



Loxahatchee River- Lake Worth Creek Aquatic Preserve

Management Plan



Florida Department of Environmental Protection
Florida Coastal Office
3900 Commonwealth Blvd., MS #235, Tallahassee, FL 32399
www.aquaticpreserves.org

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June 2018



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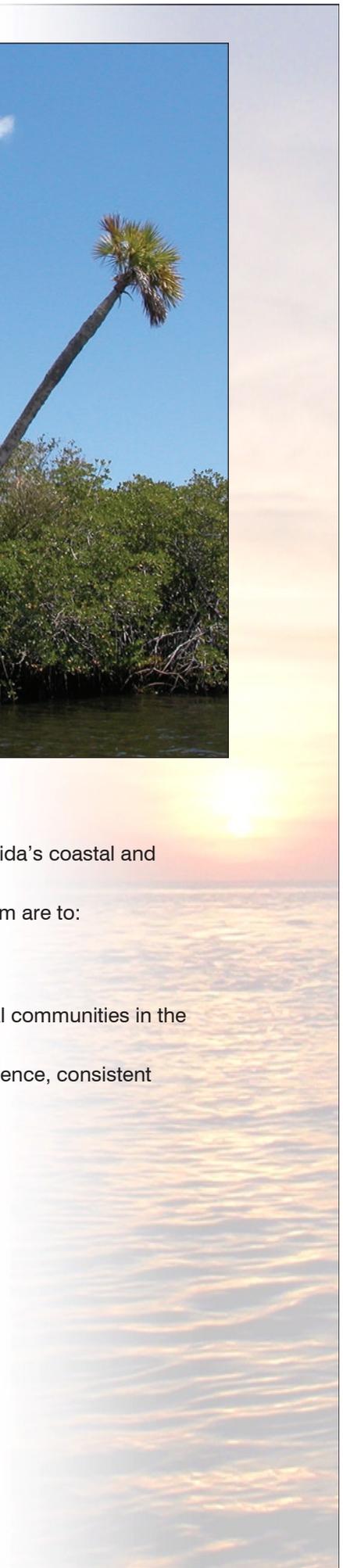


Mission Statement

The Florida Coastal Office's mission statement is: Conserving and restoring Florida's coastal and aquatic resources for the benefit of people and the environment.

The four long-term goals of the Florida Coastal Office's Aquatic Preserve Program are to:

1. protect and enhance the ecological integrity of the aquatic preserves;
2. restore areas to their natural condition;
3. encourage sustainable use and foster active stewardship by engaging local communities in the protection of aquatic preserves; and
4. improve management effectiveness through a process based on sound science, consistent evaluation, and continual reassessment.



Executive Summary

Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan

Lead Agency Florida Department of Environmental Protection's (DEP)
Florida Coastal Office (FCO)

Common Name of Property Loxahatchee River-Lake Worth Creek Aquatic Preserve

Location Martin and Palm Beach counties, Florida.

Acreage Total 1,739 acres

Acreage Breakdown According to Florida Natural Areas Inventory (FNAI) Natural Community Type

FNAI Natural Communities Acreage according to GIS

Blackwater Stream 812 acres

Mangrove Swamp 65 acres

Mollusk Reef 10 acres

Seagrass Bed 152 acres

Unconsolidated Substrate Unknown

Undetermined Estuarine Unknown

Management Agency: DEP's FCO

Designation: Aquatic Preserve, Wild and Scenic River

Unique Features: The Loxahatchee River-Lake Worth Creek area is an important home and nursery for a variety of plants and animals. Located within a rapidly growing urban area, much of the aquatic preserve has been altered and the natural shorelines and habitats have been converted to hardened seawalls and bulkheads, destroying much of the mangrove communities. Changes in hydrology resulted in saltwater intrusion which altered the river's freshwater ecosystems, and untreated runoff has greatly affected the water quality. The upper portion of the Northwest Fork of the Loxahatchee River, approximately 10.3 miles, is federally designated as Wild and Scenic, and has retained much of its natural state, creating a dichotomy between it and the other portions of the river. With the exception of the Jupiter Ridge Natural Area and the Juno Dunes Natural Area, the Lake Worth Creek section of the aquatic preserve is mostly surrounded by residential development, and few natural shorelines persist. This development creates difficulties in managing the resources of the aquatic preserve, as much of the shoreline is privately owned and few natural habitats remain.

Archaeological/ Historical Sites: The Florida Department of State's Division of Historical Resources Master Site File indicates there are archaeological and historical sites within and adjacent to Loxahatchee River-Lake Worth Creek Aquatic Preserve. The archaeological sites include prehistoric middens dating from 1000 BC, while the historic sites include military sites from the Civil War era, a fort and campsite from the second and third Seminole Wars, and Camp Murphy, located within Jonathan Dickinson State Park.

Management Needs (See Management Issues and Goals)

Ecosystem Science Natural resource protection within the aquatic preserve requires collaboration with many different stakeholders located in the area. Fostering strong partnerships among these groups is crucial to the preservation and enhancement of the aquatic preserve. An increase in monitoring of the effects of changes to the watershed as more Everglades Restoration Project components are implemented will be necessary to avoid irreparable damage to the system. Monitoring the aquatic preserve's transition zone, where water changes from fresh to estuarine, and to marine is needed to document ongoing water quality changes associated with these large scale watershed restoration projects.

Resource Management	The aquatic preserve and its watershed have been dramatically altered by historical large scale hydrological modification and more recently by increased urban development. While the northwest fork of the river still maintains most of its natural habitats, the water flow and quality have been significantly altered and have impacted habitats downstream. Changes in salinity caused by the permanent opening of Jupiter Inlet have led to changes from a cypress dominated shoreline to a mangrove dominated shoreline. Water quality degradation from increased, untreated stormwater runoff have impacted seagrass habitats and oyster reefs, which may impact fish communities within the aquatic preserve. Introduction of non-native, invasive species may have detrimental effects on native fish populations, and efforts must be made to reduce the numbers of these invasive species, and to create public awareness of the problem. The management plan will focus on efforts to restore natural habitats, increase stormwater treatment, preserve and enhance remaining natural communities, combat non-native, invasive species, and support Everglades restoration efforts that will help improve water quality and quantity throughout the aquatic preserve.
Education and Outreach	The primary education and outreach management needs are to: 1) better assist the Loxahatchee River District's current education and outreach program through support of their facility, 2) facilitate the understanding of the connection between the upland uses of the areas surrounding the aquatic preserve and their impacts on the river to foster stewardship among local residents, and 3) work with Jonathan Dickinson State Park to increase awareness of the importance of the aquatic preserve and encourage sustainable public use.
Public Use	An ever-growing population in the surrounding areas make the aquatic preserve a very popular area for recreation. Most homes along the aquatic preserve have private docks, and Jonathan Dickinson State Park provides easy access to the remaining natural areas of the river. There is a very strong boating community in the area, not only along the river, but also due to the proximity of the Jupiter Inlet, which provides easy ocean access. Information and data contained within this plan is intended to assist land managers, working closely with other state entities and local governments, to make decisions that will assure a balance between sustainable resource use, waterway management and natural resource protection.
Public Involvement:	Public support is vital to the success of obtaining the goals proposed in this management plan. The goal is to foster understanding of the problems facing these fragile ecosystems and the steps needed to adequately manage this important habitat. Loxahatchee River - Lake Worth Creek Aquatic Preserve staff held public and advisory committee meetings November 14 and 15, 2017 at Jonathan Dickinson State Park, and January 29 and 30, 2018 at Jupiter Community Center to receive input on the draft management plan. An additional public meeting was held in Tallahassee on June 15, 2018 when the Acquisition and Restoration Council reviewed the management plan.

Coastal Zone Management Issues

The state of Florida has more than 19 million residents and more than 100 million visitors annually. Florida has the second longest state coastline, and nowhere else in the country are so many people so close to such an extensive and economically valuable coastline. Within these coastal communities, recreational activities such as boating and fishing shape community culture and provide positive economic growth. However, rapid coastal development, increasing public access, and changing land use patterns are complicating regulation and management efforts within valuable aquatic systems. To protect and enhance the unique coastal resources throughout Florida, a variety of issues that affect water quality, quantity, and growth management must be addressed. Challenges facing Loxahatchee River-Lake Worth Creek Aquatic Preserve include low water quality that is further degraded by unnatural water management practices, habitat shifts caused by water management practices, invasive species entering the river, the need for hands-on resource management, rapid conversion of wetlands to urban developments deemed to have significant regional impact, little understanding of public use trends, and the impacts of public use on the protected resources.

