserve is sparsely developed. There are only two areas with significant waterfront development within the preserve's boundaries: Isles of Capri and Goodland. There are small isolated areas with minimal development on Cape Romano Island and Key (Keewadin) Island, Little Marco Island, Cannon Island and at the mouth of Henderson Creek.

The watershed of the Rookery Bay Aquatic Preserve has considerable development. In 1980, 11,712 people lived in Water Management District 6 and Belle Meade drainage areas, the two main drainage basins of the preserve (Gore, 1984). The Collier County Planning and Zoning Department projects high future growth especially in Water Management District 6. Lely Resort Community, a 10,000 residential unit development, has been proposed in the Rookery Bay watershed.

Part of the watershed of the Rookery Bay Aquatic Preserve is used for agriculture, particularly in the Belle Meade area. Consequently, there is the potential for agricultural pollutants (pesticides, herbicides, and nutrients from fertilizers) to enter the aquatic preserves.

Cape Romano-Ten Thousand Islands Aquatic Preserve is essentially uninhabited. There are only a few isolated fish camps and hermit houses located in the Ten Thousand Islands.

Annual rainfall in Collier County may range from 76 cm (30 inches) to over 178 cm (70 inches) per year with a generally accepted average of 140 cm (55 inches) (Gore, 1984). There is a distinct wet-dry precipitation regime annually with approximately 66% of the total yearly rainfall occurring between the months of June and October. An average of 20-23 cm (8-9 inches) per month of precipitation occurs between June and September and an average of 2-5 cm (1-2 inches) per month is recorded from November through March.

Southwest Florida is situated in a seasonal tropical weather belt that produces or channels hurricanes toward the coast. Few devastating hurricanes have reached land in this area. The most recent catastrophic storm was Hurricane Donna which made landfall in 1960 causing massive flooding, devastation of vegetation and wide-spread damage to homes and buildings in Collier County. An earlier storm in 1918 produced severe damage to natural and man-made features and is considered responsible for destroying or severely damaging many of the mangroves in Collier County. Although a major storm can strike Collier County at any time, projections based on storm-track averaging suggest that the probability for a storm in any given year is 5 in 10, and for two such storms 1.5 in 10 (Jordan, 1973). The probability that any of these storms will be hurricanes or great hurricanes is 5% and 1%, respectively (Gentry, 1974). Such catastrophic events may have long-term ramifications on the aquatic preserves and could change the ecology permanently (Alexander and Crook, 1974).

B. Geology, Physiography and Soils

Collier County is located in the South Florida Basin, a subunit of the Florida Plateau, a geologic region originally named by Vaughan (1910). The Florida Plateau consists of the State of Florida, and an equal area of submerged ocean shelf west to a depth of 50 fathoms (91m or 300 ft) (Drew and Schomer, 1984). The core of the plateau is formed of igneous and metamorphic rocks. Sedimentary rocks greater than 365 meters (1200 feet) thick overlie the core.

The geologic structure of the area is a result of a highly sedimented marine environment which alternately emerged and submerged during glacial and interglacial periods, respectively. All of Collier County is underlaid by the Tamiami Formation which is a nearshore shallow water rock deposited in marine littoral or shallow sublittoral zones during the Miocene Age (Gore, 1984). The Tamiami Formation is composed of tan to light grey sandy and silty clays and shell marl (McCoy, 1962). The limestone of the Tamiami formation forms the principal shallow water aquifer of Collier County. Its permeability and widespread occurrence is critical to the county's water supplies.

In the Cape Romano-Ten Thousand Islands Aquatic Preserve and its watershed, the Tamiami Formation is exposed near the surface or is covered by a thin layer of more recent sandy marine deposits. In the Rookery Bay Aquatic Preserve, portions of the Tamiami Formation are covered unconformably by the Pleistocene Anastasia Formation, a combination of subaerial lithified sands and shell hash (McCoy, 1962).

The physiography of a natural area determines surface water drainage, groundwater resources, and hydroperiod. Davis (1943) divided Collier County into three physiographic regions: 1) Flatlands; 2) Big Cypress; and, 3) Southwest Coast and Ten Thousand Islands (Figure 4). The physiographic regions were formed by deposition and erosion associated with sea-level rise during periods of interglaciation.

The Flatlands region is an elevated, relatively level area with predominantly sand soils and elevations upwards to 10 m (33 ft.) The Flatlands region does not have the characteristic relic shoreline features found in other areas

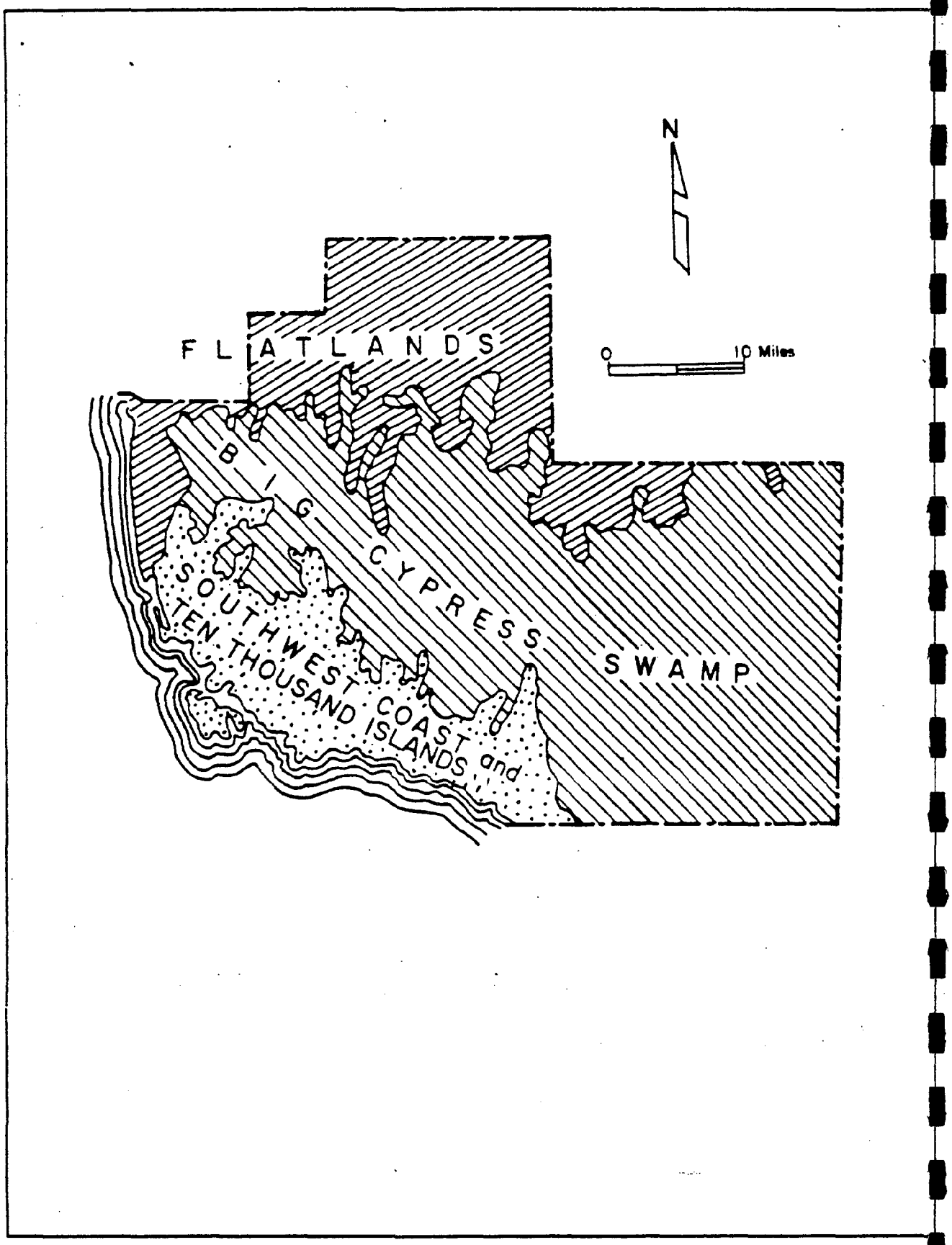


Figure 4. Three Physiographic Regions of Collier County (Davis, 1943).

formed during the same geologic time. White (1970) hypothesized that the region was formed during the Pamlico time as a submarine shoal extending south from a cape at the south end of the Desoto Plain. As the sea level dropped, the Flatlands region emerged as a slightly elevated sandy area interspersed with marsh, swamps, and open water depressions such as Okaloacoochee Slough, Corkscrew Swamp, and Lake Trafford. Soils of the Flatlands Region, mainly derived from marine deposits, are sandy and lie directly over marls, limestone, and calcareous limestone (Davis, 1943).

The Big Cypress region is oriented northwest to southeast and characterized by elevations of 15 feet or less. The region is tilted toward the Gulf of Mexico. Swamps with large cypress, islands of pine forest, and wet marl prairies are interspersed throughout the region (McCoy, 1972). The Big Cypress is characterized by thin sand or thin marl soils or the absence of soils in rockland areas (Davis, 1943).

The Southwest Coast and Ten Thousand Islands Region contains tidal streams, bays, lagoons, and thousands of washover islands. Elevations are generally 0-10 feet with a few exceptions such as Hoor's Island and Sand Hill. The geomorphology of the Collier County coast consists of two major components: 1) a coastal re-entrant zone from Gullivan Bay southward and 2) a coastal protuberant zone from Cape Romano northward (Drew and Schomer 1984).

The two distinct zones are a result of contrasting offshore bathymetry and sediment sources responding to the rising sea level. The offshore slope becomes more gradual south of Cape Romano. North of the Cape, the 5-fathom

isobath is rarely greater that 9 km (6 mi) from shore, but south of the Cape, the 5-fathom isobath is 24 to 32 km (15-20 mi) offshore. The gradual slope in the south zone reduces wave energy to a level that is insufficient to transport sand necessary for the formation of barrier islands.

The type of nearshore materials is another factor contributing to the re-entrant shoreline configuration. The nearshore sediments in the south zone are high in limestone which is not a suitable material for the formation of barrier islands. The nearshore materials north of the Cape are high in quartz sand, an excellent material for barrier island formation.

The outer islands in the Ten Thousand Islands have small quartz rich sand beaches on their seaward shores, but the sand is not available in sufficient quantity to enable the beaches to coalesce into continuous barrier islands.

Recent sediments in the Ten Thousand Islands have been deposited during the past 5000 years (Shier, 1969). Inundation of the area after the most recent glacial period produced a broad expanse of shallow water in the region. Along the seaward edge of the shallow area, conditions were favorable for the growth of the vermetid gastropod, Petaloconchus sp. A series of elongated vermetid reefs formed parallel to the shoreline and a distinctive sediment was deposited around these reefs. Presently, the seaward islands of Ten Thousand Islands are underlaid with these reef barrier sediments.

The formation of the inner islands is closely linked to the production and binding of sediments by oysters and mangroves. Sediments, transported from the Cape Romano Shoals by tidal currents and waves from strong storms,

accumulated in the islands region and was stabilized by the growth of vermetid reefs, oysters, and mangroves. The inner islands are overlying a complex of silty sands, mangrove peat, and oyster shell hash.

In the area north of Cape Romano, the combination of a greater offshore slope, moderate to high energy waves, and a constant source of sand transported by littoral currents has formed high energy barrier islands with a series of sheltered lagoons leeward of the islands.

C. Surface Water Hydrology

The Rookery Bay-Ten Thousand Islands estuarine systems are a series of small interconnected tidal embayments. The estuaries of the Rookery Bay and Cape Romano-Ten Thousand Islands Aquatic Preserves have surface areas of 28,094 and 27,006 acres, respectively. Surface water hydrology is influenced by the interaction of freshwater inputs from major man-made canals, numerous tidal creeks and rivers, and overland sheetflow with tidal exchange via several major inlets with the Gulf of Mexico. The interaction of the discharged freshwater with the tides influences the circulation patterns, sedimentation, nutrient levels, and pollution amounts.

The region exhibits two high and two low tides of unequal magnitude each lunar day (24 hours and 50 minutes). Tidal range averages 0.6 m (1.9 feet) with higher and lower extremes during spring tides. Meteorological events can modify the tidal range. Low pressure systems such as hurricanes and frontal storms have historically increased tidal amplitude, while strong north winds and high barometric pressure can suppress it.

The water circulation of the estuarine systems is complex and not well understood. There appears to be a net flow from north to south in both of the aquatic preserves. Tidal exchange with the Gulf takes place through numerous inlets such as Gordon Pass, Hurricane Pass, Big Marco Pass, Caxambas Pass, and Coon Key Pass in the Rookery Bay Aquatic Preserve. The Cape Romano-Ten Thousand Islands Aquatic Preserve consists of a labyrinth of tidal inlets and scoured tidal channels such as Whitney Channel, Dismal Key Pass, Panther Key Pass, Fakahatchee Pass, and West Pass.

Although the system receives seasonal influxes of freshwater from canals, extensive tidal exchange through the numerous inlets allows for flushing. The major hydrologic management concern in the preserves is the timing, quantity and quality of the freshwater entering the system.

The combination of physiography and a series of man-made canals determine surface water drainage and hydroperiod in Collier County. Both aquatic preserves are located in the Southwest Coast and Ten Thousand Islands physiographic region and receive drainage from the Big Cypress Swamp and Flatlands regions.

Due to the flat topography and slow natural drainage, no well-defined stream system is present in the Flatlands and Big Cypress regions. Drainage is through sloughs, strands, and canals or by overland sheet flow. In the Southwest Coast and Ten Thousand Islands regions, a series of tidal channels and small drainage creeks, oriented perpendicular to the coast, dissect mangrove forest and saltmarshes and empty into the estuaries.

The natural drainage patterns have been dramatically altered by the construction of canal systems: the Golden Gate Canal, the Faka Union Canal, and borrow canals for the construction of U.S. 41 (Tamiami Trail), S.R. 84 (Alligator Alley), S.R. 951, and S.R. 92 (Figure 5) (Collier County Board of County Commissioners, 1983). The purpose of the Golden Gate and Faka Union Canals are to lower annual peak water levels to prevent flooding during the rainy season.

The Golden Gate Canal system is 183 miles long and is interconnected with several secondary canals. The canal system provides controlled drainage which enabled development of Golden Gate Estates. The Canal is 100 feet wide and less than 8 feet deep and has several fixed weirs throughout its reach. The functions of the weirs are to control canal flow, prevent excessive drainage, and deter saltwater encroachment from the estuaries.

The majority of the flow from the Golden Gate Canal enters the estuarine system at Gordon River, north of the Rookery Bay Aquatic Preserve. However, the Henderson Creek Canal receives flow from the Golden Gate Canal during the rainy season. The Henderson Creek Canal discharges directly into the Rookery Bay Aquatic Preserve and is the major source of freshwater for the estuary. Henderson Creek, with an average depth of 0.8 m (2.6 ft), has a mean flow rate of 2,073,600 cubic feet/day (USGS, 1982).

Another important source of freshwater in the Rookery Bay Aquatic Preserve is the Lely Canal. This waterway drains the upland areas of Water Management District No. 6 and produces a mean daily flow of 144,000 cubic feet/day. Additional freshwater enters the Rookery Bay Aquatic Preserve through numerous

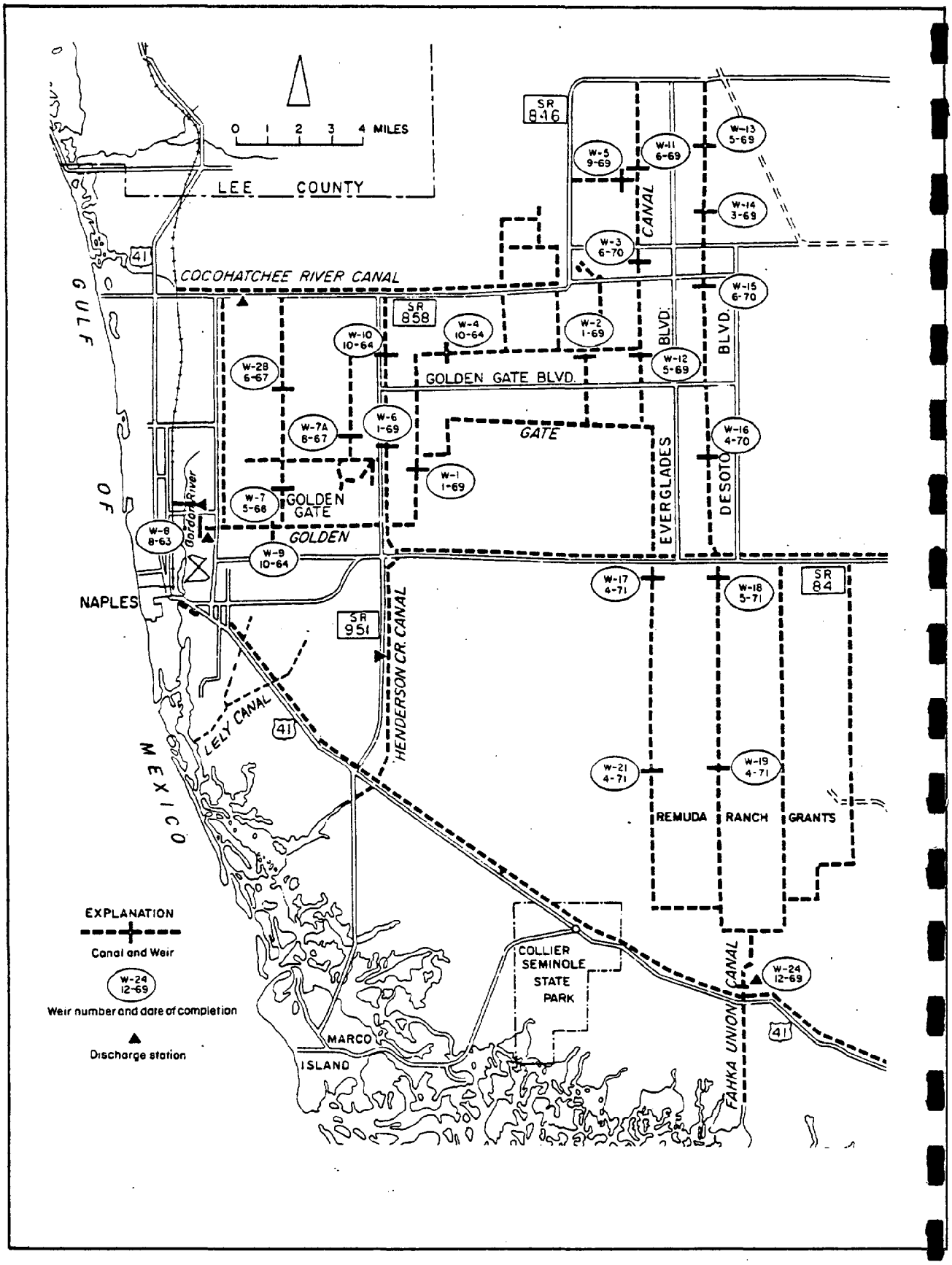


Figure 5. Canal System in Collier County (from Comprehensive Plan).

tidal creeks and minor tributaries through the mangrove forests, saltmarshes, and coastal uplands. A substantial, but immeasurable, amount of overland sheetflow enters the Rookery Bay Aquatic Preserve.

The Faka Union Canal is a combination of four parallel canals which coalesce into one and discharge though the channalized Faka Union River into Faka Union Bay. The Faka Union Canal is the major source of freshwater for the Cape Romano-Ten Thousand Islands Aquatic Preserve. The Faka Union Canal is 100 feet in width and less that 8 feet in depth. Water levels are controlled in a similar fashion as the Golden Gate Canal by a series of weirs.

Numerous small rivers, such as the Blackwater, Whitney, Pumkin, Little Wood, Wood, Fakahatchee, and East Rivers drain the immediate coastal areas of the Cape Romano-Ten Thousand Islands Aquatic Preserve. Additional freshwater enters as overland flow and via numerous tidal creeks.

D. Archaeological and Cultural Sites

The earliest cultural period in South Florida is known as the Paleo-Indian period dating from 12,000 to 6500 B.C. No Paleo-Indian sites have been located in the Rookery Bay Aquatic Preserve or the Cape Romano-Ten Thousand Islands Aquatic Preserve. Because sea level was much lower during this period, there may be sites that are now submerged or buried in the soils. Shards of pottery are known to wash ashore along the outer islands in the Ten Thousand Islands archipelago, however, the origin and age of the pottery has yet to be determined.

The subsequent cultural period, the Archaic, dates from 6500 to 1000 B.C. As large game animals became extinct, subsistence shifted from hunting to intensive gathering of localized resources, such as oysters and clams. During this period, the extensive shell middens, common in the aquatic preserves, were created.

When the Spanish explorers arrived, the Calusa (a.k.a. Caloosa, Calos, or Carlos) Indians were the dominant aborigines, in both numbers and range, in southwest Florida. The Caloosa were linguistically distinct from the Timucuan group who inhabited north Florida. Along the coast, Calusas consumed large quantities of abundant shellfish, mainly oysters and hard shell clams, and built domiciles and burial mounds from refuse shells. Secondary food sources were small and medium sized mammals, reptiles, birds, and wild plants.

The Calusa Indians traveled inland waterways by canoes and left mounds containing artifacts and human remains in the interior along their waterways. There are numerous Calusa shell mounds located in both the Rookery Bay Aquatic Preserve and Cape Romano-Ten Thousand Islands Aquatic Preserve.

There are no descendants of the Calusas left in South Florida. Most of the Calusa Indians died from epidemic diseases introduced by the Europeans in the early 1600's, or migrated to Cuba. The Seminoles and Miccosukees, who were forced into south Florida much later, are the only Native Americans remaining in the region.

According to DHR records, there are 27 known Indian middens in the Rookery Bay Aquatic Preserve and 16 Indian middens in the Cape Romano-Ten Thousand Islands Aquatic Preserve. The sites are located primarily along the shoreline and occasionally in the upland areas. Several of the sites have been excavated with skeletal remains of humans and animals, fiber-tempered pottery, and Busycon (shell) tools being common artifacts. Spanish pottery has been found on two sites in the Rookery Bay Aquatic Preserve, indicating that at one time the Spanish occupied an abandoned Indian midden. It is probable that additional shell middens and mounds from early Archaic and Paleo periods, as well as historic Spanish sites, are present in both aquatic preserves.

E. Plant Associations

The southwest Florida coast is a prime example of a subtropical coastal estuary and forest system. The aquatic preserves are characterized by coastal margin saltwater marshes, extensive mainland mangrove forest, thousands of reticulated mangrove islands, coastal strands, seagrass beds, and drift and benthic algae.

1. Benthic, Drift, and Epiphytic Algae.

Algae are important components of the marine and estuarine environment. Algae may be drift, benthic, or epiphytic, depending on the species. A firm substrate is required to begin algal growth, but once growth has been initiated, attachment for certain species is unnecessary. Drift algae become detached from substrate by wave action or grazing by organisms and are found in large quantities in the preserves' open waters during winter and spring.

Benthic algae are found attached to oyster bars, rocks, and other firm substrates or may have rhizoidal holdfasts which enable them to use sediments as a substrate. Ephiphytic algae grow attached to other plants such as seagrasses, mangroves, and other algae. There are four major taxa of algae common in the aquatic preserves: 1) Cyanophyta (blue-green algae, 2) Chlorophyta (green algae), 3) Rhodophyta (red algae), and 4) Phaeophyta (brown algae).

Blue-green algae are small plants most commonly found in littoral zones. Blue-green algae are ubiquitous in the estuary and coat mangrove roots, saltmarsh plants, rock jetties, and pilings. Plant morphology varies from small colonies of cells to elaborate filaments which may remain clumped together in macroscopically visible colonies. The ecologic value of the blue-green algae in the estuarine environment has not been fully assessed. Regardless of their ecologic value, they are the most abundant microscopic organisms in the littoral zone of southwest Florida estuaries with 34 species present (Dawes, 1974).

The green algae are well represented in southwest Florida estuaries ranging from small epiphytes to large bladed macroalgae. The green algae are important producers of organic carbon and members of the order Siphonales produce calcium carbonate for their skeleton, which is later incorporated into the sediments. Epiphytic forms are founds on seagrasses, mangrove prop roots, and drift algae. Several benthic species are common in waters of the preserves. Caulerpa spp., is common among seagrass beds and is found on

mangrove roots, muddy bottoms, and firm substrates. Williams (1981) speculated that the attached green algae (Caulerpa, Halimeda, Penicillus, Rhipocephalus, and Udotea) buffer currents allowing for subsequent sediment stabilization by seagrasses.

Red algae are predominantly marine and are most abundant in tropical and subtropical waters. Morphologically the red algae can be epiphytic, benthic or drift. Gracilaria and Laurencia are common genera of detached drift algae. These plants provide shelter and food sources for many small invertebrates and fish. Mud-sand substrates in the Ten Thousand Islands Region support growth of red algae. Seasonal variation in the standing crop of red algae occurs in the region with the peak concentration occurring from July to September (Carter et al., 1973).

The majority of the brown algae are found in cold temperate to arctic marine waters. On the west coast of Florida, brown algae are most abundant during the winter months when the shallow waters are cool (Dawes, 1974). Some tropical genera of brown algae are present year round, such as Sargassum, Dictyota, and Padina.

Sargassum spp. are bouyed by small air bladders and are transported great distances in the Gulf by currents. Occasionally, Sargassum washes up in great quantities on the beaches of the aquatic preserve and brings with it a community of highly specialized organisms. Flatworms, polychaetes, shrimps, and crabs are camouflaged to blend in with the algae.

2. Seagrasses

Seagrasses thrive only in the least disturbed bays and lagoons which have the most transparent water. These qualities are found in the Cape Romano Shoals area and on the seaward toes of the Ten Thousand Islands. Relatively high turbidity and color and periodically reduced salinities in the bay system of the Ten Thousand Islands limit their distribution. Coastal dredge and fill activities, shoreline development, canalization, and drainage of the watershed may also limit their distribution.

In the upper reaches of the estuaries, widgeon-grass (*Ruppia maritima*) is most prominent. Grassbeds in the open-water estuaries are composed of a mixture of grasses with shoal grass (*Halodule wrightii*) and turtle grass (*Thalassia testudinum*) being most common. Manatee grass (*Syringodium filiforme*) and snook grass (*Halophila balonis*) are present to a lesser extent. These marine flowering plants occur on both sandy and organic sediments in shallow depths. Information on species composition of seagrass beds is available from Yokel (1975) for Rookery Bay and Carter et al. (1973) for Faka Union and Fakahatchee Bays.

Despite their local limited aerial coverage, seagrass beds are among the most productive estuarine communities and are vital habitat for adult and juvenile fish, mollusks, and crustaceans. Many organisms that are characterized by their presence and abundance in mangrove prop roots, over oyster bars, or in open estuarine waters use the seagrass meadows as nursery grounds. Some of

these organisms may feed in the seagrasses throughout their life, but as adults they are too large to utilize the meadows for cover. Consequently, they seek shelter in the prop roots of mangroves or in the complex structure of oyster bars during the day and disperse over the seagrasses to feed at night.

Seagrass communities play an integral part in the cycling of nutrients in the estuarine environment. They are consumed directly by urchins, conchs, fishes, and the endangered West Indian Manatee (Trichechus manatus) (Zieman, 1982). Decomposition of seagrasses contributes to a food source for detrital feeders, which in turn are consumed by fish and other marine life. Seagrasses are used as an attachment site for many forms of epiphytic algae and foraminifera which may be a more utilized food source for fish and juvenile shrimp than direct seagrass herbivory (Zieman and Wetzel, 1980; Dawes, 1981).

Seagrass blades provide a baffling effect that slows the water currents thus trapping particulate matter. The roots and rhizomes of the seagrasses bind the sediments allowing organic material to accumulate which results in a diverse meiofauna (Zieman and Wetzel, 1980).

When a loss of seagrasses occurs, reductions in such factors as water quality, survival of many larval and juvenile fish and invertebrates, and the availability of food throughout the food chain take place. The ultimate consequence is lower availability of commercial and recreational fish and shellfish which directly affects the general public. Most losses of seagrasses are caused by dredge and fill activities. In Florida 60,000 acres

of estuarine habitat have been filled (Durako et al. 1985). Even if the fill is not placed directly on top of seagrass beds, mortality may result from increased water turbidity. Unconsolidated particles of fill may be continually resuspended into the water column, inhibiting recolonization by seagrasses. Excessive nutrients from point and non-point pollutants can cause phytoplankton blooms or dramatic epiphytic algae growth, which may shade seagrasses causing a reduction of productivity. Propeller cuts directly reduce aerial coverage of seagrass beds. Since primary reproduction by seagrasses is via rhizomes, recolonization of disturbed areas is relatively slow or nonexistent.

3. Salt marsh

Salt marshes are grass dominated communities that grow landward of or are interpersed among the mangrove fringing forests. Although they often do not have a direct tidal connection, they invariably contain brackish or saline waters and are periodically inundated during high spring tides. In the aquatic preserves, salt marshes occupy a transitional zone between mangroves and freshwater marshes. Lewis (1982) and Egler (1952) suggest that salt marshes may be a pioneer community in subtropical regions, eventually being replaced by mangroves due to shading.

In salt marshes, the importance of plant biomass as a food source is not as significant as the production of vegetation fragments which are decomposed into detritus. This organic matter is exported into the estuary where it serves as the base of the marine and estuarine food web. Detrital matter is

consumed by bacteria, insect larvae, amphipods, polychaetes, fiddler crabs, clams, mussels, oysters and other organisms which are in turn consumed by larger organisms.

High primary productivity and the shelter of dense marsh grass provide habitat for juvenile and adult fish, birds, and invertebrates; protect shorelines from erosion; and, remove nutrients and sediments from the water column.

Zonation of the saltmarsh vegetation is typified by having smooth cordgrass (Spartina alterniflora) as the first emergent vegetation behind the mangrove fringe. Landward of the cordgrass, black needle rush (Juncus roemerianus) occurs in large bands and comprises the bulk of biomass in most of the marshes in the aquatic preserves.

Upland of the needle rush zone, areas with hypersaline soils called salt flats are present. This zone is rarely inundated with tidal water, and when inundated, water rapidly percolates through the sandy substrate. Long periods of exposure and high evaporation result in extremely high interstitial water salinities. Consequently, halophytic plants such as seashore saltgrass (Distichlis spicata), glasswort (Salicornia perennias), and saltwort (Batis maritima) are dominant.

An associated habitat found interspersed in the saltmarshes and mangroves are coastal ponds. These small, clearly delineated areas hold semi-permanent or permanent water which can be hypersaline, saline, of brackish. Particularly during periods of drought when the water levels are down, these areas form important feeding sites for numerous wading birds and small mammals.

4. Mangrove Forest

Three species of mangroves occur in the aquatic preserves: red (Rhizophora mangle); black (Avicennia germinans); and, white (Laguncularia racemosa). The buttonwood (Conocarpus erecta) is not a true mangrove (no tendency to vivipary or root modification), but is often grouped with the mangroves because of its ecological occurrence in the higher, less tidally inundated areas.

Conditions that limit the distribution of mangroves include climate, salinity, tidal fluctuation, substrate, and available nutrients. Optimal conditions in the Ten Thousand Islands region have resulted in the development of lush, often monospecific forests. Red mangroves comprise the dominant vegetation on most of the islands and along the immediate shoreline of the bays and creeks. Black mangroves form extensive forests and are found chiefly in the tidal flushed basins located landward of the shoreline. White mangroves are generally found in the upland extreme of the mangrove assemblage, but are often intermixed with black mangrove. Buttonwood trees occur in the higher areas of the mangrove forests, along berms and high island margins, as well as along the mangrove-marsh fringe. Hydrologic and topographic features alter the zonation patterns and the three mangrove zones are occasionally indistinct, where intermixing of mangrove species occurs.

Most of the mangrove forests in the Rookery Bay and Cape Romano-Ten Thousand Islands Aquatic Preserves are secondary growth, ranging from 30 to 70-100 years old (DNR, 1986). Hurricanes in 1918 and 1960 caused extensive deforestation in the Ten Thousand Islands Area. Isolated forest remnants greater than 100 years old are located along the north shore of Rookery Bay and in Henderson Creek (The Conservation Foundation, 1968).

The mangrove forests of the aquatic preserves are of critical value to the marine and estuarine ecosystems. Complex branching prop roots of the red mangrove and black mangrove pneumatophores trap sediments, providing a rich food source for benthic, planktonic, and fish communities. The leaves of the mangroves are constantly being shed. These rapidly decay to form small particulate material called detritus which is transported by the tides into the estuaries where it is consumed by many invertebrates that inhabit soft bottom sediments.

Large numbers of invertebrates and fishes seek shelter and food in the maze of trunks and roots. The tree crabs and snails graze in the mangrove canopy. Symbiotic insects such as ants, beetles, cockroaches, and aphids live in the trunks and on the leaves.

Numerous species of wading birds use the trees as roosting and nesting areas. Raptors feed on fishes, small birds, and mammals associated with the mangroves.

In addition to their importance in nutrient production and as habitat, mangrove forests also reduce the physical effects of storms and wave overwash because their extensive root systems stabilize sediments. These same root systems slow freshwater runoff and act as filters for nutrients and sediments.

Within the aquatic preserves, changes in the distribution and composition of mangrove communities are the result of the alteration of drainage patterns in the uplands, erosion induced by increased wave action associated with increased boating activity, and direct destruction by uprooting trees for building or water access.

Since mangroves stabilize bottom sediment, disturbances to mangrove forests increase turbidity in adjacent waters, which in turn may affect seagrass and other benthic communities.

5. Coastal Strand

In the area north of Cape Romano, the combination of a greater offshore slope, moderate to high energy waves, and a constant source of sand transported by littoral currents has formed high energy barrier islands vegetated by highly adapted plants. South of Cape Romano, coastal strand vegetation is present to a lesser extent and is found along small narrow beaches of the outer Ten Thousand Islands.

High temperature extremes, very porous coastal sands, salt spray, and abrasive aeolian sand contribute to the harsh environment of the coastal strand. The vegetation of the beaches and foredunes of the aquatic preserves is characterized by pioneer plants which are adapted to the harsh environment. Typical species include sea oat (Uniola paniculata), sea rocket (Cakile sp.) and railroad vine (Ipomea pes-caprae).

A collection of associated fauna has adapted to the harsh environment of the coastal strand. Numerous shorebirds and aerial searching birds feed and nest along the Gulf beaches in the preserves. Sea turtles are known to lay eggs along Key (Keewadin), Kice, and Cape Romano Islands during the summer months.

F. Fauna

A combination of subtropical climate, diverse vegetation and a variety of habitats provides ideal conditions for the occurrence of a variety of fauna in the aquatic preserves. Mangroves, seagrass beds, oyster beds, live bottom communities and saltmarshes provide habitat for numerous species which includes marine invertebrates, mollusks, reptiles, amphibians, finfish, colonial water birds, migratory waterfowl, raptors, and marine mammals.

1. Invertebrates

Invertebrates are found in every habitat of the preserves including mudflats, seagrass beds, oyster bars, sandy bottom, live bottom communities and mangrove prop roots. Indigenous invertebrates include members of the following phyla: Porifera, Cnidaria, Ctenophora, Nemertea, Annelida, Bryozoa, Mollusca, Arthropoda, and Enchinodermata. A species list of invertebrates expected to inhabit the preserves is located in Appendix E.

Porifera

The Porifera, meaning "pore bearers", are commonly called sponges and have no true physiologic systems. They feed by filtering water through their body cavities, extracting bacteria, detritus, and planktonic algae in the process. Many members of this phylum are thin and encrusting including the two species currently identified in the preserves. Haliclona permollis is purple in color

and has a world-wide estuarine distribution. Cliona celata, a yellow species, has a similar distribution but is restricted to calcium carbonate substrata. By secreting acid, this species bores into oysters eventually killing them. It is unknown whether this species is a significant problem in these preserves.

Cnidaria

The Cnidaria are radially symmetrical animals that have a simple internal cavity. Nematocysts are characteristic of all Coelenterates. Portugese man-of-war (Physalia physalia), sea nettle (Chryasora quinquecirrha), lion's mane (Cyanea capillata), moon jellyfish (Aurelia aurita) and by-the-wind sailor (Velella velella) are pelagic but are occasionally carried into the aquatic preserves by onshore currents or winds in the Gulf. Anemones are found attached to the live bottom communities such as vermetid mollusc reefs and rock jetties. All Cnidarians are predators that feed by using long barbed nematocysts that remain coiled inside tentacles until they come in contact with a potential food source such as fish. The warty sea anemone (Bunodosoma cavernata), tricolor anemone (Calliactis tricolor), and pale anemone (Aiptasia pallida) are the predominant anemones in the region.

Ctenophora

The Ctenophores, nearly all of which lack hematocysts, have transparent, geletinous bodies bearing eight rows of comblike cilia used for locomotion. Seasonal in abundance, ctenophores can occur in large numbers in the bays and are voracious predators of zooplankton, larval fish and fish eggs, often

wreaking havoc with a year's spawning (Voss 1976). Although gooseberry (Pleurobrachia pileus), ovate comb jelly, (Beroe ovata), and phosphorus jelly (Mnemiopsis mccradyi) occur along the Gulf of Mexico, only the latter is common in estuaries.

Nermertea

The members of Nemertea are long, slender, somewhat flattened worms that range in size from less than an inch to several feet long. Nermertea are found locally burrowed in sandy mud bottoms near and below the low tide line. Numerous Nemertea were collected in core samples by staff of the Rookery Bay National Estuarine Research Reserve during monthly benthic sampling between December 1984 and November 1985 (Thoemke and Gyorkos 1987). The most common Nemertea is the ribbon worm (Cerebratulus lacteus) which preys upon other worms and small crustaceans.

Annelida

Annelida includes about 9,000 known species belonging to three classes: the Hirundinea, Oligochaeta, and Polychaeta (Meinkoth 1981). In the sediments of Rookery Bay, 75 species of polychaetes have been identified (Appendix E) (Thoemke and Gyorkos, 1987).

Bryozoa

Bryozoans are sedentary creatures that form branching, erect or encrusting colonies on a variety of substrates. Oyster bars, jetties, vermetid reefs,

marine plant stems, pilings, and seawalls are suitable substrates for colonization by bryozoans. Single-horn bryozoan (Schizoporella unicornis), a branching colony, has been observed washed up on the beaches in the Ten Thousand Islands. The hooded bryozoan (Watersipora cucullata), an encrusting form, is common on rocks, pilings, and oyster shells in south Florida (Voss, 1976).

Mollusca

Mollusks are a large, well known group of animals most of which have one or two external shells. Mollusks have historically been a highly exploited food source for humans. The Calusa Indians harvested the American oyster (Crassostrea virginica) and the southern hardshell clam (Mercenaria campechiensis) prior to the arrival of Europeans. In the Rookery Bay Aquatic Preserve, a tremendous fishery based on the southern hardshell clam existed in the early 1900's. The cause of the collapse of the clam fishery off Cape Romano is unknown.

In the Rookery Bay Aquatic Preserve, 32 species of mollusks have been identified (Thoemke and Gyorkos, 1987). Of the mollusks present, the oysters and vermetids possess reef building capabilities. Oysters are found in soft and hard bottoms consisting of sand or firm mud or attached to mangrove prop roots.

In the Rookery Bay and Ten Thousand Islands regions, oysters are limited to the mid-intertidal zone where minimum inundation and heat determine the upper limit and predation determines the lower extent. Oyster beds support a

variety of macrofauna and benthic algae. Sponges, Bryozoans, mussels, barnacles, and slipper shells use oysters as substrate. The oyster drill (Urosalpinx cinerea), stone crab (Menippe mercenaria), blue crab (Callinectes sapidus), mud crab (Panopeus herbstii), and the oystercatcher (Haematopus palliatus) prey on adult oysters.

Since oysters and clams, commonly called shellfish, filter-feed directly on suspended particulate matter in the water column, they concentrate pollutants present in the water in their tissues. Shellfish have great economic value, however if contaminated, they present a potential public health hazard to the consumer. For this reason, shellfish harvesting is only allowed in areas which meet stringent water quality standards. Large portions of Cape Romano-Ten Thousand Islands Aquatic Preserve are presently approved for shellfish harvesting. The Rookery Bay Aquatic Preserve is presently prohibited for shellfish harvesting, but efforts are underway to reevaluate the classification.

The filter-feeding vermetid gastropod Petaloconchus sp. has formed reef structures in the intertidal zone of the outer Ten Thousand Islands. No living reef-building animals have been found recently, but it is possible that reef growth may be episodic (Jones et al., 1985). Regardless of the absence of living vermetids, these reefs support a diverse live bottom community composed of bryozoans, hydroids, ascidians, sponges, and occasionally hard corals. Despite their limited distribution, the vermetid reefs are an integral part of the estuarine system, providing habitat and food to a variety of vertebrates and invertebrates.

Organisms living on the reefs are exposed to severe physical stresses from breaking waves and temperature extremes. Mobile animals seek refuge in the crevices or on the leeward side of the rocks. Most of the animals on the reefs either filter plankton from the water, graze on epiphytic algae, or scavenge scraps of food left by the ebbing tide.

Arthropoda

Arthropods include a large and varied collection of animals that range from minute amphipods and sessile barnacles to large crabs. Most arthropods have a hard external shell and jointed legs. Barnacles are common arthropods found on rocks, oyster shells, vermetid reefs, and other hard substrates. Barnacles filter plankton from the water with featherlike appendages. When the tide recedes, the appendages are withdrawn behind tightly closed opercular valves. Fragile barnacle (Chthamalus fragilis), starred barnacle (Chthamalus stellatus) and ivory barnacle (Balanus eburneus) are common in the region.

Amphipods are small arthropods that occupy an important niche in the estuarine food chain. Thoemke and Gyorkos (1987) identified 21 species of amphipods in Rookery Bay.

Isopods are another group of small arthropods that are often wood boring animals. The mangrove gribble (Sphaeroma tenebrans) bores into mangrove prop roots causing extensive damage. Rehm and Humm (1973) attributed the loss of trees during storms to isopod damage.