Goals

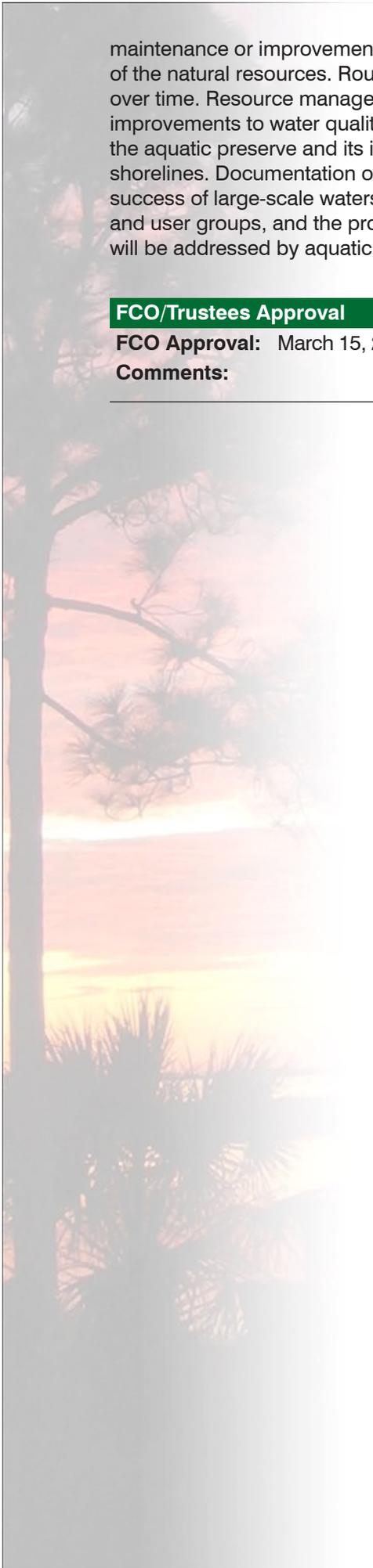
The management goals and associated strategies outlined in this document provide an action plan that will be used to address these challenges over the next decade. Because of limited resources and the overlap of jurisdictional boundaries, success will depend on partnerships formed with private, local, regional, state, and federal organizations and agencies. Partnerships will be formed to promote the

maintenance or improvement of the quality of water reaching the aquatic preserve to meet the needs of the natural resources. Routine assessment of water quality status is required to document change over time. Resource management goals that will improve the state of the aquatic preserve include improvements to water quality and quantity, invasive species removal, education and outreach about the aquatic preserve and its importance to the region, and restoration of hardened shorelines to living shorelines. Documentation of natural resource location and extent will allow managers to evaluate the success of large-scale watershed restoration projects. Maintenance of a safe environment for fish, wildlife, and user groups, and the promotion of low-impact recreational opportunities are also important goals that will be addressed by aquatic preserve staff.

FCO/Trustees Approval

FCO Approval: March 15, 2018 **ARC approval:** June 15, 2018 **Trustees approval:** Dec. 4, 2018

Comments:



Acronym List

Abbreviation	Meaning
CERP	Comprehensive Everglades Restoration Plan
cfs	cubic feet per second
CSO	Citizen Support Organization
DEP	Florida Department of Environmental Protection
DO	dissolved oxygen
EPA	Environmental Protection Agency
F.A.C.	Florida Administrative Code
FCO	Florida Coastal Office
FNAI	Florida Natural Areas Inventory
FOSI	Friends of the Spoil Islands, Inc.
F.S.	Florida Statutes
FTE	Full Time Equivalent
FWC	Florida Fish and Wildlife Conservation Commission
G	Global
GIS	Geographic Information System
HUC	Hydrologic Unit Code
IRL	Indian River Lagoon
IRLAP	Indian River Lagoon Aquatic Preserves
LRD	Loxahatchee River District
MFL	Minimum Flows and Levels
NOAA	National Oceanic and Atmospheric Administration
OFW	Outstanding Florida Water
OPS	Other Personal Services
PAR	Photosynthetically Active Radiation
ppt	parts per thousand
psu	practical salinity unit
PVC	Polyvinyl-chloride
S	State
SFWMD	South Florida Water Management District
SR	State Road
SRP	Shoreline Restoration Project
SSC	Species of Special Concern
STA	Stormwater Treatment Area
TMDL	Total Maximum Daily Loads
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WBID	Waterbody Identification

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A little blue heron foraging on the Wild and Scenic portion of the river.

Part One

Basis for Management

Chapter One

Introduction

The Florida aquatic preserves are administered on behalf of the state by the Florida Department of Environmental Protection's (DEP) Florida Coastal Office (FCO) as part of a network that includes 41 aquatic preserves, three National Estuarine Research Reserves (NERRs), a National Marine Sanctuary, Coral Reef Conservation Program, Florida Coastal Management Program, Outer Continental Shelf Program, the Clean Marinas and Clean Vessels Act Program, and the Florida Resilient Coastlines Program. This provides for a system of significant protections to ensure that our most popular and ecologically important underwater ecosystems are cared for in perpetuity. Each of these special places is managed with strategies based on local resources, issues and conditions.

Our extensive coastline and wealth of aquatic resources have defined Florida as a subtropical oasis, attracting millions of residents and visitors, and the businesses that serve them. Florida's submerged lands play important roles in maintaining good water quality, hosting a diversity of wildlife and habitats (including economically and ecologically valuable nursery areas), and supporting a treasured quality of life for all. In the 1960s, it became apparent that the ecosystems that had attracted so many people to Florida could not support rapid growth without science-based resource protection and management. To this end, state legislators provided extra protection for certain exceptional aquatic areas by designating them as aquatic preserves.

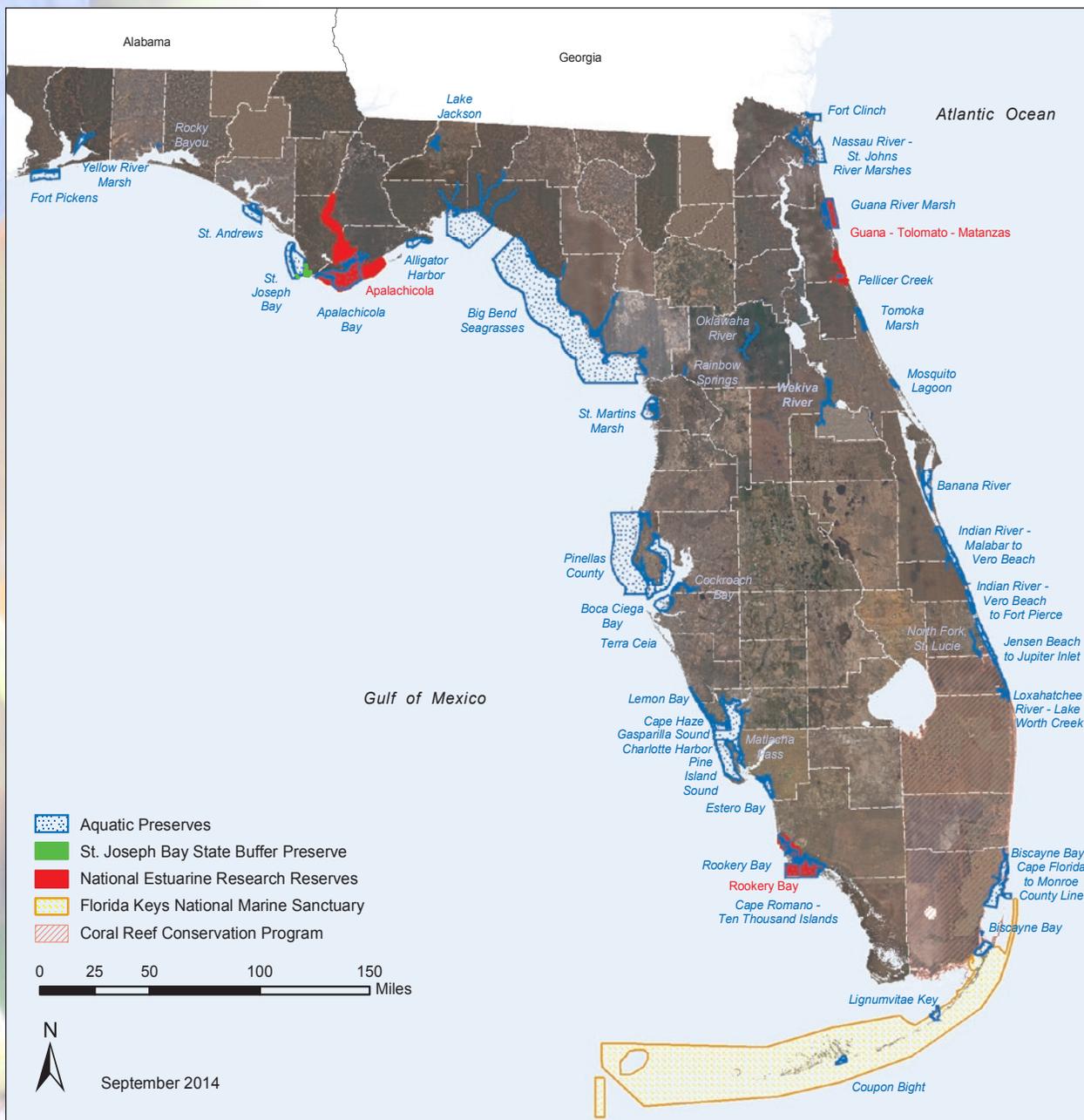
Title to submerged lands not conveyed to private landowners is held by the Board of Trustees of the Internal Improvement Trust Fund (the Trustees). The Governor and Cabinet, sitting as the Trustees, act as guardians for the people of the State of Florida (§253.03, Florida Statutes [F.S.]) and regulate the use of these public lands. Through statute, the Trustees have the authority to adopt rules related to the management of sovereignty submerged lands (Florida Aquatic Preserve Act of 1975, §258.36, F.S.).

A higher layer of protection is afforded to aquatic preserves including areas of sovereignty lands that have been “set aside forever as aquatic preserves or sanctuaries for the benefit of future generations” due to “exceptional biological, aesthetic, and scientific value” (Florida Aquatic Preserve Act of 1975, §258.36, F.S.).

The tradition of concern and protection of these exceptional areas continues, and now includes: the Rookery Bay NERR in Southwest Florida, designated in 1978; the Apalachicola NERR in Northwest Florida, designated in 1979; and the Guana Tolomato Matanzas NERR in Northeast Florida, designated in 1999. In addition, the Florida Oceans and Coastal Council was created in 2005 to develop Florida’s ocean and coastal research priorities, and establish a statewide ocean research plan. The group also coordinates public and private ocean research for more effective coastal management. This dedication to the conservation of coastal and ocean resources is an investment in Florida’s future.