The most well-known arthropods belong to the Order Decapoda which consists of shrimp, lobster, and crabs. Gore (1987) listed 121 species of shallow-water decapods that are known or are expected to occur in Collier County. Stone crab, a Decapod, is of high economic value to the local economy. In 1980, 1,483,910 pounds of stone crab claws valued at 2,167,736 dollars were landed in Collier County (DNR, 1980). Many of these crabs are harvested from the Cape Romano-Ten Thousand Islands Aquatic Preserve.

Pink shrimp (Penaeus duorarum) utilize the mangrove, salt marsh, and seagrass areas of the aquatic preserves as nursery grounds and are harvested in large quantities offshore. In 1980, 4,206,464 pounds of shrimp valued at 8,520,804 dollars were landed in Lee County (DNR, 1980).

Arboreal decapods such as the mangrove tree crab (Aratus pisonii), and brown mangrove crab (Sesarma curacaoense) seek shelter and food in the mangrove canopy.

Echinodermata

Echinodermata is an entirely marine group of invertebrates. They include the starfish, brittle stars, sea urchins, sand dollars, and sea cucumbers. Starfish and sand dollars prefer sandy substrates and are found along the Gulf beaches and near the passes of the preserves. Brittle stars are found in the intertidal and subtidal areas and are more common in muddy substrates (Donna Devlin, Collier County, pers. comm.). At least two species of sea urchins, three species of sand dollars, two species of starfish, and several brittlestars and sea cucumbers are found in the live bottom communities in association with the seagrasses.

2. Marine and Estuarine Fishes

A species list of the marine and estuarine fishes associated with mangrove based estuaries of south Florida has been compiled by Odum et al. (1982) (Appendix E). The relative abundance of mangrove associated fishes can be attributed to two factors: 1) mangrove prop roots afford a protective habitat which is particularly suitable for juvenile fish and 2) mangrove leaf litter is the basic energy source of the detritus-based food chain on which many fishes are dependant (Odum et al., 1982).

In the brackish, shallow water portions of the estuaries, the euryhaline killifishes and livebearers often occur in high abundance. Representative killifish include marsh killifish (Fundulus confluentus), Gulf killifish (F. grandis), sheepshead minnow (Cyprinodon variegatus), and diamond killifish (Adinia xenica). Livebearers, as their name implies, give birth to live young after internal fertilization and include the mosquitofish (Gambusia affinis), and sailfin molly (Poecilia latipinna).

Around the seagrass beds in Rookery Bay, pinfish (Lagodon rhomboides) were the most abundant fish taken in a 1975 study by Yokel. Silver jenny (Eucinostomus gula), spotfin mojarra (E. argenteus), pigfish (Orthropristis chrysoptera), silver perch (Bairdiella chrysura), and lane snapper (Lutjanus chrysoptera), were also found over seagrass beds (Yokel, 1975).

The open water estuarine communities are composed of benthic fish and mid and upper water column fishes (Drew and Schomer, 1984). Dominant benthic species are similar in composition to the seagrass fish community and include pinfish,

silver jenny, spotfin mojarra, pigfish, and silver perch. Of the mid and surface water species, bay anchovy (Anchoa mitchilli), striped anchovy (A. hepsetus), and menhaden (Brevoortia smithi) are characteristic fishes.

A majority of the exploited fisheries in Florida are linked to the estuarine environment (Lindall, 1981). It has been estimated that by weight 97.5% of the commercial fishery resources in the Gulf of Mexico and over 90% of the recreational species in the United States depend upon estuaries during part or all of their life cycle (Comp, 1985). In Florida, at least 72% of the 89 commercial species of finfish and shellfish and 74% of the recreational species are estuarine dependant (Durako et al., 1985).

In addition to the common snook (Centropomus undecimalis), a species of special concern, the redfish or red drum (Sciaenops ocellata) also occurs within the preserves. Current regulations for the taking of these species will be made available to the general public through the preserve staff. Updated regulations will be obtained through the local marine patrol office and staff will become familiar with the most recent versions.

Other species of commercial and recreational importance include black drum (Pogonias cromis), Gulf flounder (Paralichthys albiguttata), fantail mullet (Mugil trichodon), striped mullet (M. cephalus), spotted seatrout (Cynoscion nebulosus), sheepshead (Archosargus probatocephalus) and Tarpon (Megalops atlantica).

3. Amphibians and Reptiles.

Information on the amphibians and reptiles of southwest Florida is scarce. Deuver et al., (1982) lists 64 species of reptiles found in the Big Cypress watershed. Thirty-three species, all reptiles, frequent coastal and brackish water habitats (Appendix E). Amphibians are excluded because they cannot tolerate the high saline environment of the aquatic preserves.

Of the 32 species of reptiles that inhabit the estuaries or use the areas as corridors, only five species live exclusively in coastal habitats: diamondback terrapin (Malaclemys terrapin macrospilta); loggerhead sea turtle (Caretta caretta caretta); green sea turtle (Chelonia mydas mydas); Atlantic ridley (Lepidochelys kempii); and the American crocodile (Crocodylus acutus).

Of the remaining 25 reptilian species that frequent the estuaries, 20 species are snakes (suborder Serpentes). Snakes which commonly use coastal habitats include: mangrove water snake (Nerodia fasciata compressicuda); south Florida black swamp snake (Seminatrix pygaea); eastern hognose snake (Heterodon nasicus); southern black racer (Coluber constrictor priapus); Everglades racer (C. constrictor paludicola); eastern indigo snake (Drymarchron corais); corn snake (Elaphe guttata); yellow rat snake (E. obsoleta quadrivittata); Everglades rat snake (E. obsoleta rossalleni); Florida kingsnake (Lampropeltis getulus floridana); scarlet kingsnake (L. triangulum elapsoides); eastern diamondback rattlesnake (Crotalus adamanteus); and eastern coral snake (Micrurus fulvius).

Five species of lizards: the common anole (Anolis carolinensis), Florida scrub lizard (Sceloporus woodi), ground skink (Scincella lateralis); slender glass lizard (Ophisaurus attenuatus); and the southeastern five-lined skink (Eumeces inexpectatus) are commonly associated with the mangrove forested areas of the preserves.

Two members of the order Crocodylia, the American alligator (Alligator mississippiensis) and the American crocodile are occasionally found in the aquatic preserves. The alligator is present throughout the southeastern United States and is only incidentally found in the aquatic preserves when heavy rains decrease the salinity in the upper reaches of the estuaries. However, the crocodile is extremely dependent on estuarine mangrove areas and historically its distribution has been centered in the mangrove forested areas of the Florida Keys and the mangrove shorelines of Florida and Whitewater Bays (Kushlan 1980). American crocodiles have been spotted in Collier County. In the early 1970's crocodiles were identified in the vicinity of Bathey canals by a research assistant at TCI's Norris Marine Lab. As recently as 1984, a crocodile was sighted at Collier-Seminole State Park (Benny Woodham, DNR, pers. comm.).

4. Birds

Birds in the aquatic preserves have been grouped into categories based on similarities in habitat preference or method of food gathering. These categories are the wading birds, shorebirds, floating and diving waterbirds, aerial searching birds, birds of prey and arboreal birds.

Wading Birds

The wading birds are the most conspicuous birds found in the aquatic preserves. Fifteen species of wading birds are commonly found in the estuaries (Appendix E) (Ted Below, National Audubon Society, pers. comm.) Common species include Great Egret (*Egretta alba*), Snowy Egret (*Egretta thula*), Cattle Egret (*Bubulcus ibis*), Great Blue Heron (*Ardea herodias*), Tricolor Heron (*Hydranassa tricolor*), Little Blue Heron (*Florida caerulea*), Black-crowned Night Heron (*Nycticorax nycticorax*), Yellow-crowned Night Heron (*Nyctanassa violacea*) and White Ibis (*Eudocimus albus*).

Wading birds utilize the estuaries of the aquatic preserves for three purposes. First, estuaries are used as feeding grounds. Although some of the birds feed in the freshwater ponds and marshes located upland of the preserves, all use the estuarine areas to feed during certain times of the year. During the rainy and dry seasons, the water levels in the freshwater ponds and marshes become too high or too low to accommodate wading birds. Consequently, they disperse into the estuaries to feed in the grassbeds, mudflats, and mangrove swamps.

Second, wading birds use the mangrove islands as roosting areas. Every evening at sundown, thousands of wading birds fly into the estuarine areas to roost on mangrove tree islands, regardless of whether they are feeding in the freshwater swamps or in the estuaries. The mangrove islands provide the birds with a safe area isolated from terrestrial predators. The primary roosting

site in the area is a group of islands called ABC islands in the Big Marco River. Presently, over 5,500 birds may use these islands for overnight roosting. A smaller roosting area is Bird Island in Rookery Bay where 1,500 birds roost (Ted Below, National Audubon Society, pers. comm.)

Third, wading birds use mangrove islands as breeding sites. Tricolor Herons, Little Blue Herons, Great Egrets, Snowy Egrets, and Cattle Egrets nest in both the ABC Islands and on Bird Island as well as a few smaller islands in the preserves.

Shorebirds

Shorebirds are commonly found in the intertidal and shallow water habitats of the preserves (Appendix E). Many of these birds are either winter residents or migrants and consequently their abundance is generally greater during the winter season.

Shorebirds feed by probing the substrate for invertebrates. Probing shorebirds are opportunistic feeders, taking primarily whatever mollusks, crustaceans, or insects are available in the surface sediments, flotsam and jetsam. Common probing shorebirds include Black-bellied Plover (*Pluvialis squatarola*), Semipalmated Plover (*Charadrius semipalmatus*), American Oystercatcher (*Haematopus palliatus*), Willet (*Catoptrophus semipalmatus*), Marbled Godwit (*Limosa fedoa*), Ruddy Turnstone (*Arenaria interpres*), Red Knot (*Calidris canustus*), Sanderling (*C. alba*), Semipalmated Sandpiper (*C.*

pusilla), Western Sandpiper (C. mauri), Least Sandpiper (C. minutilla), Dunlin (C. alpina), and Shortbilled Dowitcher (Limnodromus griseus) (Ted Below, National Audubon Society, pers. comm.)

Floating and Diving Water Birds

Twenty-eight species of floating and diving water birds including ducks, grebes, loons, cormorants, pelicans, and gallinules have been identified as inhabiting the estuarine areas of south Florida (Odum et al., 1982). Only eight of the species are year round residents with the remainder being winter visitors or present only during migrations. There has been a decline in recent years in the number of wintering waterfowl in the estuarine areas of the preserves (Ted Below, National Audubon Society, pers. comm.)

Floating and diving birds are either piscivorous or omnivorous, feeding on benthic invertebrates, seagrasses and algae. Picivorous birds include Common Loon (Gavis immer), White Pelican (Pelecanus erthrorhynchos), Double-crested Cormorant (Phalacrocorax auritus), Anhinga (Anhinga anhinga), and Red-breasted Merganser (Mergus serrator).

The most common omnivorous floating or diving bird is the Blue-winged Teal (Anas discors).

Aerial Searching Birds

Sixteen species of aerial searching birds frequent south Florida estuaries. Of the 16, only 5 are common year round: Brown Pelican (Pelecanus

occidentalis); Laughing Gull (Larus atricilla); Black Skimmer (Rynchops nigra), Belted Kingfisher (Medaceryle alcyon), and Fish Crow (Corvus ossifragus). The Least Tern (Sterna albifrons) is a summer visitor and breeder while seven others are winter visitors or transients.

Ten of the aerial searching birds are piscivorous and the remaining five are omnivorous feeding on fish and invertebrates. With the exception of the Brown Pelican, Belted Kingfisher, and Fish Crow, the aerial searching birds feed and rest along the Gulf beaches. Of particular significance in the aquatic preserve, the Least Tern nests on emergent sandbars in Caxambas Pass.

The Brown Pelican roosts and nests on estuarine mangrove islands. The major nesting site is the ABC Islands in Big Marco River.

Birds of Prey

Nineteen species of birds of prey (hawks, falcons, vultures and owls) frequent the estuaries of south Florida. Birds of prey consume snakes, lizards, small birds, waterfowl, fishes and carrion (Odum et al. 1982).

Of the 19 species of birds of prey, only the Turkey Vulture (Cathartes aura), Black Vulture (Coragyps atatus), Red-shouldered Hawk (Buteo lineatus), Bald Eagle (Haliaeetus leucocephalus), and Osprey (Pandion haliaetus) are common year-round residents. The Swallow-tailed Kite (Elanoides forficatus) is a common summer visitor and breeder and the American Kestrel is a common winter visitor.

In the aquatic preserves, the Bald Eagle and Osprey are the most conspicuous birds of prey. Both feed extensively on fishes in the estuarine area. The Osprey is an efficient piscivor, searching out and grasping prey fish from the water's surface with its feet. The Bald Eagle feeds in a similar manner as the Osprey, but often will steal fish from Ospreys. Ospreys have several nests in both aquatic preserves and have successfully maintained nests atop channel markers in the Intercoastal Waterway.

Arboreal Birds

Of all the birds in the aquatic preserves, arboreal birds have the greatest species diversity with 71 species present. As the name implies, arboreal birds utilize mangrove canopies for feeding and perching. Many birds also use mangrove trunks and prop roots for feeding sites. Most arboreal birds feed on invertebrates, primarily insects.

The Yellow Warbler (*Dendroica petechia*), Mockingbird (*Mimus polyglottos*), Yellowthroat (*Geothlypis trichas*), Red-winged Blackbird (*Agelaius phoeniceus*), and Rufous-sided Towhee (*Pipilo erythrophthalmus*) are the only common year-round residents. Fourteen species are uncommon year-round residents. Twenty-seven species are winter visitors, six are summer visitors, and 14 transient during annual migrations.

5. Mammals

Two species of marine mammals and 19 species of land mammals are found in the south Florida coastal regions (Appendix E) (Odum et al. 1982). Eight species

of mammals are common in the coastal areas of south Florida: Virginia opossum (Didelphis virginiana), marsh rabbit (Sylvilagus palustris), cotton rat (Sigmodon hispidus), raccoon (Procyon lotor), striped skunk (Mephitis mephitis), Bobcat (Felis rufus) white-tailed deer (Odocoileus virginianus), (nine-banded armadillo (Dasypus novemcinctus) and black rat (Rattus rattus).

Although extremely rare, sightings of Florida panther (Felis concolor) have been reported in the Rookery Bay Aquatic Preserve. As recent as February 1987, a panther sighting was confirmed in the Rookery Bay National Estuarine Research Reserve. Only 50 to 60 individuals remain in the wild. These animals are extremely territorial and may range 125 miles.

Bottle-nose dolphin (Tursiops truncatus) and the West Indian manatee (Trichechus manatus) are the two species of marine mammals found in the aquatic preserves. During the fall and spring, manatees use the Rookery Bay Aquatic Preserve as a migratory path. Manatees winter in the Cape Romano-Ten Thousand Islands Aquatic Preserve. During the summer months, manatees disperse throughout the west coast of Florida and may migrate great distances. Aerial surveys for manatees, performed by the United States Fish and Wildlife Service (1979), demonstrated that the Ten Thousand Islands region is a center of abundance for southwest Florida. During the 1979 study, 41 manatees were sighted in the Ten Thousand Islands in July; 52 in September; 60 in October; and 49 in December.

The West Indian manatee is classified as threatened and is protected at the federal level by the Marine Mammal Protection Act of 1972 and the Endangered Species act of 1973, as amended.

6. Endangered Species

The Florida Game and Freshwater Fish Commission compiles the official list of endangered flora and fauna in Florida. Table 1 lists endangered, threatened, and species of special concern which may be found in the preserves. For management of designated plant species in the aquatic preserve, the Florida Department of Agriculture and Consumer Services (list published in Preservation of Native Flora of Florida Act, Section 581.185-187, Florida Statutes) is the primary reference source. For management of designated animal species in the aquatic preserve, the Florida Game and Fresh Water Fish Commission (list published in 39-27.03-05, Florida Administrative Code) is the primary reference source.

Table 1. Designated species known to occur in or near the Rookery Bay and Cape Romano-Ten Thousand Islands Aquatic Preserves.

Scientific Name	Common Name	Status[1]		
		FGFWFC[2]	FDA[3]	USFWS[4]
Plants				
Acrostichum aureum	Golden leather fern		E	
A. danaeifolium	Giant leather fern		T	
Chrysophyllum olivaeforme	Satin leaf		E	
Gossypium hirsutum	Wild cotton		E	
Hymenocallis latifolia	Broad-leaved spider lily			UR5
Tillandsia flexuosa	Twisted air plant		T	
T. pruinosa	Fuzzy-wuzzy air plant		E	
Invertebrates				
Liguus fasciatus	Florida tree snail	SSC		
Fish				
Centropomus undecimalis	Common snook	SSC		
Fundulus jenkinsi	Saltmarsh topminnow	SSC		
Rivulus marmortus	Rivulus	SSC		
Amphibians and Reptiles				
Alligator mississippiensis	American alligator	SSC		T(S/A)
Caretta caretta caretta	Atlantic loggerhead	T		T
Chelonia mydas mydas	Atlantic green turtle	E		E
Crocodylus acutus	American crocodile	E		E
Drymarchon corais couperii	Eastern indigo snake	T		T
Gopherus polyphemus	Gopher tortoise	SSC		UR2
Lepidochelys kempi	Atlantic ridley	E		E
Birds				
Ajaia ajaja	Roseate spoonbill	SSC		
Aramus guarauna	Limpkin	SSC		
Charadrius alexandrinus tenuirostris	Snowy plover	T		UR2
C. melodus	Piping plover	T		T
Columba leucocephala	White-crowned pigeon	T		UR2
Egretta caerulea	Little blue heron	SSC		
E. rufescens	Reddish egret	SSC		UR2
E. thula	Snowy egret	SSC		
E. tricolor	Tricolor heron	SSC		
Falco sparverius paulus	Southeastern kestrel	T		UR2

Table 1 (continued)... Designated species known to occur in or near the Rookery Bay and Cape Romano-Ten Thousand Islands Aquatic Preserve.

Scientific Name	Common Name	Status[1]		
		FGFWFC[2]	FDA[3]	USFWS[4]
Haematopus palliatus	Am. oystercatcher	SSC		
Haliaeetus leucocephalus	Bald eagle	T		E
Mycteria americana	Wood stork	E		E
Pelecanus occidentalis	Brown pelican	SSC		
Sterna antillarum	Least tern	T		
Mammals				
Felis concolor coryi	Florida panther	E		E
Sciurus niger avicennia	Mangrove fox squirrel	T		UR2
Trichechus manatus latirostris	West Indian manatee	E		E
Ursus americanus floridanus	Florida black bear	T		UR2

1
E = Endangered
T = Threatened
T(S/A) = Threatened Due to Similarity of Appearance
SSC = Species of Special Concern
UR2 = Under review for federal listing, but substantial evidence of biological vulnerability and/or threat is lacking.
UR5 = Still formally under review for listing, but no longer considered for listing because recent information indicates species is more widespread than previously believed.

2 Florida Game and Freshwater Fish Commission (list published in Section 39-27.003-005, F.A.C.)

3 Florida Department of Agriculture and Consumer Services (list published in Preservation of Native Flora of Florida Act, Section 581.185-187, F.S.)

4 United States Fish and Wildlife Service (list published in List of Endangered and Threatened Wildlife and Plants, 50 CRF 17.11-12).

Chapter V

RESOURCE MANAGEMENT

A. Introduction

The main objective of the resource management plan is to protect the resources of the aquatic preserves for the benefit of future generations (Section 258.35, F.S.). The management of the preserves will be directed toward the maintenance of existing or essentially natural conditions and toward the restoration of degraded areas.

On-site management will be conducted by Bureau of Aquatic Preserves personnel assigned to the preserves. Administrative management of the preserves will involve Division of State Lands personnel (both in the field and in Tallahassee) cooperating in the review of applications for use of state-owned lands and related activities around the preserves.

B. On-Site Management Activities

This section outlines activities which will be carried out by field personnel that are designed to properly protect and manage the plant communities, animal life, geologic features, archaeological and historic sites, and water resources of aquatic preserves. Additionally, management policies and activities regarding management of cumulative impacts and encroachments are detailed.

Chapter VI details the mechanisms by which many of these objectives can be met through interagency coordination and active interaction with other government and non-government entities. Other management strategies with respect to public uses, environmental education, and research are outlined in Chapter VI through VIII.

1. Plant Communities

Aquatic, wetland, and coastal strand plant communities perform five major functions vital to the stability and productivity of the aquatic preserves:

a. they stabilize geologic features such as beaches from the erosion and deposition forces of currents, tides, winds and waves.
b. they produce, from recycled nutrients and solar energy, the organic material that is the basis of the estuarine food web which supports fisheries, endangered species, migratory waterfowl, colonial waterbird nesting colonies, raptors, marine mammals, and marine and estuarine invertebrates;
c. they provide protective habitat for spawning and juvenile fishes, many of which are of economic importance to the commercial and recreational fisheries of the state and the nation;
d. they provide roosting and nesting habitat for birds; and
e. they physically buffer estuarine waters from contaminated and channelized runoff from uplands within the estuarine watershed, and certain wetland vegetation uptakes excess nutrients in the water column.

The management objective for the plant community is to maintain and enhance these vital functions. Due to the extreme importance of the plant communities, programs to protect the existing flora and restore damaged or destroyed communities will be developed.

Management Practices

a. Field Familiarization and Documentation. The location and occurrence of plant species and communities in the aquatic preserves will be documented. A complete species list will be compiled and continuously updated during routine patrols and field inspections. Detailed vegetation maps have been developed and will be updated bi-yearly.

b. Literature Familiarization. A working library of existing pertinent literature concerning the species and communities present in the preserves will be assembled and updated. Staff will become familiar with the ranges, life histories, ecological requirements , and productivity of the plant communities within the aquatic preserves.

c. Preparation of Guidelines for Management of Endangered Species. With the help of the scientific community, personal field observations and literature review, maps (using 7.5 minute quadrangles) showing the locations of threatened and endangered plant species within the aquatic preserves will be developed. A set of management guidelines for each species outlining the habitat requirements and the methods to sustain and restore these habitats will be developed.

In the course of documenting the occurrence of threatened and endangered animals, maps depicting locations and types of plant communities used by these animals for nesting, roosting, feeding, resting, and spawning will be developed. Guidelines for maintaining or restoring "critical habitat" required by each species will then be developed using all appropriate scientific resources available.

d. Monitoring of Plant Communities for Natural Changes. Aerial photography, LANDSAT imagery and ground truthing will be utilized to study and monitor plant communities (historical and present) and document natural changes such as:

1. freeze damage to, and recovery of, mangrove communities;
2. wind and wave damage to mangrove communities from storms and hurricanes;
3. accretion-related seaward extension of mangrove communities;
4. erosion-related landward retraction of mangrove communities;
5. depositional burying of marine grassbeds communities;
6. invasions of exotic plant species and revegetation by native species after exotic plant removal projects; and
7. pathogenic and parasitic damage to and recovery of plant communities.

e. Identification of Areas and Communities in Need of Restoration. In conjunction with resource mapping, systematic surveys of the aquatic preserves will be conducted to determine the location, nature, and extent of environmental damages from human activities and assess the possibility of restoring each site. Consideration for restoration is based on whether the site is publicly or privately owned, the cost and effort required.

f. Protection of Plant Communities. Plant communities will be protected from the various uses within the aquatic preserve under the following guidelines.

1. Applications for uses of state-owned submerged lands in the preserve, which appear to significantly jeopardize plant life or plant communities, will be scrutinized by staff to ensure compliance with management policies and applicable laws. All indigenous plant life will be protected to the greatest extent allowable by law in keeping with the general intent of the Florida Aquatic Preserves Act.

   i. Trimming of mangroves within aquatic preserves is permitted as provided by rule.

   ii. Marine grasses and other benthic vegetative communities (RPAs 1 and 2) will be given the highest emphasis for protection. Any activities that would result in the removal, shading or elimination of a vegetative benthic community to such an extent as to cause the destruction of a significant area of the community shall be governed by the provisions of rule 18-20, F.A.C.

   iii. Minor dredging for minimal access channels and maintenance dredging pursuant to Section 258.42, F.S., and activities which are part of a comprehensive resource management program for the preserve are governed by the provisions of Chapter 18-20, F.A.C.

2. Field personnel shall review applications for uses of submerged lands within the aquatic preserves by the Bureau of Aquatic Preserves central office. Applications within any Resource Protection Areas 1 and 2 (see section C of this chapter) may require field review. The field personnel will inspect the site, assess the potential impact to the plant communities, and then make their recommendations to the central office as required.

3. Education programs will be developed which are designed to increase public awareness of the damage that recreational, private and commercial uses (i.e. propeller damage) can inflict on marine grassbed communities. Educational programs will also be undertaken in conjunction with other federal, state or local groups (i.e. Florida Sea Grant and school boards, etc.)

4. After monitoring the rate and extent of invasion by exotic species, such as Brazilian pepper, Australian pine, and melaleuca, an exotic plant control and removal plan will be implemented.

5. In cooperation with the Southwest Florida Regional Planning Council, the potential impacts of oil spills or natural catastrophes on the natural resources of preserves will be determined.

g. Restoration of Plant Communities. Guidelines will be developed for restoring damaged marine grassbeds in the aquatic preserves where it is determined that artificial restoration is the appropriate method. Consultation with professionals in the wetlands restoration/vegetation field will be conducted to determine the location of stock sources of marine grasses

outside the aquatic preserves boundaries and the advisability of transplanting marine grasses into the preserve to restore damaged grassbeds. The use of marine grassbeds within the aquatic preserves as a stock source for transplanting and restoring is discouraged due to the risk of a net loss to the overall community. Research projects which avoid long-term placement of structures or would not cause significant habitat loss, and are designed to foster habitat rehabilitation and improvements shall be submitted by the Division of Marine Resources to the Bureau of Aquatic Preserves for its review and approval prior to initiation. This review shall include a statement of compatibility with statutes and rules governing aquatic preserves.

Mangrove communities will be sought within the aquatic preserves where there is a high density of mangrove seedlings which could serve as nursery stock for transplanting to restoration sites. Guidelines for restoring mangrove communities within the aquatic preserves will be developed after consulting with professionals in the wetlands restoration field of study to find proven procedures for transplanting and nurturing mangroves.

h. Identification of Research Needs. Research needs concerning plant communities within the aquatic preserve will be identified. Special emphasis will be given to research that will provide data useful for the management of plant communities. Immediate research is needed to determine how plant communities respond to environmental stress.

i. Coordination with Other Researchers. Research projects being conducted within the aquatic preserves by state and federal agency biologists and nongovernment researchers will be inventoried. Personnel will coordinate, assist and encourage research projects by the faculty and student of education institutes. Water quality research issues, because of the valuable information they can provide for the management of plant communities, will also be closely followed. The research liaison will also be addressed in Chapter IX.

2. ANIMAL LIFE

The richness of the animal life in the Rookery Bay and Cape Romano-Ten Thousand Islands area was an important factor in their designation as aquatic preserves. The fish, shrimp, and crabs within aquatic preserves are valuable resources upon which recreational and commercial fisheries depend.

Large areas of undisturbed wetlands are excellent habitat for many types of wildlife. This wildlife includes an extensive list of endangered, threatened and species of special concern, migratory waterfowl, colonial waterbirds, invertebrates and vertebrates.

Management objectives for the fauna within the aquatic preserves will be focused on the protection, through preservation or restoration, of habitats within the preserves.

Management Activity

a. Field Familiarization and Documentation. Major animal species in each habitat in the aquatic preserves will be documented. This identification process will include the location, number, season of sighting, weather conditions and any other factors which may be necessary to build a working knowledge of the species and their occurrence in the aquatic preserves. Species lists will be continuously updated during routine patrols, field inspections, and educational field trips.

b. Literature Familiarization. A working library of existing pertinent literature concerning the animal species and communities present in the aquatic preserves will be assembled. Staff will become familiar with ranges, life histories, environmental requirements, ecologic niches, habitats, and other factors necessary for sound management.

c. Preparation of Guidelines for Management of Designated Species. Guidelines of the Florida Game and Fresh Water Fish Commission, U.S. Fish and Wildlife Service, Department of Natural Resources' Division of Marine Resources, National Marine Fisheries Service, Marine Fisheries Commission, and any other applicable agencies and non-governmental organization involved in the management of endangered or threatened species, or species of special concern will be used to develop management guidelines for each designated species.

In the course of documenting the occurrence of threatened and endangered animals, maps showing the locations and types of plant communities used by

these animals for nesting, roosting, feeding, resting, and spawning will be developed. Literature and personal observations will then be used to develop guidelines for maintaining (or restoring if necessary) the "critical habitat" required by each species.

d. Manatee Management. When the proposed activity in an application for the use of submerged lands within the aquatic preserves may affect a manatee sanctuary, critical manatee habitat, or manatees known to use an area (see Chapter IV), the State Manatee Coordinator will be notified. These applications or activities require the Coordinator's authorization and approval before they can be recommended by Bureau of Aquatic Preserves. Field personnel will also work with the Coordinator in the following activities:

i. Monitoring the preserve for manatee activity and maintaining manatee sighting map. This mapping will take special note of large seasonal aggregations. A manatee reporting and data collection system will be established utilizing other governmental personnel and private individuals where possible.

ii. Identify and map shallow water and narrow areas where manatee boat/barge collisions are likely to occur.

iii. Identify any other areas for additional manatee sanctuaries, special channel marking, and slow speed zones.

iv. Application for use of submerged lands will be reviewed for design and operation that are least dangerous and disruptive to manatees. Uses of submerged lands within manatee areas require manatee caution signs and any other designated items or procedures that may improve manatee safety.

v. Assist local governments in the incorporation of manatee issues into their marina siting plans.

vi. Schedule and monitor activities within manatee use areas during seasons of lowest use.

vii. Assist in public awareness education efforts for manatee protection.

e. Monitoring Changes in Animal Populations. Changes in animal species that are caused by natural phenomena such as freezes, storms and hurricanes, changes in habitat due to changes in plant community composition, changes in habitat due to water quality changes, geologic and hydrologic changes including erosion, estuarine current flow changes, and any other physical changes will be monitored.

f. Protection of Animal Life from Human Use of the Aquatic Preserves. The protection of animal species shall be considered when reviewing applications for submerged land use in or affecting the preserves. The reviewer shall also consider the potential effects of the proposed use on plant communities that function as habitat for animal life. Disturbances that alter or hinder the natural functions of the animal species living within the preserves (e.g. air pollution, excessive noise or bright lights affecting a bird rookery), shall also be analyzed and concerns addressed in the permitting process. Field personnel will be notified of any proposed activities (e.g., seismic testing, mammal capture by permit) within the aquatic preserves that may affect the well-being of animal life. Field personnel shall be involved in the planning of these activities to limit stress on animal life.

g. Identification of Research Needs. Research information needed to improve the management of animal life in the aquatic preserves will be identified. This identification process is more fully described in Chapter X (Identified Program Needs).

3. GEOLOGICAL FEATURES

The management of geological features requires a working knowledge of the preserve's geologic features and natural processes and man-induced activities that alter them. This knowledge will strengthen the review process for applications requesting the use of state-owned lands because the proposed use(s) may affect geologic features such as inlets, islands, shoals, shorelines, embayments, and channels. The objective for the management of these features is to allow the naturally dynamic system to operate without man's influence or interference. Active management includes the review of proposed uses that may affect the geologic features within the aquatic preserves. Historically, the majority of these reviews have been concerned with bulkheads, revetments, groins, dredge and fill, bridges and channels to determine their probable affects on state-owned lands.

Bulkheads are not allowed within the preserves, except as stated in Section 258.42(2) and 258.44 F.S. and in accordance with the management objectives of the preserves. Bulkheads placed upland of the aquatic preserves shall be constructed following the natural contour of the shore. Drainage patterns will be maintained or shall only be minimally altered. The use of rip-rap with mangroves or other suitable native plantings is preferable to bulkheads.

Every effort will be made to educate the public about the economic and environmental advantages of vegetated shorelines.

Existing bridges and causeways throughout the state have resulted in losses of grassbeds, mangroves and the degradation of the water quality. Causeways restrict natural flushing and create unnatural circulation. Proposals for the construction of bridges and causeways within the preserves will be reviewed considering these potential impacts.

Proposed maintenance dredging of existing channels will be carefully reviewed and recommendations to remove conditions that require perennial maintenance and chronic environmental disturbances will be made. Channel dredging has adversely impacted waterways, with varying influences, depending on channel location and water circulation.

Project proposals that impact the aquatic preserves and are submitted to other agencies (such as the U.S. Army Corps of Engineers, Department of Environmental Regulation, the Department of Transportation, South Florida Water Management District or the Collier County Natural Resources Management Department) shall be formally reviewed jointly with those agencies' personnel whenever possible.

4. ARCHAEOLOGICAL AND HISTORICAL SITES

Archaeological and historical sites have several characteristics which must be recognized in a resource management program.

i. They are a finite and non-renewable resource.

ii. Each site is unique because individually it represents the tangible remains of events which occurred at a specific time and place.

iii. While these sites uniquely reflect localized events, these events and the origin of particular sites are related to conditions and events in other times and places. They also preserve traces of past biotic communities, climate, and other elements of the environment that are of interest to both the scientific community and the general public.

iv. These sites, particularly archaeological sites, are very fragile because their significance is derived not only from the individual artifacts within them, but also, from the spatial arrangement of those artifacts in both horizontal and vertical planes.

Administering Agency

The management of the archaeological and historical sites is authorized and administered by the Division of Historical Resources (DHR) in the Florida Department of State. DHR's management authority is presented in Chapter II (Management Authority).

Management Policy

The management policy presented here is one of conservation, as recommended by the DHR and subject to the agency's changes. Their policy is as follows:

1. The field personnel and all other agencies planning activities within the aquatic preserves shall coordinate closely with DNR in order to prevent any unauthorized disturbance of archaeological and historical sites. DHR is vested with the title to archaeological and historical resources abandoned on state lands and is responsible for the

administration and protection of such resources (subsection 267.061(1)(b), F.S.) It is illegal to destroy or otherwise alter sites on state lands without a permit from DHR (Section 267.13, F.S.) Therefore, agencies planning activities are required to coordinate their plans with DHR at a sufficiently early stage to preclude inadvertent damage or destruction to these resources.

2. The fragile nature of these sites and their vulnerability to other destructive forces has resulted in the inclusion in plans of only generalized information on the location of these sites, except where they may be adequately protected and interpreted for the public. In many instances DHR will have knowledge of site distribution in an area. Special field surveys for unknown areas may be required by DHR to identify potential endangerment of a proposed activity to archaeological and historical sites. This is necessary in the case of activities which contemplate ground disturbance over large areas.
3. Activities that are expected to change or damage known sites shall be altered as necessary to protect such sites prior to mitigation planning.
4. In the event that management activities or the permitting of dredge/fill activities are determined to be damaging to historical or archaeological sites, DHR reserves the right to require that salvage measures mitigate the destructive impact of such activities on such sites (subsection 267.061 (1)(b), F.S.) Such salvage measures shall be accomplished before DHR grants permission for site destruction.
5. Excavation of archaeological sites in the near future is discouraged. Archeological sites within the aquatic preserves should be left undisturbed for the present, with particular attention devoted to preventing site looting by "treasure hunters."

6. Field personnel will note suspected sites for future surveys by DHR. Cooperation with other agencies in this activity is also encouraged by DHR. The DHR informs field personnel about the characteristics and appearance of these sites.
7. Any discovery of looting or unauthorized destruction of these sites will be reported to the DHR so that appropriate action may be initiated. The Florida Marine Patrol and enforcement personnel of DNR shall provide enforcement assistance to DHR and make arrests or investigate cases of looting or other unauthorized destruction of archaeological sites. The field personnel will follow the above management policy and become familiar with the personnel involved with this task in DHR and their procedures for identifying suspected sites.

5. WATER RESOURCES

Responsible management of water resources designed to ensure human health, allow recreational enjoyment, and protect and enhance the flora and fauna of the preserve is the most critical aspect of aquatic preserve management.

Management Activities. The successful management of water resources of the aquatic preserves depends heavily on other government agencies (i.e., DER and the South Florida Water Management District) charged with regulating water quality and quantity. Water resource management shall have as its major objective the maintenance of water quality and the natural seasonal fluctuations of freshwater into the estuary.

Through cooperation with the Rookery Bay National Estuarine Research Reserve, an extensive water quality monitoring program has been ititiated in both aquatic preserves. Additional water resource data are available from governmental and non-governmental agencies including colleges, universities, scientific foundations, and private consultants working in Collier County.

a. Familiarization with the Jurisdiction, Personnel and Monitoring Programs of Government Agencies and Other Entities. The jurisdictions, personnel, and monitoring programs of other agencies, institutions, and corporations involved in studying, monitoring, regulating and managing water resources within the aquatic preserves and their watersheds will be inventoried. In addition, the aquatic preserve staff may investigate the desirability of designating any waters adjacent to the preserve as Outstanding Florida Waters (OFW). As appropriate, a request will be made for OFW designation to the FDER with the information needed to support affirmative action by the Environmental Regulation Commission.

b. Monitor Water Quality Data Collection. The aquatic preserve staff will continue to monitor water quality within the preserves in cooperation with the Rookery Bay National Estuarine Research Reserve.

Coordination among agencies in the planning of monitoring programs and in evaluating monitoring data within the aquatic preserves will be promoted. Data collected by other agencies, that are applicable to the aquatic preserves, will be compiled and added to these programs.

c. Review of Lease Application for Aquatic Preserve Uses and Watershed Activities that Would Affect the Preserve Water Resources. Land lease applications, Developments of Regional Impact, and DER/COE permit applications will be reviewed for their potential impact on the water resources of the aquatic preserves.

d. Identify and Monitor Potential Pollution Sources within the Watershed of the Preserves and in the Preserves Waters. A pollution source survey will be conducted to document potential and actual pollution sources in the aquatic preserves and their watersheds. Potential and actual pollution sources will be monitored to determine if the water quality of the preserves is adversely affected. This monitoring will be accomplished directly by field observations and water quality monitoring and indirectly by review of other entities' water resource data.

6. CUMULATIVE IMPACT ANALYSIS

Cumulative impacts are the sum total of major and minor changes in the natural system. Taken singularly these effects may not constitute a notable change in the condition of the natural system, but as they accumulate, their combined impact may result in a substantive environmental disturbance or degradation of the natural system.

The review of proposed uses in the aquatic preserves from the perspective of cumulative impact analysis requires a thorough knowledge of the natural system and the various interactions and dynamics within the system. This aquatic preserve management program will initiate development of a cumulative impact analysis program. The evaluation of cumulative impacts shall follow the criteria from Section 18-20.006 F.A.C.

The availability of on-site preserve staff, who are familiar with the distinctive characteristics of this system, coupled with ability to access LANDSAT imagery and mapping, and other data sources, is the key to development of a successful cumulative impact analysis program. As cumulative impacts are identified for specific areas and resources, they will become an integral part of the project analysis and decision-making processes.

7. MANAGEMENT OF ENCROACHMENTS

The management of encroachments in the preserves concerns the unauthorized placement of structures, unauthorized dredging and filling, or other illegal uses in the aquatic preserve. The encroachment may also include illegal activities associated with an approved use (e.g., extension of a dock, construction of boat houses, extension of an approved channel). Fines may be imposed for illegal encroachments on sovereignty submerged lands in aquatic preserves. Procedures will follow the provision of Chapter 18-14, F.A.C., "Administrative Fines For Damaging State Lands and Products Thereof."

After field verification of a suspected encroachment, the central office will be notified to determine the holder to the property and research the possibility that the use was an approved activity. A progressive system of mapping and recording will be initiated to assist in the monitoring of the preserves. Aerial surveys will be done to facilitate reconnaissance of illegal activities and mapping.

The management action for verified illegal encroachments will be developed by the agencies specifically involved (i.e. DNR, DER). Field personnel will assist, as necessary, with field evaluation or other support activities. Final actions will be monitored at the direction of the Trustees. The procedures followed in these applications will be decided on a case by case basis.

C. RESOURCE MAPPING AND RESOURCE PROTECTION AREAS

The preliminary description and location of resources within the area (approximately 59,600 acres of submerged land) required the use of remote sensing techniques. This work has been done in conjunction with the Rookery Bay National Estuarine Research Reserve and DNR's Marine Research Laboratory.

LANDSAT imagery, aerial photography, and ground truthing were used by staff of the National Estuarine Research Reserve and the aquatic preserves to compile a Resource Protection Area Map (RPA). This mapping identifies and classifies resources within the aquatic preserve that require protection by the management program. The on-site manager supplemented the vegetation portion of the mapping with the wildlife and fisheries information (endangered species, bird rookeries, etc.) archaeological and historical site information and other resource factors deemed crucial to the continued health and viability of the aquatic preserves.

The RPA mapping system is based on three levels of resource classification. The RPA 1 level contains resources of the highest quality. Uses proposed for these areas receive the most rigorous review. The RPA 1 level includes one or

more of the following: marine grassbeds; live bottoms; mangrove swamps; saltwater marshes; oyster bars; archaeological and historical sites (upland and submerged); endangered species habitats; colonial waterbird nesting sites; and, other appropriate factors.

The RPA 2 areas are defined as those areas containing the resources of RPA 1, but they are in a transitional condition compared to RPA 1. These resources may either be building toward RPA 1 status or declining to RPA 3 status. RPA 2 status requires careful field review to determine the specific area's sensitivity to each proposed use. In some aspects, these areas may be more sensitive to disturbances that RPA 1 areas. The resources of RPA 2 areas include: sparsely vegetated grassbeds; mangroves in scrub condition or colonizing new lands; beaches undergoing natural or man-induced restoration; saltwater marshes colonizing new lands; and other resources of RPA 1 types that fit RPA 2 condition.

RPA 3 areas are characterized by the general absence of the attributes of the above two classes. RPA 3 areas may have small localized RPA 1 or 2 areas within them. RPA 3 sites generally are submerged areas with no significant vegetation or wildlife. Nearshore and bottom areas significantly modified by man are designated RPA 3.

These RPA maps require periodic revisions as the on-site managers learn more about the resource's reactions to man's uses. Scientific research and other data additions may also necessitate modification of this classification system. Natural changes will also require modification of this system. Periodic checking by LANDSAT satellite imagery will become useful for remote sensing monitoring as its use is more fully developed.

The RPA maps are a planning tool for both on-site and central office staff. It is recognized that mapping on this scale may not adequately define small areas which do not qualify for the RPA class level assigned to a general area. More detailed field reviews are required to supplement this information on a case by case basis, as necessary.