1.1 / Management Plan Purpose and Scope

Florida’s aquatic resources are at risk for both direct and indirect impacts from increasing development and recreational use, as well as resulting economic pressures, such as energy generation and increased fish and shellfish harvesting to serve and support the growing population. These potential impacts to



Map 1 / Florida Coastal Office system.



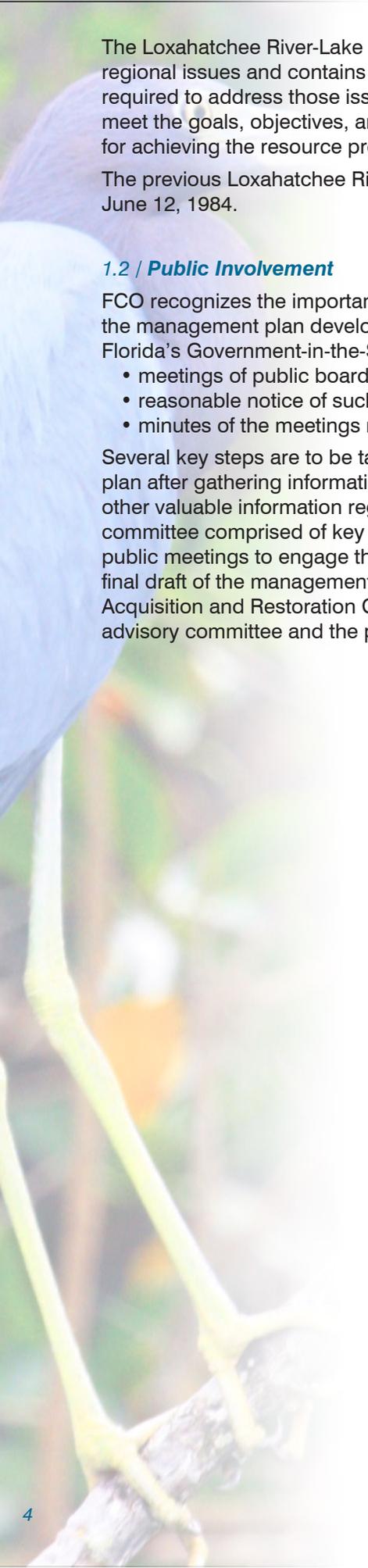
Kayaking is one of the best ways to visit the aquatic preserve.

resources can reduce the health and viability of the ecosystems that contain them, requiring active management to ensure the long-term health of the entire network. Effective management plans for the aquatic preserves are essential to address this goal and each site's own set of unique challenges. The purpose of these plans is to incorporate, evaluate and prioritize all relevant information about the site into a cohesive management strategy, allowing for appropriate access to the managed areas while protecting the long-term health of the ecosystems and their resources.

The mandate for developing aquatic preserve management plans is outlined in Section 18-20.013 and Subsection 18-18.013(2) of the Florida Administrative Code (F.A.C.). Management plan development and review begins with the collection of resource information from historical data, research and monitoring, and includes input from individual FCO managers and staff, area stakeholders, and members of the general public. The statistical data, public comment, and cooperating agency information is then used to identify management issues and threats affecting the present and future integrity of the site, its boundaries, and adjacent areas. The information is used in the development and review of the management plan, which is examined for consistency with the statutory authority and intent of the Aquatic Preserve Program. Each management plan is evaluated periodically and revised as necessary to allow for strategic improvements. Intended to be used by site managers and other agencies or private groups involved with maintaining the natural integrity of these resources, the plan includes scientific information about the existing conditions of the site and the management strategies developed to respond to those conditions.

To aid in the analysis and development of the management strategies for the site plans, the FCO identified four comprehensive management programs applicable to all aquatic preserves. To address the goals, objectives, integrated strategies and performance measures of the four programs, relevant information about the specific site has been collected, analyzed and compiled to provide a foundation for development of the management plan. While it is expected that unique issues may arise with regard to resource or management needs of a particular site, the following management programs will remain constant across the resource protection network:

- Ecosystem Science
- Resource Management
- Education and Outreach
- Public Use



The Loxahatchee River-Lake Worth Creek Aquatic Preserve management plan identifies unique local and regional issues and contains the goals, objectives, integrated strategies, and performance measures required to address those issues. The plan will also identify the program and facility needs required to meet the goals, objectives, and strategies of the management plan. These components are key elements for achieving the resource protection mission of the aquatic preserve.

The previous Loxahatchee River-Lake Worth Creek Aquatic Preserve management plan was approved June 12, 1984.

1.2 / Public Involvement

FCO recognizes the importance of stakeholder participation and encourages their involvement in the management plan development process. FCO is also committed to meeting the requirements of Florida's Government-in-the-Sunshine Law (§286.011, F.S.), including:

- meetings of public boards or commissions must be open to the public;
- reasonable notice of such meetings must be given; and
- minutes of the meetings must be recorded.

Several key steps are to be taken during management plan development. First, staff compose a draft plan after gathering information of current and historic uses; resource, cultural and historic sites; and other valuable information regarding the property and surrounding area. Staff then organize an advisory committee comprised of key stakeholders, and conduct, in conjunction with the advisory committee, public meetings to engage the stakeholders for feedback on the draft plan and the development of the final draft of the management plan. Additional public meetings are held when the plan is reviewed by the Acquisition and Restoration Council and the Trustees for approval. For additional information about the advisory committee and the public meetings refer to Appendix C - Public Involvement.



Emergent aquatic vegetation can be found in the upper portions of the river, where salinities are low.

Chapter Two

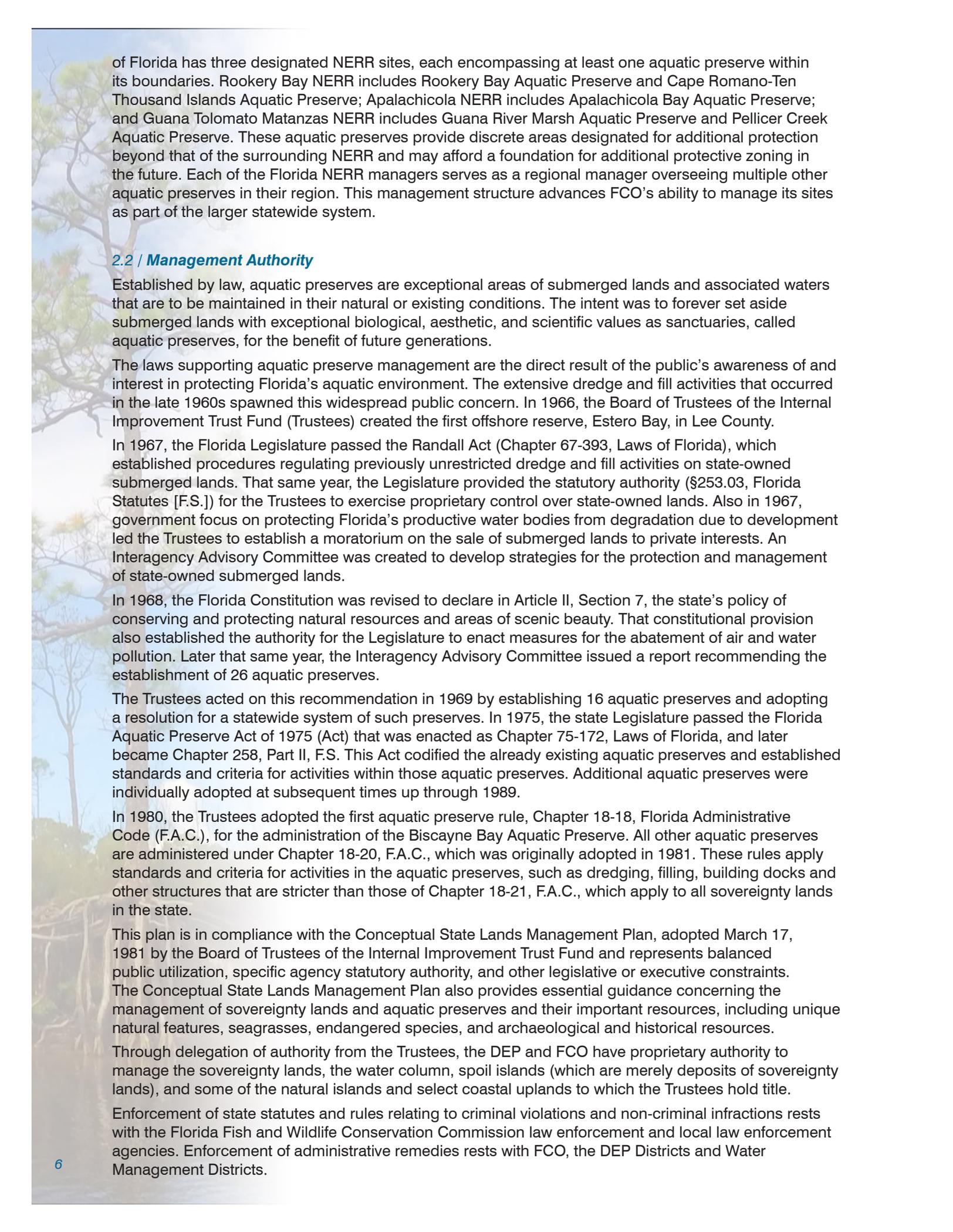
The Florida Department of Environmental Protection's Florida Coastal Office

2.1 / Introduction

The Florida Department of Environmental Protection (DEP) protects, conserves and manages Florida's natural resources and enforces the state's environmental laws. The DEP is the lead agency in state government for environmental management and stewardship and commands one of the broadest charges of all the state agencies, protecting Florida's air, water and land. The DEP is divided into three primary areas: Regulatory Programs, Land and Recreation, and Ecosystem Restoration. Florida's environmental priorities include restoring America's Everglades; improving air quality; restoring and protecting the water quality in our springs, lakes, rivers and coastal waters; conserving environmentally-sensitive lands; and providing citizens and visitors with recreational opportunities, now and in the future.