D. ADMINISTRATIVE MANAGEMENT OBJECTIVES

This section addresses the role of the central office in the aquatic preserve management planning and implementation processes. The central office's role is generally interpreted within the context of coordinating activities with the field personnel. This coordination is important to many program aspects, including project review evaluation, local contact initiation, administrative rule development, contractual services and conflict resolution, and the routine support (payroll, operating expenses, etc.) usually extended by the central office to the on-site managers. All program activities identified within this context are designed to protect and enhance the environmental, educational, scientific, and aesthetic qualities of the natural systems of the aquatic preserves.

1. Objectives

Specifically, the following administrative objectives are an essential part of the aquatic preserve management program:

a. to ensure a comprehensive, coordinated review and evaluation of proposed activities potentially affecting the environmental integrity of the aquatic preserves;

b. to serve as the link between aquatic preserve field personnel and state agencies and programs which originate in Tallahassee;

c. to serve as the primary staff in the development of administrative rule additions, deletions and revisions;

d. to serve as the administrative staff for contractual agreements and services;

e. to establish and maintain a conflict resolution process.

f. to review all existing and past activities to determine their affect on the environmental integrity of the aquatic preserves.

2. Project Review and Evaluation

A major element in the administration of an aquatic preserve management system is the establishment of a thorough process to review projects proposed in aquatic preserves. It is the intent of the program that all proposed activities within an aquatic preserve be assessed with detail and expedience, utilizing staff from the Bureau of Aquatic Preserves and the Bureau of State Lands Management. Sections 258.42 thru 258.44, F.S., and Chapters 18-20 and 18-21, F.A.C., establish the context within which all proposed uses of aquatic preserves must be evaluated.

To enhance the project review process, a regional coordination and review procedure has been developed as follows. A regional office of the Bureau of State Lands Management (BSLM), upon receiving a joint DER-COE permit application from DER, forwards the application to the Division of State Lands' Title Section, where a determination of state ownership within the aquatic preserve is made. Once ownership is confirmed, BSLM central records staff transmits the findings to the appropriate Bureau of Aquatic Preserve (BAP)

field staff. The application is reviewed to determine whether the activity will generate impacts upon the aquatic preserve and whether the activity is consistent with applicable rules and statutes.

Within 30 days from the date of receipt of the application, the BAP staff notify the applicant of their findings and whether the project application is complete or needs modification. Once a complete application is received, the field staff issue a letter of consent or denial, depending on the assessed impacts of the project proposal and its consistency with applicable rules. Certain projects may require a lease or easement and must be approved by the Board of Trustees. Staff develop a draft agenda item which is transmitted to BAP central office staff. There, the Office of Application and Field Assessment reviews the application, all staff comments, and approves or revises the agenda item. Upon Division and Department level approval, the item is forwarded to the Board for action.

The permit review process is complete upon Board approval or denial, and the applicant will be duly notified.

Applicants desirous of appealing staff recommendation shall follow those appellate procedures outlined in the appropriate authorizing statutes. In the case where applications requesting the use of state-owned lands are denied, three appellate procedures are available to the applicant. Depending upon the type of application submitted, an applicant may:

(a) Request the Governor and Cabinet to overturn an application decision rendered by the Executive Director of the Department of Natural Resources (or his designee) under a delegation of authority;

(b) Request an administrative hearing under the procedures outlined in Chapter 120, F.S.; or,

(c) Appeal the action of the Board of Trustees of the Internal Improvement Trust Fund to the District Court of Appeals.

3. Liaison Between Field Personnel and Other Interested Parties. One of the most important duties of the field personnel's jobs is to establish mutually beneficial communication with pertinent interest groups. The central office staff will assist in identifying and contacting governmental bodies, special interest groups, and individuals requiring aquatic preserves program coordination.

When requested by on-site managers, the central office staff will assist in arranging for specialized management expertise not generally available locally. This may include such things as arranging for DHR to conduct a detailed cultural resource assessment for certain areas of the preserves.

Chapter VI

MANAGEMENT IMPLEMENTATION NETWORK

Interagency Coordination

Numerous governmental agencies and private organizations play key roles in the protection of the aquatic preserves. These organizations oversee federal, state, regional, and local laws which apply to all of the lands and waters within the aquatic preserves and their watersheds. The Aquatic Preserves Program objective is to complement whenever possible the activities which are in the interest of the preserves. The following information outlines the activities and interrelationships of government agencies, non-government entities, and interest groups which are active within the scope of the preserves. The program also details activities of both field and central office staff as they relate to these organizations.

FEDERAL

Many federal agencies have property interests, land and wildlife management programs, research activities, construction activities, and regulatory programs existing or potentially existing within the aquatic preserves. Field personnel assist those agencies in areas where there are common goals. The field personnel and central office staff also review federal activities to determine their effect on aquatic preserve management objectives. This review

is coordinated through the Florida Department of Environmental Regulation, Office of Coastal Management, to enforce the provisions of the Federal Coastal Zone Management Act of 1972, as amended.

1. United States Fish and Wildlife Service. The United States Fish and Wildlife Service (USFWS) administers three programs directly affecting the aquatic preserves. The Division of Ecological Services, headquartered in Vero Beach, reviews dredge and fill requests and other federal permitting under the Fish and Wildlife Coordination Act and comments to the U.S. Army Corps of Engineers.

The USFWS is also charged with the protection and recovery of endangered species and bird rookeries. Field personnel will use available recovery techniques as necessary.

The USFWS, Division of Wildlife, administers a series of National Wildlife Refuges. The Federal Government is negotiating to obtain privately owned land within the boundaries of Cape Romano-Ten Thousand Islands Aquatic Preserve for designation as a National Wildlife Refuge. The proposal to establish a wildlife refuge in the Ten Thousand Islands area is consistent with the goals and objectives of the Aquatic Preserve Program.

2. United State Army Corps of Engineers: The United States Army Corps of Engineers (COE) regulates activities in waters and wetlands under four separate but related laws: Rivers and Harbors Act of 1899, Federal Water Pollution Control Act of 1972, Clean Water Act of 1977, and Marine Protection Research and Sanctuaries Act of 1972.

The COE's major responsibilities, which relate to the aquatic preserves, are the maintenance of navigable waters, pollution abatement, maintenance of water quality, and the enhancement of fish and wildlife. The COE is charged with providing technical guidance and planning assistance for development of the nation's water resources. Under Section 404 of the Federal Water Pollution Control Acts Amendments of 1972, the COE has regulatory authority over dredge and fill activities in coastal wetlands.

In December 1982 a Memorandum of Understanding (MOU) between DNR, the Florida Department of Environmental Regulation (DER), and the COE was executed. The MOU established a process whereby the proprietary concerns of the Trustees, stated in Chapter 253, F.S., is integrated into the DER/COE joint permit processing system.

3. United States Geological Survey: The United States Geological Survey (USGS) of the Department of the Interior has the responsibility to perform surveys, investigations, and research pertaining to topography, geology, and mineral and water resources. The USGS has conducted studies on the resources of Southwest Florida. Published results of the studies that are pertinent to the preserves will be included in the preserves' resource inventory.

4. United States Environmental Protection Agency: The United States Environmental Protection Agency (EPA) is responsible for the control and abatement of six types of pollution: air, water, noise, solid waste, toxic waste, and radiation. The Florida Department of Environmental Regulation is

the state agency responsible for pollution control in lieu of a federal program. Within the aquatic preserves, field personnel will assist the EPA in planning field activities where there are common interests.

5. United States Coast Guard: The United States Coast Guard is charged with the protection of the Nation's coastline. In the aquatic preserves, the Coast Guard is involved in the regulation of boating safety, search and rescue, and the surveillance of narcotics contraband. Additionally, the Coast Guard regulates the construction of structures, such as bridges, causeways, and aerial utilities, which may pose navigation hazards. DNR field personnel and central office staff review and comment to the Coast Guard on permit applications for proposed projects in the aquatic preserves.

6. National Marine Fisheries Service: The National Marine Fisheries Service (NMFS) of the U.S. Department of Commerce records commercial fish landings, enforces national fishery laws, and protects vital fishery habitats.

The Environmental Assessment Branch of NMFS comments on permit applications at the federal level which may adversely alter fishery habitats. DNR comments concerning projects in the aquatic preserves are submitted to the Environmental Assessment Branch.

7. National Oceanic and Atmospheric Administration: The National Oceanic and Atmospheric Administration (NOAA), Office of Coastal and Resource Management, administers the National Estuarine Research Reserve Program including the

Rookery Bay National Estuarine Research Reserve. Management activities in the aquatic preserves are often conducted in conjunction with the national estuarine research reserve.

NOAA's office of Oceanography and Marine Assessment, Ocean Assessment Division (OAD) conducts research, assessment, and monitoring activities on environmental quality issues of the Nation's estuaries. Through its National Status and Trends Program, OAD is conducting a nationwide monitoring program to assess chemical contamination in estuaries throughout the USA. Through its National Coastal Pollutant Discharge Inventory, OAD determines the sources and analyzes the quality of discharged pollutants in estuaries nationwide. OAD has a National Estuarine Inventory which characterizes the physical and hydrological features of the Nation's estuaries and coastal areas. The Ten Thousand Islands region is incorporated in the atlas, but the Rookery Bay system has been omitted. Efforts are underway to include the Rookery Bay system in the National Estuarine Inventory.

STATE

Many state agencies have property interests, land and wildlife management programs, research activities, construction activities, and regulatory programs existing within the aquatic preserves. Additionally, DNR administers other programs which may affect the resources and watersheds of the aquatic preserves. Field personnel will assist other agencies and other DNR Divisions in areas where there are common goals. The interactions and relationships of the various agency programs with aquatic preserve management is outlined in the following:

1. Department of Natural Resources: The Division of Marine Resources has several programs beneficial to the aquatic preserves. The Marine Research Laboratory in St. Petersburg has several projects, including Resource Protection Area mapping, fishery habitat utilization studies, and habitat loss mapping, which generate valuable resource management information.

The Marine Laboratory is headquarters of the State Manatee Coordinator. In the permit review process, coordination with the State Manatee Coordinator is essential in the review of projects located in critical manatee areas. Additionally, the State Manatee Coordinator will be solicited for comments on proposed marina sitings and expansions within the preserves.

The Division of Marine Resources also administers a permitting program for the collection of certain marine species and the use of certain chemicals. The Bureau of Aquatic Preserves receives notification of issuance of permits within the aquatic preserves.

The Division of Marine Resources' Shellfish Environmental Assessment Section (SEAS) is responsible for the classification and management of shellfish harvesting areas. The Cape Romano-Ten Thousand Islands Aquatic Preserve is presently classified as one of these approved areas. Rookery Bay Aquatic Preserve is classified as a prohibited area. Efforts to reclassify the shellfish harvesting waters of Rookery Bay Aquatic Preserve are ongoing. Field personnel are assisting SEAS with the collection of water samples for bacteriological analysis and will continue to assist SEAS in their efforts to reclassify the shellfish growing areas. The Division is also involved in a long-term study of snook in the area.

The Division of Law Enforcement's Marine Patrol District 9 has a detachment located in Naples Florida. The detachment is staffed by a Captain, Lieutenant, and six officers. Aquatic preserves' field personnel are familiar with these programs and their operation and call on the Marine Patrol for law enforcement support as required.

The Division of State Lands, in addition to the work related to aquatic preserves by BAP, is charged with overseeing uses, sales, leases or transfers of state-owned lands. The aquatic preserve staff interact with other staff of State Lands in all transactions concerning submerged lands within the preserves including acquisition of privately titled submerged lands or contiguous uplands important to the integrity of the preserves.

The Division of Resource Management is responsible for the management of aquatic plants, mineral resources, oil and gas exploration, and mine reclamation. It also supervises Navigation Districts and the Canal Authority. Staff communicates with this Division to ensure consideration is given to the protection of the preserves.

The Division of Beaches and Shores is responsible for managing erosion control, hurricane protection, coastal flood control, shoreline and offshore rehabilitation and regulation of work and activities likely to affect the physical condition of the beach or shore (Chapter 161, F.S.). The Division is currently actively involved in the Caxambas Pass to Cape Romano portion of the Rookery Bay Aquatic Preserve. The Division has jurisdiction over regulating construction along the beaches within and adjacent to the preserve.

The Division of Recreation and Parks is involved in the management of nearby state preserves, state parks and state recreation areas. Located within Collier County is Collier-Seminole State Park, Delnor-Wiggins Pass State Recreation Area, and Fakahatchee Strand State Preserve. The aquatic preserves' staff member works closely with the park staff and preserve managers in the management of the resources of the aquatic preserves.

2. Marine Fisheries Commission: The Marine Fisheries Commission (MFC) manages marine life by regulating the harvesting of all marine life except the endangered species. Their authority covers the following areas: a) gear specifications, b) prohibited gear, c) bag limits, d) size limits, e) species that may not be sold, f) protected species, g) closed areas, h) quality control codes, i) harvesting seasons, j) special considerations related to egg-bearing females, and k) oyster and clam relaying.

The MFC is required to make annual recommendations to the Governor and Cabinet regarding marine fisheries research priorities. The field and central office staff use these recommendations to direct research efforts within the aquatic preserves.

3. Florida Game and Freshwater Fish Commission: The Florida Game and Freshwater Fish Commission (GFWFC) has two programs directly related to resource management of the aquatic preserves. The Environmental Services office in Vero Beach reviews projects which may potentially affect local fish and wildlife habitat. The Division of Wildlife located in Tallahassee is responsible for designating Critical Wildlife Habitat Areas. Least Tern

nesting areas in Caxambas Pass have recently been designated a Critical Wildlife Habitat Area to provide protection for this species. During routine patrols and field inspections, additional critical wildlife habitats will be noted and recommended to GFWFC for designation.

4. Department of Environmental Regulation: The Department of Environmental Regulation (DER) is responsible for regulating air, water, noise, wastewater, and hazardous waste pollution through a permitting and certification process. An interagency agreement between DNR and DER provides an avenue for prior DNR staff review and comment on projects with potential environmental impacts in the aquatic preserves.

DER is the local contact for the initiation of dredge and fill applications in conjunction with the Army Corps of Engineers and DNR. The dredge and fill permitting process is vital to the management of the aquatic preserves. DNR personnel coordinate with the DER district offices in Ft. Myers and Punta Gorda to expedite the application review process.

In December 1982, a Memorandum of Understanding (MOU), between DER, DNR, and the U.S. Army Corps of Engineers (COE) established a process whereby the proprietary concerns of the Trustees, stated in Chapter 253, F.S., are integrated into the DER/COE joint permit processing system.

The DER, Office of Coastal Management is charged with coordinating activities related to coastal management and reviewing federal actions for consistency with the State Coastal Management Program. DNR staff maintains a close

relationship with the Office of Coastal Management for assistance in the review of federal actions, the determination of data and research needs, and other program support.

5. Department of Community Affairs: The Department of Community Affairs (DCA) is responsible for coordinating Developments of Regional Impacts (DRI) and designating Areas of Critical State Concern (ACSC).

DRI's are major developments that may affect more than one county and require regional review from neighboring local governments and state agencies. Both central office staff and field personnel are involved in the DRI review process. Field personnel are notified of DRIs by the central office and they conduct a field review. Central office staff coordinate field review findings and works with other state agencies in Tallahassee in the DRI review process.

The ACSC program is intended to protect areas of the state where unsuitable land development has endangered or may potentially endanger resources. If an area is identified as a possible ACSC, a Resource Planning and Management Program (RPMP) is established. The RPMP evaluates the resources and the local government's land use practices. After the evaluation is complete, the RPMP committee makes recommendations to local governments on how to improve land use practices to ensure an orderly, well planned growth that will protect critical resources. If improvements are not made by the appropriate government entities, those areas may then be designated as ACSCs by the Legislature. Under ACSC designation, local governments are required to notify

DCA of any application for a development permit. The entire land development process requires State intervention until local government modifies its land use practices to conform to ACSC requirements. A large portion of Collier is designated as Big Cypress ACSC.

6. Department of Transportation: The Department of Transportion, District 4 office, located in Ft. Lauderdale is responsible for the planning and construction of State Roads in Collier County. Field personnel and central office staff work with the resident Project Developer on anticipated projects having potential detrimental consequences to the aquatic preserves. Proposed construction of any major highway or bridge within the preserves and their watersheds are subject to review by aquatic preserves' staff.

7. Department of State: The Department of State, Division of Historical Resources (DHR) has a close working relationship with aquatic preserves' field personnel and central office staff in their efforts to protect archaeological and historical sites. Field personnel, in conjunction with the central office are directed by DHR.

8. Department of Health and Rehabilitative Services: The Department of Health and Rehabilitative Services (HRS), administers septic tank regulation and mosquito control programs at the state level.

Proper installation and maintenance of septic tank systems in the watersheds of aquatic preserves is essential to the protection of estuarine water quality

and productivity. Field personnel monitor water quality in areas of high septic tank density within the aquatic preserves. Excessive nutrient on fecal coliform levels are reported to Collier County HRS.

Although mosquito control serves a useful public function, the effects of pesticides in the waters of the preserves are a primary concern. DNR staff are involved in the management programs developed by the Florida Coordinating Council on Mosquito Control. Subsequent policy recommendations resulting from this group will be evaluated for applicability to the ongoing aquatic preserve management program.

9. Florida Sea Grant: Florida Sea Grant is a State University System program with administrative offices at the University of Florida. The resident Marine Extension Agent responsible for Collier County is located in the City of Palmetto in Manatee County. By using seminars, workshops, demonstrations, publications, and personal contacts, Sea Grant informs the public of current issues of the sea and coast. Sea Grant publications will be used in the development of education programs for the aquatic preserves.

REGIONAL

The South Florida Water Management District and the Southwest Florida Regional Planning Council administer permitting, planning, and resource management programs at the regional level. DNR field personnel assist these agencies in the administration of these programs when the aquatic preserve is involved.

1. Water Management District

The South Florida Water Management District has two functions within its 17 counties. It operates and maintains a water management system and conducts two permitting programs: surface water management permits and water withdrawal permits. In Collier County, the Big Cypress Basin Board operates the District's water management system. The board also funds research projects geared to improve the water resources of the county.

2. Southwest Florida Regional Planning Council

The Southwest Florida Regional Planning Council (SFRPC) serves as a regional planning agency for Sarasota, Charlotte, Lee, Collier, Highlands, and Hendry Counties. Among its duties are: aiding local governments with planning expertise; representing regional concerns in the Development of Regional Impact (DRI) review; serving as a regional clearinghouse for state and federal programs; and conveying information from local governments to the state and federal levels.

The DRI review of projects with potential impact to the aquatic preserves is conducted by the central office staff with field personnel assistance when necessary. DRIs concerning large marinas, large subdivisions on the uplands, and commercial or industrial developments require a field review.

LOCAL GOVERNMENTS AND SPECIAL DISTRICTS

Both aquatic preserves are contained entirely within Collier County. The

extreme northern portion of the Rookery Bay Aquatic preserve is located within the Naples city limits. The Cape Romano-Ten Thousand Islands does not have any incorporated cities adjacent to or within its boundaries.

Field personnel are the liaison with local governments. They assist in modifying local government policies and practices to insure conformance with the objectives of aquatic preserves management plans. The exchange of information and expertise is for mutual benefit.

a. Relationship to local management plans: Local (municipal and county) governments are required by the Local Government Comprehensive Planning Act of 1975 (Section 163.3161, F.S.) [as amended by Chapter 85-55, Laws of Florida, to the Local Government Comprehensive Planning and Land Development Regulation Act] to update their local plans and among other requirements, adopt land development regulations and improve coastal management protection. The coastal management element of the LGCP along with the land use and conservation elements establishes long range plans for orderly, and balanced development, with particular attention to the identification and protection of environmental resources in the planning area. Conformance with the criteria, policies and practices of a local government comprehensive plan is required for all development within the local governmental jurisdiction.

The aim of the aquatic preserves, with respect to these local government comprehensive plans, is to insure consistency with the adopted aquatic preserves' management plan. DNR field personnel determine the consistency of local plans with the objectives of aquatic preserves management. Collier County is presently rewriting its comprehensive plan as mandated by the Growth

Management Act. Aquatic preserves staff will review the revised plan and will advise the Collier County Commission of its consistency with Trustees adopted policies for the preserves. Assistance from aquatic preserves staff has been offered to the Collier County Chief Planner to help formulate those portions of the plan which pertain to the aquatic preserves.

b. Relation to local development codes: The local zoning and development codes provide regulations for the development of property. The zoning prescribes allowable uses and maximum density. Certain uses in the preserves and their watersheds may affect the preserves.

Field personnel are familiar with the local zoning, development codes and their potential effects on the preserves. Assistance with identifying changes in zoning, which provide for conformance with the objectives of the aquatic preserves, will be offered to local planning and zoning officials. Assistance will also be offered in the review of proposed subdivisions in the preserves' watersheds.

c. Special districts: Special districts are taxing authorities established to correct drainage and mosquito control problems. Water Management District No. 6 is located in the watershed of the Rookery Bay Aquatic Preserve. There are no water management taxing districts in the watershed of the Cape Romano-Ten Thousand Islands Aquatic Preserves. Collier County has one mosquito control district which has the potential to affect both preserves. The Collier County Mosquito Control District is required to provide arthropod control plans for all lands identified as environmentally sensitive or biologically highly productive. These plans have been approved by the land

managing agency. The field personnel are familiar with the policies and activities of the Mosquito Control District and Water Management District No. 6 and recommend practices which will minimize impacts on the aquatic preserves.

OTHER ORGANIZATIONS

This section applies to the numerous nongovernmental organizations that have interest in the aquatic preserves. This includes, but is not limited to, environmental interest groups (i.e. National Audubon Society, The Conservancy, Sierra Club, and Native Plant Society), scientific organizations, fishing and sports interest groups (i.e. Florida League of Anglers and Organized Fishermen of Florida), universities which may have research projects in the preserves (i.e. University of South Florida; University of Miami) and any other interest groups. The relationship of these organizations to aquatic preserves management might include coordination of activities such as research, environmental education, management of bird rookeries or other natural areas, and numerous other potential activities. Field personnel will be active in communicating the aquatic preserves management objectives and methods to the various groups and consulting with them for help.

Effective management of aquatic preserves will be enhances by continued support from organized groups, associations and individuals. Citizens Support Organizations (CSO) are particularly valuable through the provision of technical, non-technical and financial assistance. The administrative and the field office staff will actively solicit the organization of and participation in CSO at each aquatic preserve.

The National Audubon Society (NAS) has been instrumental in aquatic preserve management. The NAS has a warden assigned to the Rookery Bay area, and several joint activities have been conducted. A monthly sundown census of wading birds is conducted by NAS at the ABC Islands in the Big Marco River. Aquatic preserve's staff assist the warden in this program. The warden also identifies areas that are critical to the avian populations of the preserves and implements strategies for their protection (i.e. limiting entry in roosting areas). Continued cooperation with the NAS warden will receive high priority in the resource management of the preserves.

Chapter VII

USES

This chapter provides a description of public, private and commercial uses that may be allowed pursuant to statutory direction and all other applicable authorities in aquatic preserves. These uses are subject to the approval of the Board (Governor and Cabinet) or their designee. Approval of these uses is normally predicated upon demonstration that the proposed use is environmentally sound, and, in the opinion of the Board, necessary for the public.

A. Mitigation Policy

In all cases, approved uses that adversely impact the resources of an aquatic preserve should only be approved when accompanied by adequate compensation measures that contribute to an overall net public benefit.

Mitigation measures, other than those directly associated with programs for habitat restoration or rehabilitation, are viewed by the Board as inadequate attempts to compensate for alteration of essentially natural ecological conditions through the establishment of artificial resource systems. Therefore, mitigation should only be permitted in conjunction with on and off-site projects that are designed to reestablish natural habitats and where an aquatic preserve will biologically and aesthetically benefit from proposed restoration actions.

B. Public Uses

The "Florida Aquatic Preserve Act of 1975" (Section 258.35, F.S.) allows for the lawful and traditional public uses of aquatic preserves, such as sport fishing, boating and swimming (as adapted from subsection 258.43 (1), F.S.).

1. Consumptive Uses

Consumptive uses involve the removal of resources from the preserves. These uses include fishing, hunting, shellfishing, and other related activities. They also include the unintentional removal of resources by propeller damage to seagrass beds and air boat damage to salt marshes. The management of these uses (See Chapter V. Resource Management Section B: On-site Management Objectives) includes the observation and monitoring of the effects of these uses on the resources. Field personnel will periodically assess the impacts through the use of the Marine Laboratory's LANDSAT capabilities, aerial photography, boat surveys, aerial surveys, and current studies or data sources for identifying habitat losses or disturbances in the aquatic preserves. Management will also include the protection of the resources from unlawful or excessive consumptive uses. Field personnel will, for example, become familiar with and monitor the success of regulations adopted by the Marine Fisheries Commission. These will include regulations on fishing gear, bag and size limits, closed areas and seasons.

These consumptive uses will also be monitored for their effect on other resources (e.g. bird rookeries, marine grassbeds, live bottom communities,

archaeological and historical sites). Additional enforcement needs (i.e. the need for added enforcement staff during nesting seasons) will be identified.

2. Non-consumptive Uses

Non-consumptive uses are those which do not generally remove resources from the preserve. Examples of these include swimming, diving, boating (including airboating), bird watching, and other related activities. Although boating and diving are usually considered non-consumptive uses, they can become consumptive when boat operators place anchors on seagrass beds, navigate into waters that are too shallow for their boats, venture outside open channels and traverse salt marsh vegetation, or when divers remove components of a live bottom community. The management practices involved with non-consumptive uses will be the same as those previously described under Section B1. The guiding principle in these cases will be whether or not the activity causes disruptions of the preserves' resources (e.g. destroys marine grassbeds or salt marshes, or disturbs rookeries). Only in the event of these disruptions will the field personnel become involved. Efforts to minimize these disruptions may be achieved through environmental education (See Chapter VIII). Where the impact is considered significant by management staff, additional steps may be taken to adopt appropriate rules and/or encourange local ordinances and enforcement policies to protect the aquatic preserves.

C. Private Non-Commercial Uses

This section will apply to those private, non-commercial uses which are derived from riparian land ownership. The management of the aquatic preserves

recognizes the traditional riparian rights of the upland property owners. The rights of ingress, egress, boating, swimming, fishing, and other incidental uses of sovereignty lands historically allowed for the placement of certain structures, such as docks, within the preserves. The right to make any preemptive use of sovereign lands is a qualified one and can only be exercised with the prior consent of the Board after a finding that such uses will not impair public uses or destroy or damage areas of environmental significance.

Private non-commercial uses shall be designed to avoid critical Resource Protection Areas 1 and 2 and shall be designed to reduce the user's impact to the preserves in general. Individual applications for these private non-commercial uses shall be reviewed using the applicable Resource Protection Area Maps and criteria. In addition, private dock proposals will be reviewed by the criteria described in Subsection 18-20.004(5), F.A.C. of the revised General Aquatic Preserve Rule (See Appendix B).

Bulkheads should be placed, when allowed, in such a way as to be the least destructive and disruptive to the vegetation and other resource factors in each area.

Dredging proposals shall be reviewed according to the procedures in Chapter V depending on the location of the proposed activity within the RPA. New dredging proposals within RPA 1 and 2 areas (Chapter V (c)) are governed by the provision of Chapter 18-20, F.A.C. Maintenance dredging of existing navigation channels are permitted under the provision of Section 258.42, F.S. and Section 18-20.004, F.A.C.

The location of proposed multiple docking facilities, such as those associated with condominium developments, shall be based on the criteria described in subsection 18-20.004(5) F.A.C. of the revised General Aquatic Preserve Rule (See Appendix B).

Authorization of such facilities will be conditioned upon receipt of documentation evidencing the subordination of the riparian rights of ingress and egress for the remainder of the applicant's shoreline for the life of the proposed docking facility. Boat ramps and travel lift platforms or other similar launching facilities, with associated temporary mooring facilities built with minimal damage to wetlands, will be encouraged over permanent wet storage facilities. Non-residential docking facilities (commercial) are addressed later in this Chapter.

D. Commercial Uses

This section addresses a variety of traditional and non-traditional commercial uses which may occur within the aquatic preserve. Among the traditional uses are utility crossings, marinas, yacht clubs, commercial fishing, shellfishing and boats for hire (e.g. sportfishing). Non-traditional uses in this area include oil and gas transportation facilities, phosphate transportation and other commercial uses.

1. Traditional commercial uses

a. Utilities crossings. At the present time, there are aerial utility crossings in the Rookery Bay Aquatic Preserve. Future proposals should be

designed so that the preserve is crossed by the least destructive method in the least vulnerable areas according to the RPA maps. Increased or additional use of any existing utility crossings is preferable, if their condition at the time of the proposal is acceptable. The field personnel will assess all areas with existing or proposed utility crossings to determine appropriate sites for placement of any additional crossings where the least disturbance to the environment would occur.

Crossings should be limited to open water areas where live bottom communities are not present, to minimize disturbance to marine grassbeds, mangroves or other critical habitat areas.

b. Commercial Fishing. The management of the aquatic preserves shall not include the direct management of commercial fishing activities. These activities will be monitored and their impacts on the preserves assessed in conjunction with the Division of Marine Resources, the Florida Marine Patrol and the Marine Fisheries Commission and as a cooperative effort with these agencies. The field personnel will notify the requisite authorities in the event of illegal fishing practices (Chapter 370, F.S. or by special act).

Field personnel will monitor fishing within the aquatic preserves. Monitoring will concentrate on boat access into certain areas, prevention of marine grassbed destruction and other concerns of the aquatic preserves. When commercial fishing problems are identified and documented, the findings will be presented to the Marine Fisheries Commission. It is the authority of the Commission and the Florida Legislature to regulate commercial fishing within the preserves.

c. Marinas. The location of marinas and their related uses are major concerns of the aquatic preserve management. Marinas represent a use with many potential impacts on the preserve's resources. The policy of Subsection 18-20.004(5) F.A.C. shall be used for siting marinas in aquatic preserves (See Appendix B).

d. Other Docking. Any other type of commercial docking, not mentioned in the preceding sections, will follow the marina siting policy as stated in Subsection 18-20.004(5) F.A.C. of the revised General Aquatic Preserve Rule.

2. Non-traditional Commercial Uses

a. Power Plants. Power plants have the potential for causing major changes in the air quality, water quality, and plant and animal life of the aquatic preserve. For these reasons, power plants are incompatible with the purposes of these aquatic preserves. The location of proposed power plants should be evaluated as to the effects on the preserve.

b. Aquaculture. The aquatic preserves may be used for aquaculture activities in select locations subject to the requirements of Sections 253.67 - .75 F.S., and Chapters 18-21 and 18-20, F.A.C.

c. Deep Water Port Facilities. There are no major deep water port facilities within the boundaries of the preserves. New port facilities within the preserves will be discouraged.

d. Other Uses. Any other use that qualifies as a commercial use of submerged lands not mentioned above will require a review for its anticipated impact on the aquatic preserve and the best location for the activity compatible with the resources within the preserve.

Chapter VIII

RESEARCH

A. Introduction

The research program of the aquatic preserves operates in conjunction with the Rookery Bay National Estuarine Research Reserve. The purpose of the aquatic preserves' research program is to promote scientific research which generates information on the resources of the preserves. Research results can then be utilized by aquatic preserves' staff in the development of resource management strategies.

The research program consists of two components: the coordination of research activities within the preserves, and on-site research activities designed to generate baseline environmental data. Scientific research conducted within the aquatic preserves requires approval from the on-site manager and the central office staff. Factors including site location, species collection, and frequency of sampling will be carefully reviewed to determine if the research activity will disturb the resources of the preserves.

The research program operates through a cooperative effort with the Rookery Bay National Estuarine Research Reserve. Field sampling trips, sampling station locations, and research design, are coordinated to insure efficient collection of pertinent scientific data. The capability to work in concert

and share personnel, equipment, and facilities greatly enhances the ability of the aquatic preserves' staff to conduct basic research and monitoring programs.

B. Existing Research Programs

Existing research activities are limited to baseline studies. The baseline studies are designed to identify and analyze the physical, chemical, and biological characteristics of the resources of the preserves. Data generated from baseline studies will be used to reach conclusions regarding the content, complexity and health of the ecosystem. Changes detected in physical, chemical, and biological parameters can potentially document adverse affects from development activities in the preserves and their watersheds. This information is crucial to the development of effective resource protection strategies.

Presently, three baseline research programs are being conducted by Aquatic Preserves and National Estuarine Research Reserve staff:

1. Rookery Bay Water Quality Monitoring: water quality data from the Rookery Bay Aquatic Preserve is collected every two weeks. Parameters monitored include water temperature, salinity, conductivity, dissolved oxygen, pH, turbidity, fecal coliform bacteria, and redox potential. Fecal coliform bacteria enumeration is provided by the Division of Marine Resources Shellfish Environmental Assessment Section.

2. Cape Romano-Ten Thousand Islands Aquatic Preserve Water Quality Monitoring: a water quality monitoring program is presently being

conducted in the Cape Romano-Ten Thousand Islands Aquatic Preserve under a FDER/NOAA Coastal Zone Management research grant. The purpose of the research grant is twofold: water quality analysis is being conducted for long-term analysis and a manual is being formulated to be used as a guide to initiate water quality monitoring in other aquatic preserves throughout the State. Parameters monitored include water temperature, salinity, conductivity, dissolved oxygen, pH, turbidity, fecal coliform bacteria, redox potential, orthophosphate, nitrite, nitrate, ammonia, chlorophylls, biological oxygen demand and suspended solids.

3. Habitat Mapping: Plant communities and submerged habitats are being delineated using LANDSAT imagery and ground truthing. Signatures of vegetative cover are field inspected to determine plant species composition, species density, and canopy height. The habitat mapping will be used in the permit review process and as a monitoring tool to detect changes in plant communities and the gain or loss of habitat.

C. Identified Research Needs

The research program will continue to be directed towards the collection of data which enhance resource management efforts. Major research needs ranked in order or importance include:

1. Studies to determine species composition, richness and diversity of the vermetid reefs in the Cape Romano-Ten Thousand Islands Aquatic Preserve. In the United States, vermetid reefs are unique to the Ten

Thousand Islands region. Limited comprehensive research has been conducted on the reef ecosystem.

2. Studies evaluating the effects of environmental stresses (e.g. freezes, shading, freshwater influx, depleted dissolved oxygen levels, watershed alterations) on the health and diversity of the flora and fauna of the preserves are needed.

3. Specific research projects which investigate endangered species will be encouraged. A number of endangered species of plant and animals are found in the preserves. Most notable are the Bald eagle and West Indian manatee.

4. Research useful to the management of the preserves including mangrove habitat utilization, mangrove restoration, effects of watershed alterations on mangroves, and the use of mangroves to stabilize shorelines.

5. Studies on the abundance and temporal changes in the biotope and the role of seagrasses in providing food habitat in Rookery Bay and the Ten Thousand Islands.

6. Studies to survey major plant and animal groups in the preserves.

This list will be continuously updated as additional research needs are identified.

Chapter IX

ENVIRONMENTAL EDUCATION

A. Introduction

The purpose of the aquatic preserves' education program is to increase public awareness of the value of estuarine systems and the coastal zone and the need for their protection. An informed public is capable of making sound decisions regarding environmental issues.

The aquatic preserves offer a unique opportunity for the interpretation of subtropical estuarine systems. Basic ecologic principles (e.g. food webs, habitats, etc.) are stressed in the aquatic preserves' education program. A wide array of biotopes are present in both preserves including live bottom communities, oyster bars, extensive mangrove forests, seagrass beds, sandy beaches, and open estuarine and marine waters. Applying ecological principles to these biotopes stresses the vital functions of natural systems as well as the detrimental impacts of human activities.

B. Coordination

The objectives of the education program are obtained through a cooperative effort with the Rookery Bay National Estuarine Research Reserve. Combined field trips, poster displays, and training workshops are coordinated to insure maximum awareness of the need to protect the resources of the aquatic

preserves and the national estuarine research reserve. The capability to work in concert and share personnel, equipment, and facilities greatly enhances the aquatic preserves staff's ability to reach the public. Although participation and coordination with the national estuarine research reserve staff is essential to the success of the aquatic preserves education program, it is necessary to emphasize the distinction between the two programs and this has been accomplished during joint education programs.

C. Objectives

The objectives of the aquatic preserves' education program are consistent with the objectives of the Rookery Bay National Estuarine Research Reserve. The three main objectives are:

1) to increase public awareness of the Rookery Bay and Ten Thousand Islands ecosystems, the role of the aquatic preserves in their management, and coastal zone issues which are of regional importance;

2) to encourage public awareness and involvement in the protection and preservation of coastal resources;

3) to facilitate communication between the aquatic preserves staff, regulatory agencies, and potential users of the aquatic preserves.

D. Existing Education Programs

Through cooperation with the Rookery Bay National Estuarine Research Reserve, an education program has been developed and implemented for the Rookery Bay

and Cape Romano-Ten Thousand Islands Aquatic Preserves. Present activities include out-reach programs, on-site programs, and training workshops.

1. Community Education Programs

Community awareness is accomplished through on-site and outreach education activities. Potential target audiences include high school and college students, educators, civic groups, and conservation organizations.

Interpretive field trips and slide presentations have been implemented in on-site programs. Interpretive field trips have been successful tools to increase public awareness of the value of estuarine systems. Presently, field trips are conducted primarily in the Rookery Bay Aquatic Preserve due to its accessibility. Short boat trips into Rookery Bay give participants the opportunity to use field sampling equipment such as fish trawls, benthic core samplers, and plankton trawls. Additional field trips consist of hikes through mangrove forests and surveys of oyster reefs. This first hand experience gives participants a chance to learn about the variety of plants and animals that depend on estuarine systems.

A slide presentation has been developed by the Rookery Bay National Estuarine Research Reserve staff demonstrating the importance of estuaries. Use of the slide presentation is available to aquatic preserve personnel. A series of slide programs is being developed by staff of the aquatic preserves and the national estuarine research reserve describing the major habitats found within the preserves. Tentative topics include mangrove forests, oyster reef ecology, and seagrass ecosystems. These slide programs will be integrated into the on-site education activities.

The outreach program is designed to provide off-site education to local and regional communities about the ecology of the aquatic preserves and their management. Initially, the outreach programs have consisted of a portable interpretive exhibit, displays with informational flyers, and a brochure. Off-site slide/lecture presentations to civic groups and school classes will be developed in an effort to expand the outreach program.

2. Professional Education Programs

Professional education is accomplished by on-site training workshops and distributing technical information to coastal zone management professionals. The on-site training workshops ultimately assist in the resource management activities of the preserves. By providing information about aquatic preserve management to regulatory agency personnel, local governments, marine construction firms, environmental consultants and other potential users, awareness of aquatic preserve issues is increased, resulting in more efficient permit application review. Training workshops can also be utilized by regulatory agencies such as the Florida Department of Environmental Regulation to familiarize employees on the taxonomy of local flora and fauna.

The aquatic preserves, in cooperation with the national estuarine research reserve, function as a clearinghouse for technical resource management information. Upon request, aquatic preserves staff distribute information regarding such coastal issues as wetlands restoration, marina siting, marine toxicology, and water quality monitoring to local, county, and state agencies.

E. Identified Education Needs

Although several education activities have been implemented, the education program of the aquatic preserves will to be expanded in certain areas. The development of off-site slide/lecture presentations is critical to obtaining educational objectives. Efforts will be made by aquatic preserves' staff and national estuarine research reserve staff to increase the frequency of off-site presentations.

Evaluations from participants of previous on-site programs have strongly indicated a need for the development of slide presentations regarding advanced topics (e.g. mangrove ecology) targeted for high school and college level students. Students knowledgeable in basic ecological principals require advanced lectures on specific subjects. The wide range of biotopes present in both preserves presents a tremendous opportunity for college and high school students to study a variety of topics. Development of slide presentations concerning specific subjects such as mangrove forests, oyster bar communities, and seagrass beds is essential in meeting the needs of visiting school groups. These slide programs may also be used in off-site presentations to biology classes at Edison Community College, Berry College, and Collier County high schools.

Due to its inaccessibility, the Cape Romano-Ten Thousand Islands Aquatic Preserve has not been utilized for field trips. The acquisition of a large boat capable of transporting 10-15 participants would increase educational opportunities in the Cape Romano-Ten Thousand Islands Aquatic Preserve. The

development of overnight field trips to the state-owned islands within the preserve would also increase educational opportunities. Overnight trips would target advanced students from high schools and colleges and could draw local, regional, and statewide participants.

Due to limited office and laboratory space at the Rookery Bay National Estuarine Research Reserve, it is often awkward to conduct on-site education programs. There is a tremendous need for an education building with dormitories, wetlabs, classrooms, and interpretive displays. Such a facility would benefit both the aquatic preserves and the national estuarine research reserve and would draw high school and college students from regional, state and national levels.

The formation of a review committee to conduct an annual evaluation of the education program will help determine future program needs. Additionally, groups participating in on-site activities are solicited for critiques of the programs. The responses from participants provide valuable information which is used in the development of new programs.

Initial education activities at the Rookery Bay and Cape Romano-Ten Thousand Islands Aquatic Preserves have been implemented, however there is great potential for an increase in on-site and outreach programs. As the program develops, more needs will be identified and implemented.

Chapter X

Identified Program Needs

This chapter addresses the identity of program needs throughout program development. The management of the aquatic preserves and the protection of the natural resources will be enhanced by continually identifying specific program needs, then resolving them through legislative or administrative action. Subjects which will receive particular attention in the constant pursuit of program improvement are as follows:

A. property acquisition
B. boundary determination
C. legislation need
D. administrative rules
E. data
F. resource protection
G. funding and staffing

Staff will develop an annual status report to summarize identified needs and suggest resolution measures.

A. Property Acquisition

There are areas within and upland of the aquatic preserves that are owned by various local, state and federal agencies. These lands contain important resources, such as bird rookeries, archaeological or historical sites,

endangered species habitats, and freshwater wetlands. Formal interagency administration agreements which will ensure the compatible management of these areas, will be sought. Other areas within or adjacent to the preserves that are privately owned will be closely examined to determine the advisability of public ownership. If acquired by the state these lands could act to buffer critical resources, prevent development of sensitive areas, allow restoration of areas adversely affected by previous development, or allow removal of disrupting uses. The field personnel will become aware of upland and submerged land areas which, if developed, could compromise the integrity of the aquatic preserves. The field personnel will keep a record of these areas and will determine their importance in the effective management of the aquatic preserves for consideration in public acquisition proceedings.