The Florida Coastal Office (FCO) is the unit within the DEP that manages more than four million acres of submerged lands and select coastal uplands. This includes 41 aquatic preserves, three National Estuarine Research Reserves (NERRs), the Florida Keys National Marine Sanctuary as well as providing management support through the Coral Reef Conservation Program, the Clean Marinas and Clean Vessels Act Program, the Florida Resilient Coastlines Program, the Outer Continental Shelf Program, and the Coral Reef Conservation Program. The three NERRs, the Florida Keys National Marine Sanctuary, and the Coral Reef Conservation Program are managed in cooperation with the National Oceanic and Atmospheric Administration (NOAA).

FCO manages sites in Florida for the conservation and protection of natural and historical resources and resource-based public use that is compatible with the conservation and protection of these lands. FCO is a strong supporter of the NERR system and its approach to coastal ecosystem management. The State



of Florida has three designated NERR sites, each encompassing at least one aquatic preserve within its boundaries. Rookery Bay NERR includes Rookery Bay Aquatic Preserve and Cape Romano-Ten Thousand Islands Aquatic Preserve; Apalachicola NERR includes Apalachicola Bay Aquatic Preserve; and Guana Tolomato Matanzas NERR includes Guana River Marsh Aquatic Preserve and Pellicer Creek Aquatic Preserve. These aquatic preserves provide discrete areas designated for additional protection beyond that of the surrounding NERR and may afford a foundation for additional protective zoning in the future. Each of the Florida NERR managers serves as a regional manager overseeing multiple other aquatic preserves in their region. This management structure advances FCO's ability to manage its sites as part of the larger statewide system.

2.2 / *Management Authority*

Established by law, aquatic preserves are exceptional areas of submerged lands and associated waters that are to be maintained in their natural or existing conditions. The intent was to forever set aside submerged lands with exceptional biological, aesthetic, and scientific values as sanctuaries, called aquatic preserves, for the benefit of future generations.

The laws supporting aquatic preserve management are the direct result of the public's awareness of and interest in protecting Florida's aquatic environment. The extensive dredge and fill activities that occurred in the late 1960s spawned this widespread public concern. In 1966, the Board of Trustees of the Internal Improvement Trust Fund (Trustees) created the first offshore reserve, Estero Bay, in Lee County.

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 provided the statutory authority (§253.03, Florida Statutes [F.S.]) for the Trustees to exercise proprietary control over state-owned lands. Also in 1967, government focus on protecting Florida's productive water bodies from degradation due to development led the Trustees to establish a moratorium on the sale of submerged lands to private interests. An Interagency Advisory Committee was created to develop strategies for the protection and management of state-owned submerged lands.

In 1968, the Florida Constitution was revised to declare in Article II, Section 7, the state's policy of conserving and protecting natural resources and areas of scenic beauty. That constitutional provision also established the authority for the Legislature to enact measures for the abatement of air and water pollution. Later that same year, the Interagency Advisory Committee issued a report recommending the establishment of 26 aquatic preserves.

The Trustees acted on this recommendation in 1969 by establishing 16 aquatic preserves and adopting a resolution for a statewide system of such preserves. In 1975, the state Legislature passed the Florida Aquatic Preserve Act of 1975 (Act) that was enacted as Chapter 75-172, Laws of Florida, and later became Chapter 258, Part II, F.S. This Act codified the already existing aquatic preserves and established standards and criteria for activities within those aquatic preserves. Additional aquatic preserves were individually adopted at subsequent times up through 1989.

In 1980, the Trustees adopted the first aquatic preserve rule, Chapter 18-18, Florida Administrative Code (F.A.C.), for the administration of the Biscayne Bay Aquatic Preserve. All other aquatic preserves are administered under Chapter 18-20, F.A.C., which was originally adopted in 1981. These rules apply standards and criteria for activities in the aquatic preserves, such as dredging, filling, building docks and other structures that are stricter than those of Chapter 18-21, F.A.C., which apply to all sovereignty lands in the state.

This plan is in compliance with the Conceptual State Lands Management Plan, adopted March 17, 1981 by the Board of Trustees of the Internal Improvement Trust Fund and represents balanced public utilization, specific agency statutory authority, and other legislative or executive constraints. The Conceptual State Lands Management Plan also provides essential guidance concerning the management of sovereignty lands and aquatic preserves and their important resources, including unique natural features, seagrasses, endangered species, and archaeological and historical resources.

Through delegation of authority from the Trustees, the DEP and FCO have proprietary authority to manage the sovereignty lands, the water column, spoil islands (which are merely deposits of sovereignty lands), and some of the natural islands and select coastal uplands to which the Trustees hold title.

Enforcement of state statutes and rules relating to criminal violations and non-criminal infractions rests with the Florida Fish and Wildlife Conservation Commission law enforcement and local law enforcement agencies. Enforcement of administrative remedies rests with FCO, the DEP Districts and Water Management Districts.

2.3 / **Statutory Authority**

The fundamental laws providing management authority for the aquatic preserves are contained in Chapters 258 and 253, F.S. These statutes establish the proprietary role of the Governor and Cabinet, sitting as the Board of Trustees of the Internal Improvement Trust Fund, as Trustees over all sovereignty lands. In addition, these statutes empower the Trustees to adopt and enforce rules and regulations for managing all sovereignty lands, including aquatic preserves. The Florida Aquatic Preserve Act was enacted by the Florida Legislature in 1975 and is codified in Chapter 258, F.S.

The legislative intent for establishing aquatic preserves is stated in Section 258.36, F.S.: “It is the intent of the Legislature that the state-owned submerged lands in areas which have exceptional biological, aesthetic, and scientific value, as hereinafter described, be set aside forever as aquatic preserves or sanctuaries for the benefit of future generations.” This statement, along with the other applicable laws, provides a foundation for the management of aquatic preserves. Management will emphasize the preservation of natural conditions and will include lands that are statutorily authorized for inclusion as part of an aquatic preserve.

Management responsibilities for aquatic preserves may be fulfilled directly by the Trustees or by staff of the DEP through delegation of authority. Other governmental bodies may also participate in the management of aquatic preserves under appropriate instruments of authority issued by the Trustees. FCO staff serves as the primary managers who implement provisions of the management plans and rules applicable to the aquatic preserves. FCO does not “regulate” the lands per se; rather, that is done primarily by the DEP Districts (in addition to the Water Management Districts) which grant regulatory permits. The Florida Department of Agriculture and Consumer Services through delegated authority from the Trustees, may issue proprietary authorizations for marine aquaculture within the aquatic preserves and regulates all aquaculture activities as authorized by Chapter 597, Florida Aquaculture Policy Act, F.S. Staff evaluates proposed uses or activities in the aquatic preserve and assesses the possible impacts on the natural resources. Project reviews are primarily evaluated in accordance with the criteria in the Act, Chapter 18-20, F.A.C., and this management plan.

Comments of FCO staff, along with comments of other agencies and the public are submitted to the appropriate permitting staff for consideration in their issuance of any delegated authorizations in aquatic preserves or in developing recommendations to be presented to the Trustees. This mechanism provides a basis for the Trustees to evaluate public interest and the merits of any project while also considering potential environmental impacts to the aquatic preserves. Any activity located on sovereignty lands requires a letter of consent, a lease, an easement, or other approval from the Trustees.

Florida Statutes that authorize and empower non-FCO programs within DEP or other agencies may also be important to the management of FCO sites. For example, Chapter 403, F.S., authorizes DEP to adopt rules concerning the designation of “Outstanding Florida Waters” (OFWs), a program that provides aquatic preserves with additional regulatory protection. Chapter 379, F.S., regulates saltwater fisheries, and provides enforcement authority and powers for law enforcement officers. Additionally, it provides similar powers relating to wildlife conservation and management. The sheer number of statutes that affect aquatic preserve management prevents an exhaustive list of all such laws from being provided here.

2.4 / **Administrative Rules**

Chapters 18-18, 18-20 and 18-21, F.A.C., are the three administrative rules directly applicable to the uses allowed in aquatic preserves specifically and sovereignty lands generally. These rules are intended to be cumulative, meaning that Chapter 18-21 should be read together with Chapter 18-18 or Chapter 18-20 to determine what activities are permissible within an aquatic preserve. If Chapter 18-18 or Chapter 18-20 are silent on an issue, Chapter 18-21 will control; if a conflict is perceived between the rules, the stricter standards of Chapter 18-18 or Chapter 18-20 supersede those of Chapter 18-21. Because Chapter 18-21 concerns all sovereignty lands, it is logical to discuss its provisions first.

Originally codified in 1982, Chapter 18-21, F.A.C., is meant “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; to insure maximum benefit and use of sovereignty lands for all the citizens of Florida; 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; to manage and provide maximum protection for all sovereignty lands, especially those important to public drinking water supply, shellfish harvesting, public recreation, and fish and wildlife propagation and management; 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 to aid in the implementation of the State Lands Management Plan.”

To that end, Chapter 18-21, F.A.C., contains provisions on general management policies, forms of authorization for activities on sovereignty lands, and fees applicable for those activities. In the context of the rule, the term “activity” includes “construction of docks, piers, boat ramps, boardwalks, mooring pilings, dredging of channels, filling, removal of logs, sand, silt, clay, gravel or shell, and the removal or planting of vegetation” (Rule 18-21.003, F.A.C.). In addition, activities on sovereignty submerged lands must be not contrary to the public interest (Rule 18-21.004, F.A.C.). Chapter 18-21 also sets policies on aquaculture, geophysical testing (using gravity, shock wave and other geological techniques to obtain data on oil, gas or other mineral resources), and special events related to boat shows and boat displays. Of particular importance to FCO site management, the rule also addresses spoil islands, preventing their development in most cases.