In the Rookery Bay Aquatic Preserve, acquisition of Horrs, Johnson, Cannon, Little Marco, and Key (Keewaydin) Islands and the surrounding privately owned submerged lands are given high priority. These parcels are located in essentially pristine areas which are targeted for development.

In the Cape Romano-Ten Thousand Islands Aquatic Preserve, many of the mangrove islands are in private ownership. Acquisition of these islands would assure the protection of this highly sensitive ecosystem.

B. Boundary Considerations

The boundaries of the aquatic preserves are artificial delineations of the natural systems within and surrounding the preserves. During normal management activities, possible needs for boundary modification will be identified.

Potential boundary changes and acquisition projects may include areas upstream of the present boundary in the preserve's watersheds, previously conveyed sovereign lands, or other areas not presently within the preserves. Boundary changes require legislative approval. Additional areas to be considered for acquisition are the submerged lands of Big Marco Pass and Caxambas Pass. This area contains emergent sandbars which are prime nesting areas for shore birds. The current boundary line arbitrarily passes through the middle of both passes.

The ABC Islands are located adjacent to the Rookery Bay Aquatic Preserve. This series of islands is the major estuarine rookery in Collier County and is utilized by over 5,500 birds. These islands would be afforded additional protection by being included within the boundaries of the Rookery Bay Aquatic Preserve.

C. Legislation

Management needs could conceivably involve changes in the legislation governing the aquatic preserves. These changes may include boundary realignments as mentioned above or the strengthening of management authority.

The names of the aquatic preserves have resulted in confusion among the private sector. Although the preserves are contiguous and managed under the same management plan, they are separate preserves in the Florida Statutes. In addition, Cape Romano is located in the Rookery Bay Aquatic Preserve and not in the Cape Romano-Ten Thousand Islands Aquatic Preserve. Therefore, it is suggested that the Cape Romano-Ten Thousand Islands name be changed to the Ten Thousand Islands Aquatic Preserve. A change in name would require legislative action.

D. Administrative Rule Changing

Administrative rules are the specific procedures and policies formally adopted into the Florida Administrative Code by the managing agency to implement the intent of the program statutes. Existing chapters concerning aquatic preserve management include 18-20, 18-21, F.A.C. These chapters shall be revised as required for the effective management of the aquatic preserves.

E. Data

The field personnel and central office staff will define data needs and promote research or other means to obtain them. Data needs in the near future will include such ongoing projects as the U.S. Geological Survey's and the South Florida Water Management District's studies, Department of Environmental Regulation water quality monitoring or by the research of other agencies. The field personnel will be aware of the data needs as they interact with the various levels of government and with other entities. Data needs may include mapping, ownership information, water quality data or other data. The major suppliers of data will probably be public agencies, colleges and universities conducting research programs in or around the preserves.

F. Resource Protection and Enforcement Capabilities.

Protection of the preserves' natural resources is dependent on the preserves' field personnel and assistance from the Florida Marine Patrol. Protection needs may include additional enforcement support from local government, federal, or state agencies. These needs may also involve additional manpower, or equipment.

The field personnel will become familiar with the capabilities of both the Department of Natural Resources' staff and the other agencies with enforcement responsibilities in the preserve. It appears that the present level of enforcement is not fully protecting the resource because of a lack of manpower.

G. Funding and Staffing Needs

Historically, the aquatic preserve program has been largely dependent on federal coastal zone management grant funds for its operation, and as a result, the funding of both field position and central office positions has been limited. The 1986 Florida Legislature changed this by authorizing eleven field positions. An Environmental Specialist II position was assigned for the management of the Rookery Bay/Cape Romano Ten Thousands Aquatic Preserves in December 1986.

A budget covering projected staff time, equipment, travel, and other expenses is shown below. The budget is required to fulfill the short range needs of the preserves as described in this management plan, and to accomplish the Department goal of on-site management for all aquatic preserves by 1991, as expressed in the Agency Functional Plan.

Propsed Continuation Budget for Fiscal Year 1988-1989
for the
ROOKERY BAY AND CAPE ROMANO - TEN THOUSAND ISLANDS AQUATIC PRESERVES

Salary (Environmental Specialist II) and Associated Overhead	=	$30,000
(OPS Employment)	=	10,000
Operating Capital Outlay	=	20,000
Expenses	=	10,000
Total	=	70,000

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A. Florida Aquatic Preserve Act of 1975 (§ 258.35-46, F.S.)

B. Administrative Rules for Florida's Aquatic Preserves (§ 18-20, F.A.C.)

C. Administrative Rules for Florida Sovereignty Submerged Lands Management (§ 18-21. F.A.C.)

D. Legal Description of Tomoka Marsh Aquatic Preserve.

E. Species List

* Copies of the above appendices may be obtained from:

Bureau of Aquatic Preserves
Department of Natural Resources
Cedars Executive Center, Suite 232-B
Mailbox 21, 2639 North Monroe Street
Tallahassee, Florida 32303

Appendix B

RULES

OF THE

BOARD OF TRUSTEES OF THE INTERNAL

IMPROVEMENT TRUST FUND

CHAPTER 18-20

FLORIDA AQUATIC PRESERVES

18-20.001	Intent
18-20.002	Boundaries and Scope of the Preserves
18-20.003	Definitions
18-20.004	Management Policies, Standards and Criteria
18-20.005	Uses, Sales, Leases, or Transfer of Interests in Lands, or Materials, Held by the Board (Repealed)
18-20.006	Cumulative Impacts
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18-20.009	Establishment or Expansion of Aquatic Preserves
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18-20.017	Lake Jackson Aquatic Preserve

18-20.001 Intent.

(1) All sovereignty lands within a preserve shall be managed primarily for the maintenance of essentially natural conditions, the propagation of fish and wildlife, and public recreation, including hunting and fishing where deemed appropriate by the board, and the managing agency.

(2) The aquatic preserves which are described in 73-534, Laws of Florida, Sections 258.39, 258.391, 258.392 and 258.393, Florida Statutes, future aquatic preserves established pursuant to general or special acts of the legislature, and in Rule 18-20.002, Florida Administrative Code, were established for the purpose of being preserved in an essentially natural or existing condition so that their aesthetic, biological and scientific values may endure for the enjoyment of future generations.

(3) The preserves shall be administered and managed in accordance with the following goals:

(a) To preserve, protect, and enhance these exceptional areas of sovereignty submerged lands by reasonable regulation of human activity within the preserves through the development and implementation of a comprehensive management program;

(b) To protect and enhance the waters of the preserves so that the public may continue to enjoy the traditional recreational uses of those waters such as swimming, boating, and fishing;

(c) To coordinate with federal, state, and local agencies to aid in carrying out the intent of the Legislature in creating the preserves;

(d) To use applicable federal, state, and local management programs, which are compatible with the intent and provisions of the act and these rules, and to assist in managing the preserves;

(e) To encourage the protection, enhancement or restoration of the biological, aesthetic, or scientific values of the preserves, including but not limited to the modification of existing manmade conditions toward their natural condition, and discourage activities which would degrade the aesthetic, biological, or scientific values, or the quality, or utility of a preserve, when reviewing applications, or when developing and implementing management plans for the preserves;

(f) To preserve, promote, and utilize indigenous life forms and habitats, including but not limited to: sponges, soft coral, hard corals, submerged grasses, mangroves, salt water marshes, fresh water marshes, mud flats, estuarine, aquatic, and marine reptiles, game and non-game fish species, estuarine, aquatic and marine invertebrates, estuarine, aquatic and marine mammals, birds, shellfish and mollusks;

(g) To acquire additional title interests in lands wherever such acquisitions would serve to protect or enhance the biological, aesthetic, or scientific values of the preserves;

(h) To maintain those beneficial hydrologic and biologic functions, the benefits of which accrue to the public at large.

(4) Nothing in these rules shall serve to eliminate or alter the requirements or authority of other governmental agencies, including counties and municipalities, to protect or enhance the preserves provided that such requirements or authority are not inconsistent with the act and this chapter.

Specific Authority 120.53, 258.43(1) FS. Law Implemented 258.35, 258.36, 258.37, 258.39, 258.393 FS., Chapter 80-280, Laws of Florida. History—New 2-23-81. Amended 6-7-85. Formerly 16Q-20.01. Transferred from 16Q-20.001.

18-20.002 Boundaries and Scope of the Preserves.

(1) These rules shall only apply to those sovereignty lands within a preserve, title to which is vested in the board, and those other lands for which the board has an appropriate instrument in writing, executed by the owner, authorizing the inclusion of specific lands in an aquatic preserve pursuant to Section 2(2) of Chapter 73-534, Laws of Florida, Sections 258.40(1) and 258.41(5), Florida Statutes, future aquatic preserves established through general or special acts of the legislature, and pursuant to Rule 18-20.008, Florida Administrative Code. Any publicly owned and maintained navigation channel authorized by the United States Congress, or other public works project authorized by the United States Congress, designed to improve or maintain commerce and navigation shall be deemed to be excluded from the provisions of this chapter, pursuant to Subsection 258.40(2), Florida Statutes. Furthermore, all lands lost by avulsion or by artificially induced erosion shall be deemed excluded from the provisions of this chapter pursuant to Subsection 258.40(3), Florida Statutes.

(2) These rules do not apply to Boca Ciega Bay, Pinellas County or Biscayne Bay Aquatic Preserves.

(3) These rules are promulgated to clarify the responsibilities of the board in carrying out its land management functions as those functions apply within the preserves. Implementation and responsibility for environmental permitting of activities and water quality protection within the preserves are vested in the Department of Environmental Regulation. Since these rules are considered cumulative with other rules, a person planning an activity within the preserves should also consult the other applicable department rules (Chapter 18-21, Florida Administrative Code, for example) as well as the rules of the Department of Environmental Regulation.

(4) These rules shall not affect previous actions of the board concerning the issuance of any easement or lease; or any disclaimer concerning sovereignty lands.

(5) The intent and specific provisions expressed in 18-20.001(e) and (f) apply generally to all existing or future aquatic preserves within the scope of this chapter. Upon completion of a resource inventory and approval of a management plan for a preserve, pursuant to 18-20.013, the type-designation and the resource sought to be preserved may be readdressed by the Board.

(6) For the purpose of clarification and interpretation, the legal description set forth as follows do not include any land which is expressly recognized as privately owned upland in a pre-existing recorded mean high water line settlement agreement between the board and a private owner or owners. Provided, however, in those instances wherein a settlement agreement was executed subsequent to the passage of the Florida Coastal Mapping Act, the determination of the mean high water line shall be in accordance with the provisions of such act.

(7) Persons interested in obtaining details of particular preserves should contact the Bureau of State Lands Management, Department of Natural Resources, 3900 Commonwealth Blvd., Tallahassee, FL 32303 (telephone 904-488-2297).

(a) The preserves are described as follows:

1. For Clinch State Park Aquatic Preserve, as described in the Official Records of Nassau County in Book 108, pages 343-346, and in Book 111, page 409.

2. Nassau River — St. Johns River Marshes Aquatic Preserve, as described in the Official Records of Duval County in Volume 3183, pages 547-552, and in the Official Records of Nassau County in Book 108, pages 232-237.

3. Pellicer Creek Aquatic Preserve, as described in the Official Records of St. Johns County in Book 181, pages 363-366, and in the Official Records of Flagler County in Book 33, pages 131-134.

4. Tomoka Marsh Aquatic Preserve, as described in the Official Records of Flagler County in Book 33, pages 135-138, and in the Official Records of Volusia County in Book 1244, pages 615-618.

5. Wekiva River Aquatic Preserve, as described in Section 258.39(30), F.S.

6. Mosquito Lagoon Aquatic Preserve, as described in the Official Records of Volusia County in Book 1244, pages 619-623, and in the Official Records of Brevard County in Book 1143, pages 190-194.

7. Banana River Aquatic Preserve, as described in the Official Records of Brevard County in Book 1143, pages 195-198, less those lands dedicated to the U. S. A. prior to the enactment of the act, until such time as the U. S. A. no longer wishes to maintain such lands for the purpose for which they were dedicated, at which time such lands would revert to the board, and be managed as part of the preserve.

8. Indian River — Malabar to Sebastian Aquatic Preserve, as described in the Official Records of Brevard County in Book 1143, pages 199-202, and in the Official Records of Indian River County in Book 368, pages 5-8.

9. Indian River — Vero Beach to Fort Pierce Aquatic Preserve, as described in the Official Records of Indian River County in Book 368, pages 9-12, and in the Official Records of St. Lucie County in Book 187, pages 1083-1086.

10. Jensen Beach to Jupiter Inlet Aquatic Preserve, as described in the Official Records of St. Lucie County in Book 218, pages 2865-2869.

11. North Fork, St. Lucie Aquatic Preserve, as described in the Official Records of Martin County in Book 337, pages 2159-2162, and in the Official Records of St. Lucie County in Book 201, pages 1676-1679.

12. Loxahatchee River — Lake Worth Creek Aquatic Preserve, as described in the Official Records of Martin County in Book 320, pages 193-196, and in the Official Records of Palm Beach County in Volume 1860, pages 806-809.

13. Biscayne Bay — Cape Florida to Monroe County Line Aquatic Preserve, as described in the Official Records of Dade County in Book 7055, pages 852-856, less, however, those lands and waters as described in Section 258.165, F.S., (Biscayne Bay Aquatic Preserve Act of 1974), and those lands and waters within the Biscayne National Park.

14. Lignumvitae Key Aquatic Preserve, as described in the Official Records of Monroe County in Book 502, pages 139-142.

15. Coupon Bight Aquatic Preserve, as described in the Official Records of Monroe County in Book 502, pages 143-146.

16. Cape Romano — Ten Thousand Islands Aquatic Preserve, as described in the Official Records of Collier County in Book 381, pages 298-301.

17. Rookery Bay Aquatic Preserve, as described in Section 258.39(31), F.S.

18. Estero Bay Aquatic Preserve as described in Section 258.39(28), Florida Statutes.

19. Pine Island Sound Aquatic Preserve, as described in the Official Records of Lee County in Book 648, pages 732-736.

20. Matlacha Pass Aquatic Preserve, as described in the Official Records of Lee County in Book 800, pages 725-728.

21. Gasparilla Sound — Charlotte Harbor Aquatic Preserve, as described in Section 258.392, F.S.

22. Cape Haze Aquatic Preserve, as described in Section 258.39(29), F.S.

23. Cockroach Bay Aquatic Preserve, as described in Section 258.391, F.S.

24. St. Martins Marsh Aquatic Preserve, as described in the Official Records of Citrus County in Book 276, pages 238-241.

25. Alligator Harbor Aquatic Preserve, as described in the Official Records of Franklin County in Volume 98, pages 82-85.

26. Apalachicola Bay Aquatic Preserve, as described in the Official Records of Gulf County in Book 46, pages 77-81, and in the Official Records of Franklin County in Volume 98, pages 102-106.

27. St. Joseph Bay Aquatic Preserve, as described in the Official Records of Gulf County in Book 46, pages 73-76.

28. St. Andrews State Park Aquatic Preserve, as described in the Official Records of Bay County in Book 379, pages 547-550.

29. Rocky Bayou State Park Aquatic Preserve, as described in the Official Records of Okaloosa County in Book 593, pages 742-745.

30. Yellow River Marsh Aquatic Preserve, as described in the Official Records of Santa Rosa County in Book 206, pages 568-571.

31. Fort Pickens State Park Aquatic Preserve, as described in the Official Records of Santa Rosa County in Book 220, pages 60-63, in the Official Records of Escambia County in Book 518, pages 659-662, less the lands dedicated to the U. S. A. for the establishment of the Gulf Islands National Seashore prior to the enactment of the act, until such time as the U. S. A. no longer wishes to maintain such lands for the purpose for which they were dedicated, at which time such lands would revert to the board and be managed as part of the preserve.

32. For the purpose of this section the boundaries of the Lake Jackson Aquatic Preserve, shall be the body of water in Leon County known as Lake Jackson in Sections 1, 2, 3, 5, 10, 11 and 14, Township 1 North, Range 1 West and Sections 11, 12, 13, 14, 15, 21, 22, 23, 26, 27, 28, 29, 32, 33, 34, and 35, Township 2 North, Range 1 West lying below the ordinary high water line. Such lands shall include the submerged bottom lands and the water column upon such lands, as well as all publicly owned islands, within the boundaries of the preserve. Any privately held upland within the boundaries of the preserve shall be deemed to be excluded therefrom; provided that the Board may negotiate an arrangement with any such private upland owner by which such land may be included in the preserve.

33. Terra Ceia Aquatic Preserve, as described in Section 258.393, Florida Statutes.

34. Future aquatic preserves established pursuant to general or special acts of the legislature.

Specific Authority 120.53, 258.43(1) FS. Law Implemented 258.39, 258.391, 258.392, 258.393, 258.40, 258.41, 258.42, 258.43, 258.44, 258.45 FS. History—New 2-23-81, Amended 8-7-85, Formerly 16Q-20.02, Transferred from 16Q-20.002.

18-20.003 Definitions. When used in these rules, the following words shall have the indicated meaning unless the context clearly indicates otherwise:

(1) "Act" means the provisions of Section 258.35 through 258.46, F.S., the Florida Aquatic Preserve Act.

(2) "Activity" means any project and such other human action within the preserve requiring board approval for the use, sale, lease or transfer of interest in sovereignty lands or materials, or which may require a license from the Department of Environmental Regulation.

(3) "Aesthetic values" means scenic characteristics or amenities of the preserve in its essentially natural state or condition, and the maintenance thereof.

(4) "Applicant" means any person making application for a permit, license, conveyance of an interest in state owned lands or any other necessary form of governmental approval in order to perform an activity within the preserve.

(5) "Beneficial biological functions" means interactions between flora, fauna and physical or chemical attributes of the environment, which provide benefits that accrue to the public at large, including, but not limited to: nutrient, pesticide and heavy metal uptake; sediment retention; nutrient conversion to biomass; nutrient recycling and oxygenation.

(6) "Beneficial hydrological functions" means interactions between flora, fauna and physical geological or geographical attributes of the environment, which provide benefits that accrue to the public at large, including, but not limited to: retardation of storm water flow; storm water retention; and water storage, and periodical release;

(7) "Biological values" means the preservation and promotion of indigenous life forms and habitats including, but not limited to: sponges, soft corals, hard corals, submerged grasses, mangroves, saltwater marshes, fresh water marshes, mud flats, marine, estuarine, and aquatic reptiles, games and non-games fish species, marine, estuarine, and aquatic mammals, marine, estuarine, and aquatic invertebrates, birds and shellfish.

(8) "Board" means the Governor and Cabinet sitting as the Board of Trustees of the Internal Improvement Trust Fund.

(9) "Channel" means a trench, the bottom of which is normally covered entirely by water, with the upper edges of its sides normally below water.

(10) "Commercial, industrial and other revenue generating/income related docks" means docking facilities for an activity which produces income, through rental or any other means, or which serves as an accessory facility to other rental, commercial or industrial operations. It shall include, but not be limited to docking for: marinas, restaurants, hotels, motels, commercial fishing, shipping, boat or ship construction, repair, and sales.

(11) "Department" means the State of Florida Department of Natural Resources, as administrator for the board.

(12) "Division" means the Division of State Lands, which performs all staff duties and functions related to the administration of lands title to which is, or will be, vested in the board, pursuant to section 253.002, F.S.

(13) "Dock" means a fixed or floating structure, including moorings, used for the purpose of berthing buoyant vessels either temporarily or indefinitely.

(14) "Essentially natural condition" means those functions which support the continued existence or encourage the restoration of the diverse population of indigenous life forms and habitats to the extent they existed prior to the significant development adjacent to and within the preserve.

(15) "Extreme hardship" means a significant burden, unique to the applicant and not shared by property owners in the area. Self-imposed circumstances caused to any degree by actions of any person subsequent to the enactment of the Act shall not be construed as an extreme hardship. Extreme hardship under this act shall not be construed to include any hardship which arises in whole or in part from the effect of other federal, state or local laws, ordinances, rules or regulations. The term may be inherent in public projects which are shown to be a public necessity.

(16) "Fill" means materials from any source, deposited by any means onto sovereignty lands, either for the purpose of creating new uplands or for any other purpose, including spoiling of dredged materials. For the purpose of this rule, the placement of pilings or riprap shall not be considered to be filling.

(17) "Lease" means a conveyance of interest in lands, title to which is vested in the board, granted in accordance with specific terms set forth in writing.

(18) "Marina" means a small craft harbor complex used primarily for recreation.

(19) "Oil and gas transportation facilities" means those structures necessary for the movement of oil and gas from the production site to the consumer.

(20) "Person" means individuals, minors, partnerships, corporations, joint ventures, estates, trusts, syndicates, fiduciaries, firms, and all other associations and combinations, whether public or private, including governmental entities.

(21) "Pier" means a structure in, on, or over sovereignty lands, which is used by the public primarily for fishing, swimming, or viewing the preserve. A pier shall not include a dock.