Chapters 18-18 and 18-20, F.A.C., apply standards and criteria for activities in the aquatic preserves that are stricter than those of Chapter 18-21. Chapter 18-18 is specific to the Biscayne Bay Aquatic Preserve and is more extensively described in that site’s management plan. Chapter 18-20 is applicable to all other aquatic preserves. It further restricts the type of activities for which authorizations may be granted for use of sovereignty lands and requires that structures that are authorized be limited to those necessary to conduct water dependent activities. Moreover, for certain activities to be authorized, “it must be demonstrated that no other reasonable alternative exists which would allow the proposed activity to be constructed or undertaken outside the preserve” (Paragraph 18-20.004(1)(g), F.A.C.).

Chapter 18-20, F.A.C., expands on the definition of “public interest” by outlining a balancing test that is to be used to determine whether benefits exceed costs in the evaluation of requests for sale, lease, or transfer of interest of sovereignty lands within an aquatic preserve. The

rule also provides for the analysis of the cumulative impacts of a request in the context of prior, existing, and pending uses within the aquatic preserve, including both direct and indirect effects. The rule directs management plans and resource inventories to be developed for every aquatic preserve. Further, the rule provides provisions specific to certain aquatic preserves and indicates the means by which the Trustees can establish new or expand existing aquatic preserves.

Aquatic preserve management relies on the application of many other DEP and outside agency rules. Perhaps most notably, Chapter 62-302, F.A.C., concerns the classification of surface waters, including criteria for OFW, a designation that provides for the state’s highest level of protection for water quality. All aquatic preserves contain OFW designations. No activity may be permitted within an OFW that degrades ambient water quality unless the activity is determined to be in the public interest. Once again, the list of other administrative rules that do not directly address FCO’s responsibilities but do affect FCO-managed areas is so long as to be impractical to create within the context of this management plan.

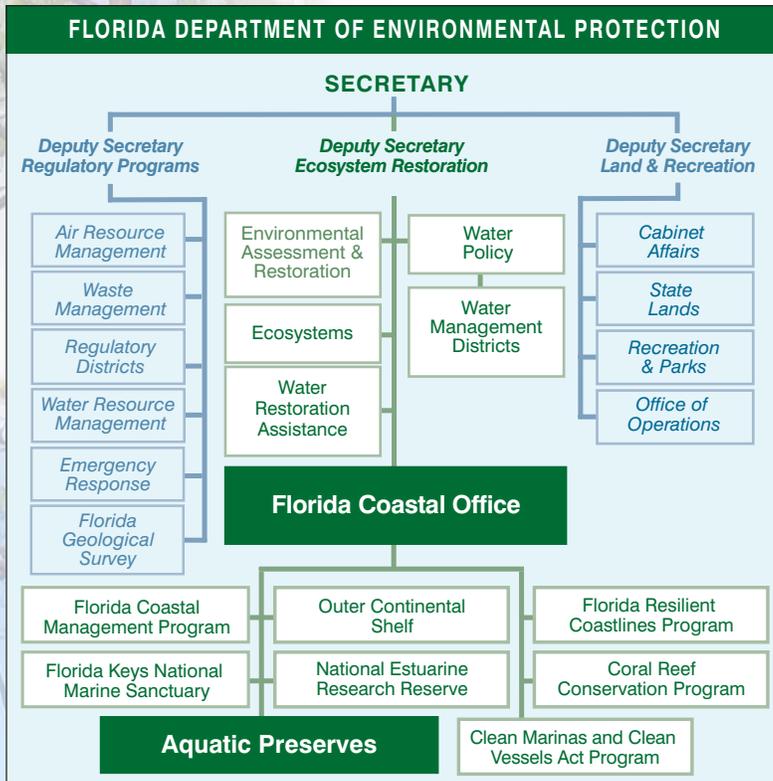


Figure 1 | State management structure.



The name Loxahatchee is derived from two Seminole words “Lowchow” (turtle) and “Hatchee” (river) signifying ‘Turtle River.’

Chapter Three

Loxahatchee River-Lake Worth Creek Aquatic Preserve

3.1 / Historical Background

During the 1500s, early European exploration spread into the west by ambitious explorers such as Ponce de Leon and Menendez as they traveled from Cuba and forged north along the Florida coast. Their exploration led them to present-day Jupiter Inlet and the Loxahatchee River area (Palm Beach County, 2016; LoxahatcheeRiver.net, n.d.). Although not all succeeded in bringing the riches of exploration back to home port, as was the case with San Miguel de Archangel, a Spanish ‘aviso’ or dispatch ship which sunk off Jupiter Inlet in December 1659. Discovered in 12 feet of water, about 200 yards off Jupiter Beach by lifeguard Peter Leo on July 13, 1987, the ship had sailed from Cartagena, Colombia, bound for Spain and carried samples of silver ingots and coins. The 33 survivors were rescued by a boat sent from St. Augustine and taken to Havana. Artifacts from this ship are on display at the Jupiter Inlet Lighthouse and Museum (Jupiter Inlet Lighthouse & Museum, n.d.). Among other ships that met a similar fate was the notable English-born merchant ship, the Reformation.

On September 23, 1696, while in route from Port Royal, Jamaica to Philadelphia, Pennsylvania, the Reformation, captained by Jonathan Dickinson, became shipwrecked five miles north of the Jupiter Inlet (Andrews & Andrews, 1945; Forshay, 1967). Himself, his family, and 21 other passengers, including 12 slaves were held captive by the Jobe Indians that called the Loxahatchee River area home. This event was of historical importance, as Dickinson kept a journal during his time in captivity describing the culture and tribal life of the natives, along with original descriptions of the Loxahatchee River area (DuBois, 1981).

Within 250 years of Juan Ponce de León’s exploration of the Florida coastline, the early tribes were gone. Some were killed in warfare or enslaved; most died from European diseases, for which they had no resistance. When Florida’s original population of natives decreased, groups of Lower and Upper Creeks, also known as Muscogeans, moved into Florida from Alabama and Georgia, resulting in two dominant tribes, the Miccosukees and the Seminoles, separated by their languages. The Miccosukees’ language descended from the Lower Creeks, while the Seminoles’ language came from the Upper Creeks (Palm



The Jupiter Inlet lighthouse was completed in 1860.

Beach County History Online, n.d.) Today there are two sovereign tribes speaking very different languages in Florida who practice modern lifestyles while preserving a rich adaptive culture – the Seminole Tribe of Florida and the Miccosukee Tribe of Indians of Florida. In 1957, the U.S. government recognized them as “The Seminole Tribe of Florida.” Some of the Miccosukees maintained a separate identity and as such received federal recognition in 1962 as “The Miccosukee Tribe of Indians of Florida” (Jupiter Inlet Lighthouse & Museum, n.d.). The name Loxahatchee is derived from the two Seminole words, “Lowchow” (turtle) and “Hatchee” (river).

By the mid-1800s, the U.S government was instituting the removal of Native Americans from their lands, including Seminoles and others which called the Loxahatchee River home (Florida Memory, n.d.). Subsequently, a failed exploration by Lt. L.M. Powell resulted in a battle along the Northwest Fork of the Loxahatchee River. (The location has been commemorated with a historical marker at Riverbend Park, entitled “Powell’s Battle.”) This attack prompted a large military engagement between the native Seminole tribe and the commanding officer of the U.S forces, General T.S. Jesup (DuBois, 1981). On January 24, 1838, the Battle of the Loxahatchee took place between General Jesup’s forces and the local Seminole tribe at the headwaters of the Loxahatchee River (near present day Indiantown Road, where a marker entitled “Jesup’s Battle” denotes the location.) Though the general was successful in scattering the warriors, Jesup’s forces suffered heavy casualties. The battle and General Jesup’s continued presence contributed to the conclusion of the Second Seminole War of 1835-1842 by pushing the Native American tribes deep into the Everglades and relocating surrendered Seminoles to reservations in Oklahoma (Gissendanner, 1984). The engagement forced the U.S government to construct Fort Jupiter shortly after. Upon General Jesup’s return to Washington, D.C, he pleaded with President Martin Van Buren to leave the lands to the natives as it was viewed as uninhabitable terrain and was promised under the Treaty of Payne’s Landing in 1832 and the Treaty of Fort Gibson in 1833 (Florida Memory, n.d.). President Van Buren refused Jesup’s plea and stated that he would not waiver from Jackson’s desire to remove all Indians west of the Mississippi River. Jesup once again assembled his army to pursue the largest resistance groups. But in April 1838, General Jesup was recalled to his quartermaster post in Washington and his command was turned over to future president Zachary Taylor (Florida Memory, n.d.).

In 1853, Congress authorized the building of a lighthouse at Jupiter Inlet. The Jupiter Lighthouse was constructed on a parcel of land that was later established as a military reservation in 1855 (Fort Jupiter Military Reservation), which included a significant portion of the Loxahatchee River (DuBois, 1981). The

construction was complicated, as building materials were not easily brought to port due to the fluctuations of the Jupiter Inlet which opened and closed due to differing seasonal effects and natural disturbances. The lighthouse operated for only a short time before the onset of the Civil War. The Confederate soldiers removed the lighting mechanism to conceal the location of the Jupiter Inlet from nightly Union patrols. After the conclusion of the war in 1868, James Arango Armour became the “Head Keeper” of the Jupiter lighthouse holding the position for more than 40 years. From 1860 to 1939, more than 70 different keepers served for some period of time at the Jupiter Inlet Lighthouse. In 1939, the civilian lighthouse service merged with the Coast Guard. Keeper Charles Seabrook and his assistants chose to enlist in the Coast Guard. Military personnel remained keepers of the lighthouse until its automation in 1987. The lighthouse remains an active Public Aid to Navigation, with one of only 13 active 1st Order Fresnel lenses in the entire United States (Jupiter Inlet Lighthouse & Museum, n.d.).

With the ending of the Civil War, the Fort Jupiter Military Reservation was abandoned, and many settlers welcomed the opportunity for the land to be opened for homesteading (DuBois, 1981). In July 1884, the Senate opened portions of Fort Jupiter Military Reservation for homesteading with preferences given to those settlers that had been living on the reservation already. On February 13, 1886, Susan Kitching of Bewaley, England homesteaded 37 acres of land (known today as Kitching Creek) at a cost of \$1.25 per acre.

Homesteading allowed the communities between the Loxahatchee River and Lake Worth to grow, but commerce between towns was at a relatively slow rate. The slow rate was due in part because of the difficulties traversing the terrain to reach isolated small towns such as Jupiter and Juno. For much of the late 1800s the only way to travel around the Loxahatchee area was either by river via paddle, steam, sail boats, or a system of wagons and pull carts, referred to by locals as “Ox Trains” (Shappee, 1962). This provided the necessary demand for a railroad presence to enter the area.

The Jupiter and Lake Worth Railway began operation in 1889. The railways were a mere 7.5 miles, connecting the towns of Jupiter and Juno while making the occasional stops at the stations of Mars and Venus to take on more passengers and freight. This smaller railroad only traveled one way, and as it reached the town of Lake Worth, it would just return to Jupiter in reverse. When out of town passengers from the north sought the remote offerings of south Florida, many could not help but notice how the railway schedule read, so they fittingly dubbed the Jupiter and Lake Worth Railway the “Celestial Railroad” (Shappee, 1962). The Celestial Railroad enjoyed only a short period of prosperity before a railroad tycoon named Henry Flagler also realized the opportunity at hand.

In 1892, Flagler received a charter from the state of Florida to construct a railway from Daytona along the Indian River (Henry Morrison Flagler Museum, 2016). Flagler witnessed firsthand how remote and removed the towns of the southeast coast were. Flagler was heavily dependent upon the Celestial Railroad for the delivery of construction equipment and goods to build his railroad as well as a hotel, the Royal Poinciana, along the eastern shore of Lake Worth (today’s Palm Beach) (Shappee, 1962). This dependency allowed the owners of the Celestial Railroad to enjoy the largest profits it would ever receive. The owners of the Celestial Railroad and the residents of the Jupiter and the Lake Worth area were aware of the difficult topography and swampy flatlands west of Lake Worth and knew what a demanding, if not impossible, project it would be to complete. They hoped that Flagler would decide to cut his losses and leave.

The owners of the Celestial Railroad increased the cost of freight on Flagler, knowing he would have to continue paying until the completion of the tracks or stop construction and leave. Nevertheless, in 1894, Flagler completed the project by constructing the first railroad trestle bridge across the Loxahatchee River west of Jupiter, allowing a direct track into the town of West Palm Beach (Henry Morrison Flagler Museum, 2016). This removed the necessity to pass through towns such as Juno, Mars, and Venus, inevitably guaranteeing the end of the Celestial Railroad and that of the towns as well. The Celestial Railroad went bankrupt and was dismantled in 1896. The courthouse of Juno was relocated to Miami in 1899, and the failing town fell victim to a massive fire (Shappee, 1962), speeding the decline of the older region around the Loxahatchee River in favor of the Palm Beach-West Palm Beach area.

Between the years of 1890 and 1900, several construction projects were undertaken in the Jupiter – Loxahatchee River area, including the building of George Tindall’s home along the Loxahatchee River in 1892 (today’s Palm Point) (Gissendanner, 1984). This is considered the oldest pioneering home in the Jupiter area. The Tindall House was acquired by the Loxahatchee River Historical Society in 1997. It was restored in 2009, and can be visited at the Jupiter Inlet Lighthouse and Museum which is operated by the Loxahatchee River Historical Society (Jupiter Inlet Lighthouse & Museum, n.d.).

Another notable family home, the DuBois Pioneer Home, was constructed in 1898 atop the Indian middens located on the southern shores of Jupiter Inlet (today’s DuBois Park). This home is listed on the National Register of Historic Places and is the second oldest existing home in Palm Beach County. The donations



The bridge is owned and operated by the Florida East Coast Railway.

and contributions from the DuBois family have provided the Loxahatchee River community the opportunity to preserve its local history as well as aiding in the conservation of its natural flora and fauna. The house is located in DuBois Park, and is managed by Palm Beach County Parks and Recreation Department, which provide tours of the home (Palm Beach County, n.d.-c).

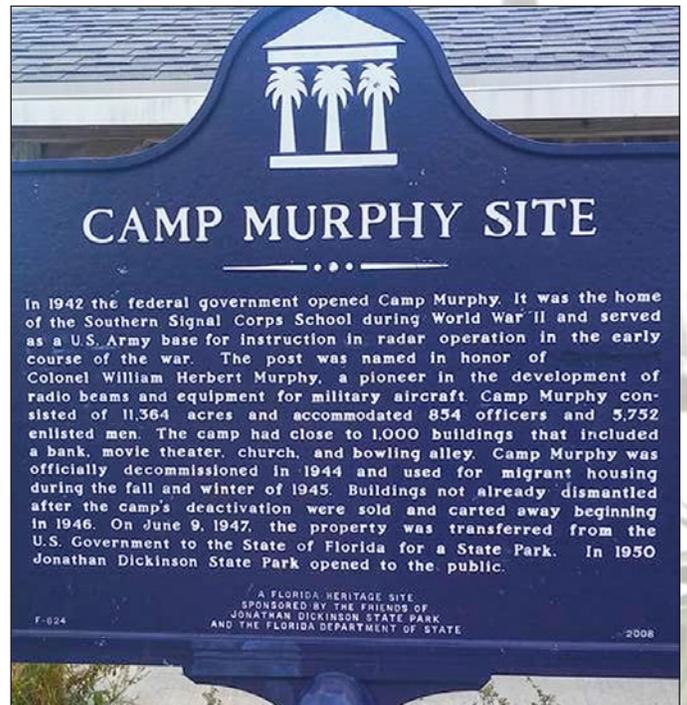
The Jupiter Inlet of today, located at the northern end of Palm Beach County connecting the Loxahatchee River to the Atlantic Ocean, experienced many changes to its hydrology and natural flow in the late 1800s (McPherson, Sabanskas, & Long, 1982). The terrestrial construction projects between 1890 and 1900 coincided with large-scale aquatic construction projects. The East Coast Canal Company was tasked with the dredging of the East Coast Canal, now known as the Intracoastal Waterway. During the conclusion of the Celestial Railroad and the expansion of Flagler's railroad into West Palm Beach, the East Coast Canal Company reached Jupiter Inlet in 1890 (Treasure Coast Regional Planning Council, 2009).

In 1896, a canal was excavated which connected Jupiter Sound to the headwaters of Lake Worth Creek. Continuing their dredging operations south towards Lake Worth, the East Coast Canal Company experienced difficulty making the cut alongside the creek, but ultimately completed the Jupiter Lake Worth section in 1898 (Treasure Coast Regional Planning Council, 2009). This section of the East Coast Canal was of strategic importance as it provided a water avenue and safe passage for commerce between the towns from Titusville to Key West. The passage of the National River and Harbors Appropriations Acts of 1882, 1884, 1899, and later in 1927, put an end to the privateering and collection of tolls along the waterway. In addition, the act made the damming of rivers illegal without the approval of the U.S. Army Corps of Engineers. This act is one of the oldest federal environmental laws in the United States.

During the early 1900s, Jupiter Inlet experienced periodic openings and closings due in part to water diversion as a result of the construction of the East Coast Canal (McPherson, Sabanskas, & Long, 1982). The Jupiter Inlet District was developed through a special act of Florida State Legislation in 1921 and tasked with the management of the Jupiter Inlet and Loxahatchee River. In 1922, the Jupiter Inlet District implemented a plan to dredge and construct two jetties, 300-feet long by 300-feet wide (Palm Beach County, 2016). Despite extensions of the jetties along with additional rocky material for reinforcement and the continued dredging efforts, periodic shoaling and closing of the inlet recurred (Palm Beach County, 2016). This behavior continued until 1942 when the channel experienced another closure and remained that way until the conclusion of World War II, when it was permanently stabilized for navigation in 1947.

During the periodic opening and closing of the Jupiter Inlet, an intriguing local character was making his mark in the narrow waters of the Loxahatchee River. Vincent “Trapper” Nelson entered the Loxahatchee area via railcar during the 1920s (DuBois, 1981). He was known as a local legend, trapping and making his living off the lands alongside and within the Loxahatchee River. He spent many years as an animal trapper and fur trader, living a self-sufficient life with no electricity or city water. Trapper Nelson, the famous ‘Wildman of the Loxahatchee,’ slowly converted his homestead into a tourist attraction after World War II. Visitors from around the world came to see the legendary Trapper, as he handled poisonous snakes and wrestled alligators. Visitors could buy souvenirs, rent rowboats or stay overnight in one of Trapper’s cabins (Florida Department of Environmental Protection [DEP], n.d.-b). Following his death, his heirs sold approximately 857 acres of Trapper’s property, which bordered the Northwest Fork, to Jupiter Hills Club. Jupiter Hills Club agreed with the state of Florida to swap Trapper’s property with the land they desired for a golf course, saving the south side of the Northwest Fork from River Mile 6.0 to 11.0 from being developed. In 1985, the MacArthur Foundation donated to the South Florida Water Management District (SFWMD) several tracts of property south of the former Trapper Nelson property to Indiantown Road extending protection of the Northwest Fork to River Mile 16 on both sides of the river. The SFWMD also purchased small land parcels and Palm Beach County worked with other land owners to implement density changes and land exchanges (DEP & SFWMD, 2010).