(22) "Preserve" means any and all of those areas which are exceptional areas of sovereignty lands and the

associated water body so designated in Section 258.39, 258.391, and 258.392, F.S., including all sovereignty lands, title to which is vested in the board, and such other lands as the board may acquire or approve for inclusion, and the water column over such lands, which have been set aside to be maintained in an essentially natural or existing condition of indigenous flora and fauna and their supporting habitat and the natural scenic qualities and amenities thereof.

(23) "Private residential single dock" means a dock which is used for private, recreational or leisure purposes for a single family residence, cottage or other such single dwelling unit and which is designed to moor no more than two boats.

(24) "Private residential multi-slip dock" means a docking facility which is used for private recreational or leisure purposes for multi-unit residential dwellings which shall include but is not limited to condominiums, townhouses, subdivisions and other such dwellings or residential areas and which is designed to moor three or more boats. Yacht clubs associated with residential developments, whose memberships or utilization of the docking facility requires some real property interest in the residential area, shall also be included.

(25) "Public interest" means demonstrable environmental, social, and economic benefits which would accrue to the public at large as a result of a proposed action, and which would clearly exceed all demonstrable environmental, social, and economic costs of the proposed action. In determining the public interest in a request for use, sale, lease, or transfer of interest in sovereignty lands or severance of materials from sovereignty lands, the board shall consider the ultimate project and purpose to be served by said use, sale, lease, or transfer of lands or materials.

(26) "Public navigation project" means a project primarily for the purpose of navigation which is authorized and funded by the United States Congress or by port authorities as defined by Section 315.02(2), F.S.

(27) "Public necessity" means the works or improvements required for the protection of the health and safety of the public, consistent with the Act and these rules, for which no other reasonable alternative exists.

(28) "Public utilities" means those services, provided by persons regulated by the Public Service Commission, or which are provided by rural cooperatives, municipalities, or other governmental agencies, including electricity, telephone, public water and wastewater services, and structures necessary for the provision of these services.

(29) "Quality of the preserve" means the degree of the biological, aesthetic and scientific values of the preserve necessary for present and future enjoyment of it in an essentially natural condition.

(30) "Resource management agreement" means a contractual agreement between the board and one or more parties which does not create an interest in real property but merely authorizes conduct of certain management activities on lands held by the board.

(31) "Resource Protection Area (RPA) 1" — Areas within the aquatic preserves which have resources of the highest quality and condition for that area. These resources may include, but are not limited to corals; marine grassbeds; mangrove swamps; salt-water marsh; oyster bars; archaeological and historical sites; endangered or threatened species habitat; and, colonial water bird nesting sites.

(32) "Resource Protection Area 2" — Areas within the aquatic preserves which are in transition with either declining resource protection area 1 resources or new pioneering resources within resource protection area 3.

(33) "Resource Protection Area 3" — Areas within the aquatic preserve that are characterized by the absence of any significant natural resource attributes.

(34) "Riparian rights" means those rights incident to lands bordering upon navigable waters, as recognized by the courts of this state and common law.

(35) "Sale" means a conveyance of interest in lands, by the board, for consideration.

(36) "Scientific values" means the preservation and promotion of certain qualities or features which have scientific significance.

(37) "Shore protection structure" means a type of coastal construction designed to minimize the rate of erosion. Coastal construction includes any work or activity which is likely to have a material physical effect on existing coastal conditions or natural shore processes.

(38) "Sovereignty lands" means those lands including, but not limited to: tidal lands, islands, sandbars, shallow banks, and lands waterward of the ordinary or mean highwater line, to which the State of Florida acquired title on March 3, 1845, by virtue of statehood, and of which it has not since divested its title interest. For the purposes of this rule sovereignty lands shall include all submerged lands within the boundaries of the preserve, title to which is held by the board.

(39) "Spoil" means materials dredged from sovereignty lands which are redeposited or discarded by any means, onto either sovereignty lands or uplands.

(40) "Transfer" means the act of the board by which any interest in lands, including easements, other than sale or lease, is conveyed.

(41) "Utility of the preserve" means fitness of the preserve for the present and future enjoyment of its biological, aesthetic and scientific values, in an essentially natural condition.

(42) "Water dependent activity" means an activity which can only be conducted on, in, over, or adjacent to, water areas because the activity requires direct access to the water body or sovereignty lands for transportation, recreation, energy production or transmission, or source of water and where the use of the water or sovereignty lands is an integral part of the activity.

Specific Authority 258.43(1) FS. Law Implemented 258.37, 258.43(1) FS. History—New 2-25-81, Amended 8-7-85. Formerly 16Q-20.03. Transferred from 16Q-20.003.

18-20.004 Management Policies, Standards and Criteria. The following management policies, standards and criteria are supplemental to Chapter 18-21, Florida Administrative Code (Sovereignty Submerged Lands Management) and shall be utilized in determining whether to approve, approve with conditions or modifications or deny all requests for activities on sovereignty lands in aquatic preserves.

(1) GENERAL PROPRIETARY

(a) In determining whether to approve or deny any request the Board will evaluate each on a case-by-case basis and weigh any factors relevant under Chapter 253 and/or 258, Florida Statutes. The Board, acting as Trustees for all state-owned lands, reserves the right to approve, modify or reject any proposal.

(b) There shall be no further sale, lease or transfer of sovereignty lands except when such sale, lease or transfer is in the public interest (see Section 18-20.004(2) Public Interest Assessment Criteria).

(c) There shall be no construction of seawalls waterward of the mean or ordinary high water line, or filling waterward of the mean or ordinary high water line except

in the case of public road and bridge projects where no reasonable alternative exists.

(d) There shall, in no case, be any dredging waterward of the mean or ordinary high water line for the sole or primary purpose of providing fill for any area landward of the mean or ordinary high water line.

(e) A lease, easement or consent of use may be authorized only for the following activities:

1. a public navigation project;

2. maintenance of an existing navigational channel;

3. installation or maintenance of approved navigational aids;

4. creation or maintenance of a commercial/industrial dock, pier or a marina;

5. creation or maintenance of private docks for reasonable ingress and egress of riparian owners;

6. minimum dredging for navigation channels attendant to docking facilities;

7. creation or maintenance of a shore protection structure;

8. installation or maintenance of oil and gas transportation facilities;

9. creation, maintenance, replacement or expansion of facilities required for the provision of public utilities; and

10. other activities which are a public necessity or which are necessary to enhance the quality or utility of the preserve and which are consistent with the act and this chapter.

(f) For activities listed in paragraphs 18-20.004(1)(e)1.-10. above, the activity shall be designed so that the structure or structures to be built in, on or over sovereignty lands are limited to structures necessary to conduct water dependent activities.

(g) For activities listed in paragraphs 18-20.004(1)(e)7., 8., 9. and 10. above, it must be demonstrated that no other reasonable alternative exists which would allow the proposed activity to be constructed or undertaken outside the preserve.

(h) The use of state-owned lands for the purpose of providing private or public road access to islands where such access did not previously exist shall be prohibited. The use of state-owned lands for the purpose of providing private or public water supply to islands where such water supply did not previously exist shall be prohibited.

(i) Except for public navigation projects and maintenance dredging for existing channels and basins, any areas dredged to improve or create navigational access shall be incorporated into the preempted area of any required lease or be subject to the payment of a negotiated private easement fee.

(j) Private residential multi-slip docking facilities shall require a lease.

(k) Aquaculture and beach renourishment activities which comply with the standards of this rule chapter and Chapter 18-21, Florida Administrative Code, may be approved by the board, but only subsequent to a formal finding of compatibility with the purposes of Chapter 258, Florida Statutes, and this rule chapter.

(l) Other uses of the perserve, or human activity within the preserve, although not originally contemplated, may be approved by the board, but only subsequent to a formal finding of compatibility with the purposes of Chapter 258, Florida Statutes, and this rule chapter.

(2) PUBLIC INTEREST ASSESSMENT CRITERIA

In evaluating requests for the sale, lease or transfer of interest, a balancing test will be utilized to determine whether the social, economic and/or environmental benefits clearly exceed the costs.

(a) GENERAL BENEFIT/COST CRITERIA:

1. any benefits that are balanced against the costs of a particular project shall be related to the affected aquatic preserve;

2. in evaluating the benefits and costs of each request, specific consideration and weight shall be given to the quality and nature of the specific aquatic preserve. Projects in the less developed, more pristine aquatic preserves such as Apalachicola Bay shall be subject to a higher standard than the more developed urban aquatic preserves such as Boca Ciega Bay; and,

3. for projects in aquatic preserves with adopted management plans, consistency with the management plan will be weighed heavily when determining whether the project is in the public interest.

(b) BENEFIT CATEGORIES:

1. public access (public boat ramps, boatslips, etc.);

2. provide boating and marina services (repair, pumpout, etc.);

3. improve and enhance public health, safety, welfare, and law enforcement;

4. improved public land management;

5. improve and enhance public navigation;

6. improve and enhance water quality;

7. enhancement/restoration of natural habitat and functions; and

8. improve/protect/endangered/threatened/unique species.

(c) COSTS:

1. reduced/degraded water quality;

2. reduced/degraded natural habitat and function;

3. destruction, harm or harassment of endangered or threatened species and habitat;

4. preemption of public use;

5. increasing navigational hazards and congestion;

6. reduced/degraded aesthetics; and

7. adverse cumulative impacts.

(d) EXAMPLES OF SPECIFIC BENEFITS:

1. donation of land, conservation easements, restrictive covenants or other title interests in or contiguous to the aquatic preserve which will protect or enhance the aquatic preserve;

2. providing access or facilities for public land management activities;

3. providing public access easements and/or facilities, such as beach access, boat ramps, etc.;

4. restoration/enhancement of altered habitat or natural functions, such as conversion of vertical bulkheads to riprap and/or vegetation for shoreline stabilization or re-establishment of shoreline or submerged vegetation;

5. improving fishery habitat through the establishment of artificial reefs or other such projects, where appropriate;

6. providing sewage pumpout facilities where normally not required, in particular, facilities open to the general public;

7. improvements to water quality such as removal of toxic sediments, increased flushing and circulation, etc.;

8. providing upland dry storage as an alternative to wetslip; and

9. marking navigation channels to avoid disruption of shallow water habitats.

(3) RESOURCE MANAGEMENT

(a) All proposed activities in aquatic preserves having management plans adopted by the Board must demonstrate that such activities are consistent with the management plan.

(b) No drilling of oil, gas or other such wells shall be allowed.

(c) Utility cables, pipes and other such structures shall

be constructed and located in a manner that will cause minimal disturbance to submerged land resources such as oyster bars and submerged grass beds and do not interefere with traditional public uses.

(d) Spoil disposal within the preserves shall be strongly discouraged and may be approved only where the applicant has demonstrated that there is no other reasonable alternative and that activity may be beneficial to, or at a minimum, not harmful to the quality and utility of the preserve.

(4) RIPARIAN RIGHTS

(a) None of the provisions of this rule shall be implemented in a manner that would unreasonably infringe upon the traditional, common law and statutory riparian rights of upland riparian property owners adjacent to sovereignty lands.

(b) The evaluation and determination of the reasonable riparian rights of ingress and egress for private, residential multi-slip docks shall be based upon the number of linear feet of riparian shoreline.

(c) For the purposes of this rule, a private, residential, single docking facility which meets all the requirements of Rule 18-20.004(5) shall be deemed to meet the public interest requirements of Rule 18-20.004(1)(b), Florida Administrative Code. However, the applicants for such docking facilities must apply for such consent and must meet all of the requirements and standards of this rule chapter.

(5) STANDARDS AND CRITERIA FOR DOCKING FACILITIES

(a) All docking facilities, whether for a single or multi-slip residential or commercial, shall be subject to the following standards and criteria:

1. no dock shall extend waterward or the mean or ordinary high water line more than 500 feet or 20 percent of the width of the waterbody at that particular location whichever is less;

2. certain docks may fall within areas of special or unique importance. These areas may be of significant biological, scientific, historic and/or aesthetic value and require special management considerations. Modifications may be more restrictive than the normally accepted criteria. Such modifications shall be determined on a case-by-case analysis, and may include, but shall not be limited to changes in location, configuration, length, width and height;

3. the number, lengths, drafts and types of vessels allowed to utilize the proposed facility may also be stipulated; and

4. where local governments have more stringent standards and criteria for docking facilities, the more stringent standards for the protection and enhancement of the aquatic preserve shall prevail.

(b) Private residential single docks shall conform to the following specific design standards and criteria:

1. any main access dock shall be limited to a maximum width of four (4) feet;

2. the dock decking design and construction will insure maximum light penetration, with full consideration of safety and practicality;

3. the dock will extend out from the shoreline no further than to a maximum depth of minus four (—4) feet (mean low water);

4. when the water depth is minus four (—4) feet (mean low water) at an existing bulkhead the maximum dock length from the bulkhead shall be 25 feet, subject to modifications accommodating shoreline vegetation overhang;

5. wave break devices, when necessary, shall be designed to allow for maximum water circulation and shall be built in such a manner as to be part of the dock structure;

6. terminal platform size shall be no more than 160 square feet; and

7. dredging to obtain navigable water depths in conjunction with private residential, single dock applications is strongly discouraged.

(c) Private residential multi-slip docks shall conform to the following specific design standards and criteria:

1. the area of sovereignty, submerged land preempted by the docking facility shall not exceed the square footage amounting to ten times the riparian waterfront footage of the affected waterbody of the applicant, or the square footage attendant to providing a single dock in accordance with the criteria for private residential single docks, whichever is greater. A conservation easement or other such use restriction acceptable to the Board must be placed on the riparian shoreline, used for the calculation of the 10:1 threshold, to conserve and protect shoreline resources and subordinate/waive any further riparian rights of ingress and egress for additional docking facilities;

2. docking facilities and access channels shall be prohibited in Resource Protection Area 1 or 2, except as allowed pursuant to Section 258.42(3)(e)1., Florida Statutes, while dredging in Resource Protection Area 3 shall be strongly discouraged;

3. docking facilities shall only be approved in locations having adequate existing water depths in the boat mooring, turning basin, access channels, and other such areas which will accommodate the proposed boat use in order to insure that a minimum of one foot clearance is provided between the deepest draft of a vessel and the bottom at mean low water;

4. main access docks and connecting or cross walks shall not exceed six (6) feet in width;

5. terminal platforms shall not exceed eight (8) feet in width;

6. finger piers shall not exceed three (3) feet in width, and 25 feet in length;

7. pilings may be utilized as required to provide adequate mooring capabilities; and

8. the following provisions of Rule 18-20.004(5)(d) shall also apply to private residential multi-slip docks.

(d) Commercial, industrial and other revenue generating/income related docking facilities shall conform to the following specific design standards and criteria:

1. docking facilities shall only be located in or near areas with good circulation, flushing and adequate water depths;

2. docking facilities and access channels shall be prohibited in Resource Protection Area 1 or 2, except as allowed pursuant to Sections 258.42(3)(e)1., Florida Statutes; while dredging in Resource Protection Area 3 shall be strongly discouraged;

3. the docking facilities shall not be located in Resource Protection Area 1 or 2; however, main access docks may be allowed to pass through Resource Protection Area 1 or 2, that are located along the shoreline, to reach an acceptable Resource Protection Area 3, provided that such crossing will generate minimal environmental impact;

4. beginning July 1, 1986 new docking facilities may obtain a lease only where the local governments have an adopted marina plan and/or policies dealing with the siting of commercial/industrial and private, residential, multi-slip docking facilities in their local government comprehensive plan;

5. the siting of the docking facilities shall also take into account the access of the boat traffic to avoid marine grassbeds or other aquatic resources in the surrounding areas;

6. the siting of new facilities within the preserve shall be secondary to the expansions of existing facilities within the preserve when such expansion is consistent with the other standards:

7. the location of new facilities and expansion of existing facilities shall consider the use of upland dry storage as an alternative to multiple wet-slip docking;

8. marina siting will be coordinated with local governments to insure consistency with all local plans and ordinances:

9. marinas shall not be sited within state designated manatee sanctuaries: and

10. in any areas with known manatee concentrations, manatee warning/notice and/or speed limit signs shall be erected at the marina and/or ingress and egress channels, according to Florida Marine Patrol specifications.

(e) Exceptions to the standards and criteria listed in Rule 18-20.004(5), Florida Administrative Code, may be considered, but only upon demonstration by the applicant that such exceptions are necessary to insure reasonable riparian ingress and egress.

(6) MANAGEMENT AGREEMENTS

The board may enter into management agreements with local agencies for the administration and enforcement of standards and criteria for private residential single docks.

Specific Authority 253.03, 258.43(1) FS. Law Implemented 253.03, 258.41, 258.42, 258.43(1), 258.44 FS. History—New 2-25-81. Amended 8-7-85. Formerly 16Q-20.04. Transferred from 16Q-20.004.

18-20.005 Uses, Sales, Leases, or Transfer of Interests in Lands, or Materials, Held by the Board.

Specific Authority 258.43(1) FS. Law Implemented 253.02, 253.12, 258.42 FS. History—New 2-25-81. Repealed 8-7-85. Formerly 16Q-20.05. Transferred from 16Q-20.005.

18-20.006 Cumulative Impacts. In evaluating applications for activities within the preserves or which may impact the preserves, the department recognizes that, while a particular alteration of the preserve may constitute a minor change, the cumulative effect of numerous such changes often results in major impairments to the resources of the preserve. Therefore, the department shall evaluate a particular site for which the activity is proposed with the recognition that the activity may, in conjunction with other activities adversely affect the preserve which is part of a complete and interrelated system. The impact of a proposed activity shall be considered in light of its cumulative impact on the preserve's natural system. The department shall include as a part of its evaluation of an activity:

(1) The number and extent of similar human actions within the preserve which have previously affected or are likely to affect the preserve, whether considered by the department under its current authority or which existed prior to or since the enactment of the Act; and

(2) The similar activities within the preserve which are currently under consideration by the department; and

(3) Direct and indirect effects upon the preserve and adjacent preserves, if applicable, which may reasonably be expected to result from the activity; and

(4) The extent to which the activity is consistent with management plans for the preserve, when developed; and

(5) The extent to which the activity is permissible within the preserve in accordance with comprehensive plans adopted by affected local governments, pursuant to section 163.3161, F.S., and other applicable plans adopted by local, state, and federal governmental agencies;

(6) The extent to which the loss of beneficial hydrologic and biologic functions would adversely impact the quality or utility of the preserve; and

(7) The extent to which mitigation measures may compensate for adverse impacts.

Specific Authority 258.43(1) FS. Law Implemented 258.36, 258.43, 258.44 FS. History—New 2-25-81. Formerly 16Q-20.06. Transferred from 16Q-20.006.

18-20.007 Protection of Riparian Rights.

Specific Authority 258.43(1) FS. Law Implemented 258.123, 258.124(8), 258.44 FS. History—New 2-25-81. Repealed 8-7-85. Formerly 16Q-20.07. Transferred from 16Q-20.007.

18-20.008 Inclusion of Lands, Title to Which Is Not Vested in the Board, in a Preserve.

(1) Lands and water bottoms which are within designated aquatic preserve boundaries, or adjacent thereto and which are owned by other governmental agencies, may be included in an aquatic preserve upon specific authorization for inclusion by an appropriate instrument in writing executed by the agency.

(2) Lands and water bottoms which are within designated aquatic preserve boundaries or adjacent thereto, and which are in private ownership, may be included in an aquatic preserve upon specific authorization for inclusion by an appropriate instrument in writing executed by the owner.

(3) The appropriate instrument shall be either a dedication in perpetuity, or a lease. Such lease shall contain the following conditions:

(a) Ther term of the lease shall be for a minimum period of ten years.

(b) The board shall have the power and duty to enforce the provisions of each lease agreement, and shall additionally have the power to terminate any lease if the termination is in the best interest of the aquatic preserve system, and shall have the power to include such lands in any agreement for management of such lands.

(c) The board shall pay no more than $1 per year for any such lease.

Specific Authority 258.43(1) FS. Law Implemented 258.46, 258.41 FS. History—New 2-25-81. Formerly 16Q-20.08. Transferred from 16Q-20.008.

18-20.009 Establishment or Expansion of Aquatic Preserves.

(1) The board may expand existing preserves or establish additional areas to be included in the aquatic preserve system, subject to confirmation by the legislature.

(2) The board may, after public notice and public hearing in the county or counties in which the proposed expanded or new preserve is to be located, adopt a resolution formally setting aside such areas to be included in the system.

(3) The resolution setting aside an aquatic preserve area shall include:

(a) A legal description of the area to be included. A map depicting the legal description shall also be attached.

(b) The designation of the type of aquatic preserve.

(c) A general statement of what is sought to be preserved.

(d) A statement that the area established as a preserve shall be subject to the management criteria and directives of this chapter.

(e) A directive to develop a natural resource inventory and a management plan for the area being established as an aquatic preserve.

(4) Within 30 days of the designation and establishment of an aquatic preserve, the board shall record in the public records of the county or counties in which the preserve is located a legal description of the preserve.

Specific Authority 258.43(1) FS. Law Implemented 258.41 FS. History—New 2-25-81. Formerly 16Q-20.09. Transferred from 16Q-20.009.

18-20.010 Exchange of Lands. The board in its discretion may exchange lands for the benefit of the preserve, provided that:

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