The U.S government utilized the Loxahatchee River and Jupiter Inlet during the course of World War II. In 1942, Camp Murphy was opened and commissioned as the home of the Southern Signal Corps School and as an army base for the purpose of instructing the enlisted with radar operations. Camp Murphy was a large base, consisting of more than 11,000 acres and in excess of 6,000 enlisted men (DEP, 2012). The camp was not the only military presence in the Loxahatchee River area. The Naval Radio Station Jupiter was originally established in 1905. In 1939-1940 it was converted to the Communications Radio Intelligence Unit and Radio Direction Finding Station, known as Station J (Historical Society of Palm Beach County, 2009b). Station J was based on the Jupiter Lighthouse grounds and tasked with the monitoring of extremely high-frequency direction finding (HF/DF “Huff Duff”) radio communications that German U-boats stationed outside the Jupiter Inlet were using at the time. By 1943, the station consisted of more than 90 individuals and was successful in defending allied ships from German U-boats by intercepting and locating many of the submarines which would surface every night to charge their batteries. This strategy contributed to the sinking of more than 60 German U-boats during the summer of 1943 (Historical Society of Palm Beach



Top: The homestead and zoological park of Trapper Nelson (also known as Tarzan of the Loxahatchee) was built along the narrow, scenic Northwest Fork of the Loxahatchee River in the 1950s. Center: Visitors to Jonathan Dickinson State Park can learn about Camp Murphy. Bottom: Signage located throughout the park provides information about the top secret operations that took place there.

County, 2009b). By 1944, Camp Murphy was decommissioned. The Navy continued to operate Station J until 1945 when the station was transferred to the U.S. Coast Guard who operated it until 1947. On June 9, 1947, the land where Camp Murphy was located, was offered to the state for use as a state park. Two years later, it was renamed Jonathan Dickinson State Park. In 2008, the Jupiter Inlet Lighthouse grounds where Station J had been located, received the prestigious honor of being designated as an “Outstanding Natural Area” by President George W. Bush (Historical Society of Palm Beach County, 2009b).

Historically, the Northwest Fork drained most of the Loxahatchee watershed with the headwaters originating in Loxahatchee and Hungryland sloughs. Within the past century, canals and levees were constructed for drainage and flood control, altering the natural flow of the river. The C-18 canal was built in 1958 and diverted water away from the Northwest Fork thereby depriving the waterway of the volume it once had. The C-18 canal system also drains lands within the glades region to the southwest, as well as the Loxahatchee Slough along the perimeter of West Palm Beach (Gissendanner, 1984). The construction of the C-18 canal and the permanent opening of the Jupiter Inlet both contributed to the destruction of Limestone Creek, resulting in the inundation of tidal and estuarine flow up the Loxahatchee River. These structural projects affected the Loxahatchee River area by shifting the distribution of vegetation to more of an estuarine-based system, dominated by salt tolerant species such as red mangrove (*Rhizophora mangle*). Further ditching and draining of the headwater areas of the Northwest Fork diverted the flow and deprived the river of the much-needed freshwater (DEP & SFWMD, 2010).

Since the Jupiter Inlet District reopened the inlet in 1947, biennial maintenance dredging kept the inlet open for small craft navigation. With the adoption of the Jupiter Inlet Management Plan in 1997, a series of management options were implemented, including the bypassing of 60,000 cubic yards of sediment on an average annual basis. A sand trap was dredged 1,000 feet west off the entrance of Jupiter Inlet while in the late 1960s, both jetties were extended landward to prevent flanking (M. Grella, personal communication, January 8, 2018).

During the 1970s, concerned citizens and local stakeholders sought an answer to the environmental degradation occurring within the Loxahatchee River and surrounding basin. Addressing the public concern, Loxahatchee River-Lake Worth Creek Aquatic Preserve was adopted through Florida Statutes, Chapter 258 on November 2, 1970. The Florida Department of Environmental Protection (DEP) Florida Coastal Office, formerly known as the Office of Coastal and Aquatic Management Areas, have since managed it, from the Indian River Lagoon Aquatic Preserves (IRLAP) office. In 1971, at the request of concerned citizens and the Loxahatchee Council of Governments, the State Legislature also created the Loxahatchee River Environmental Control District (LRD), which is charged

with the mission to preserve and protect the Loxahatchee River. While IRLAP is charged with managing the aquatic preserve, the LRD is one of the lead entities in the management of the Loxahatchee River. The LRD provides wastewater management, storm drainage and various planning, regulatory and operational functions (Chapter 71-822, Special Acts of Florida, 1971, as amended). The jurisdictional area of the LRD includes the majority of the developed portions of the Loxahatchee River watershed. The LRD has active roles in wastewater management, aquatic monitoring, environmental education and public information. For more than 20 years, the LRD has served as one of the primary agencies conducting research and monitoring on the Loxahatchee River. Wild Pine Ecological Laboratory is the LRD’s state-certified laboratory, which provides the needed scientific staff, equipment and professional analysis to conduct research and monitoring for the purpose of advancing knowledge about the river (DEP & SFWMD, 2010). The objectives of the Loxahatchee River-Lake Worth Creek Aquatic Preserve are to regulate human activities, the preservation of natural resources and ecosystems, as well as the restoration of such areas where applicable (Gissendanner, 1984).

The population of Jupiter experienced a significant increase from 9,868 in 1980 to 13,274 in 1982, which inevitably placed a greater demand on the natural resources and ecosystems of the Loxahatchee River area (Terhune, 1983; Gissendanner, 1984). Further efforts were undertaken in 1985 to preserve these



The Loxahatchee River was the first river in Florida to receive the Wild and Scenic designation. The Wild and Scenic portion begins near river mile six.

natural resources and the Loxahatchee River ecosystem through the designation of the upper 10 miles of the Northwest Fork as Florida’s first “National Wild and Scenic River” (DEP & SFWMD, 2010). The Loxahatchee National Wild and Scenic River (see Map 2) is managed through a multi-agency effort designed to permanently preserve and enhance the natural conditions of this designated area for citizens of the state, nation, and future generations.

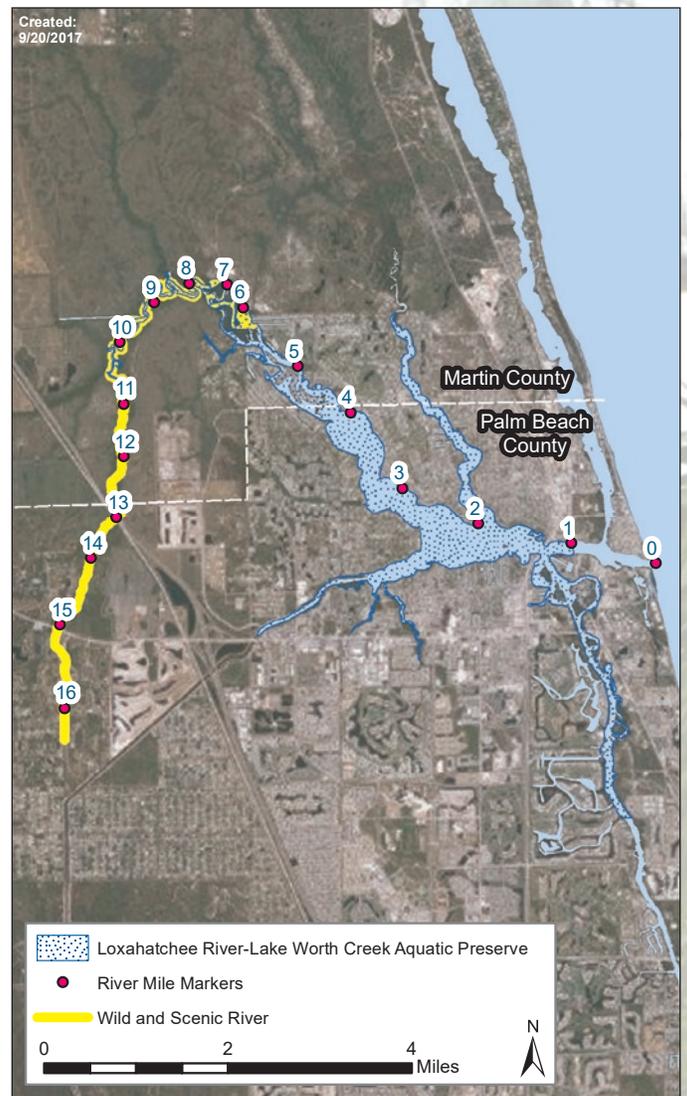
During the 1990s and 2000s, an extensive effort was undertaken at the federal and state level to restore and protect the Loxahatchee River area. In 1989, the Jupiter Inlet District commissioned the drafting of a management plan for the Loxahatchee (Loxahatchee River Management Plan), with the intent to enhance public recreational uses, where appropriate, while preserving the natural resources of the river, including the restoration of four oxbows in the river’s Northwest Fork (M. Grella, personal communication, January 8, 2018). A national effort was made in 2000 to enhance the water flow into the Everglades, through the development of the Comprehensive Everglades Restoration Plan (CERP). CERP entails a 35-year plan, costing more than 10.5 billion dollars. It is designed to “restore, preserve, and protect the South Florida ecosystem while providing for other water-related needs of the region, including water supply and flood protection” (National Park Service, n.d.; U.S. Army Corps of Engineers & SFWMD, 2005). Working together, the U.S. Army Corps of Engineers and stakeholder agencies such as the LRD developed the Loxahatchee River Watershed Restoration Plan. This plan established the objectives of improving the quality, quantity, and distribution of freshwater to the National Wild and Scenic portion of the Loxahatchee River (U.S. Army Corps of Engineers, n.d.; LRD, 2013). Between 2004 and 2009, more than 40,000 acres of land within the Loxahatchee River watershed were purchased under CERP, for ongoing restoration. In 2010, a large scale oyster restoration project was undertaken funded from federal stimulus money, to spread more than 30 million pounds of limestone material within the Northwest Fork for the propagation and establishment of an enhanced bivalve community to aid in the filtration of waters traversing downstream (LoxahatcheeRiver.net, n.d.). Since 2010, many ongoing projects have been developed for the restoration of oyster and seagrass populations with the purpose of enhancing the biologically diverse communities in Loxahatchee River-Lake Worth Creek Aquatic Preserve and the encompassing watershed. The ongoing goal is to re-establish, to the extent possible, the natural conditions that existed before the development of the region.

3.2 / General Description

International/National/State/Regional Significance

Loxahatchee River-Lake Worth Creek Aquatic Preserve is located in Martin and Palm Beach counties. Approximately ten miles long, the aquatic preserve also lies between the town of Jupiter and village of Tequesta. The Lake Worth Creek section connects south to the Lake Worth Lagoon. The Jupiter Inlet and central embayment open easterly to the Indian River Lagoon and the Atlantic Ocean. The remaining sections consist of three major tributaries, the North Fork, Northwest Fork, and Southwest Fork (C-18 canal) (DEP & SFWMD, 2010; DEP, n.d.-c).

The aquatic preserve is designated and managed in two sections - wilderness and urban. The wilderness section of the aquatic preserve consists of the upper five miles of the Northwest Fork, including the National “Wild and Scenic” portion and the meandering waters up until Kitching Creek. This area is composed of freshwater and tidal marsh/riverine communities. All other parts of the aquatic preserve are classified as the urban section (Fann, Swett, & Grella, 2015). The overall management focus for the wilderness section



Map 2 | Loxahatchee National Wild and Scenic River.

of the aquatic preserve is to maintain the natural vegetative distribution and the conservation of existing habitats for the benefit of current and future generations. The generalized management strategy for the urban section of the aquatic preserve is to restore, to the extent possible, the conservation and natural distribution of the flora and fauna that existed in the area before development.

A multi-agency effort involving DEP, SFWMD, and LRD, in collaboration with other various federal, state, and local agencies are responsible for the monitoring and management of the Loxahatchee River area. They are working to improve the conditions within the aquatic preserve through the development and implementation of management and restoration plans, such as those projects contained within CERP and others (U.S. Army Corps of Engineers & SFWMD, 2005; DEP & SFWMD, 2010). Meeting the Minimum Flows and Levels (MFLs) and other freshwater quality/quantity standards of the Northwest Fork and Loxahatchee River watershed would accomplish many of the same restoration and management goals, including ones proposed within this plan (SFWMD, 2006). Distinguishing between the correct time to allow

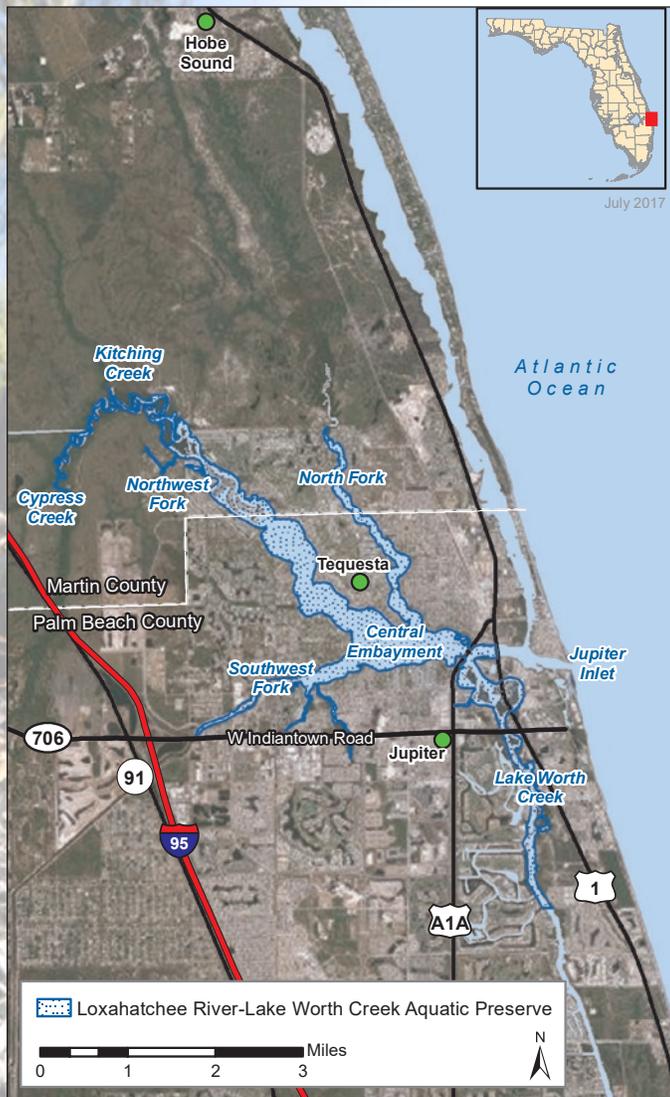
larger quantities of freshwater through the aquatic preserve, and when not to, has been historically challenging. It has unintentionally contributed to the degradation of the aquatic preserve at various periods in time (DEP & SFWMD, 2010).

Loxahatchee River-Lake Worth Creek Aquatic Preserve is designated as an “Outstanding Florida Waters” (Pursuant to Chapter 62-302 Florida Administrative Code) and provides an array of habitats in which the public can enjoy recreational and commercial activities, including areas abundant with local, state, and national history. The riverine-estuarine system within the aquatic preserve is vital to the region. It provides the essential habitat for the propagation of various fish and invertebrate species, such as blue crab (*Callinectes sapidus*), striped mullet (*Mugil cephalus*), snook (*Centropomus undecimalis*), and tarpon (*Megalops atlanticus*) (DEP, n.d.-c). Loxahatchee River-Lake Worth Creek Aquatic Preserve is also host to Threatened or Endangered species such as the little blue heron (*Egretta caerulea*), wood stork (*Mycteria americana*), and roseate spoonbill (*Platalea ajaja*) (DEP, n.d.-c). A portion of the aquatic preserve is considered “Critical Habitat” for the submerged aquatic vegetation species Johnson’s seagrass (*Halophila johnsonii*). Under the Endangered Species Act of 1973, it was designated as “Threatened.” This seagrass species was the first submerged marine plant to be given such a designation (National Marine Fisheries Service, 2002; SFWMD, 2006).

The Loxahatchee River meanders through the southwestern portion of Jonathan Dickinson State Park located along U.S. Highway 1, south of Hobe Sound. The park is important to the aquatic preserve as it provides a natural corridor for species to access the North and Northwest forks. The 11,000-acre state park contains a variety of habitats including pine flatwoods, sand pine scrub, mangroves, and riverine and cypress

swamps (DEP, n.d.-b). Jonathan Dickinson State Park is home to the formerly top-secret radar training school of Camp Murphy. The park also includes Trapper Nelson’s historical site and the Elsa Kimbell Environmental Education and Research Center. It is also home to several archaeological and cultural sites ranging from Native American middens to sites of historical battles between local tribes and the U.S. government during the Second Seminole War (DEP, 2012).

Other points of regional significance throughout Loxahatchee River-Lake Worth Creek Aquatic Preserve include Jupiter Lighthouse, Jupiter Beach Park, Jupiter Inlet District Office, Riverbend Park, Loxahatchee River Historical Society, Loxahatchee River Environmental Center “River Center,” DuBois Park, and DuBois



Map 3 | Loxahatchee River-Lake Worth Creek Aquatic Preserve.



Development along the Loxahatchee River has reduced the amount of habitat available to wildlife.

Pioneer Home, as well as many natural areas that are managed by Palm Beach County Department of Environmental Resource Management.

Location/Boundaries

Loxahatchee River-Lake Worth Creek Aquatic Preserve is located in southeastern Florida, approximately 10 miles south of Hobe Sound and 12.5 miles north of North Palm Beach. The aquatic preserve lies within the incorporated towns of Jupiter and Tequesta. The majority of the aquatic preserve is situated within northern Palm Beach County and the remainder within the southern portion of Martin County (see Map 3).

Jonathan Dickinson State Park bounds the northern most section of the aquatic preserve (North Fork). It is bound to the northwest by Interstate-95 (I-95) near Kitching Creek and to the southwest (Southwest Fork) by I-95 and the C-18 canal. To the south and east, it is bound by the towns of Tequesta, Jupiter, and the Atlantic Ocean at the Jupiter Inlet. The Lake Worth Creek section of the aquatic preserve ends at the Florida Inland Navigation District office at Marcinski Road, a mile east of Old Dixie Highway and is bordered to the west and east by large residential developments. Loxahatchee River-Lake Worth Creek Aquatic Preserve lies between two major roadways; it is approximately five miles east of I-95 and 1.5 miles west of U.S. Highway A1A.

Eight bridges cross the aquatic preserve: 1) East Indiantown Road bridge, two miles south of Jupiter Inlet Lighthouse and Museum, 2) U.S Highway 1 bridge, at the Jupiter Inlet Lighthouse and Museum, 3) U.S. Alt. A1A bridge, 0.5 miles southwest of the Jupiter Inlet Lighthouse and Museum, 4) Loxahatchee River Road bridge, 0.5 miles north of Center Street, 5) Central Boulevard bridge, 0.5 miles north of West Indiantown Road, 6) Island Way bridge, 1.5 miles east of I-95, 7) Tequesta Drive bridge, two miles west of U.S. Highway A1A, and 8) Southeast Island Way four miles east of I-95.

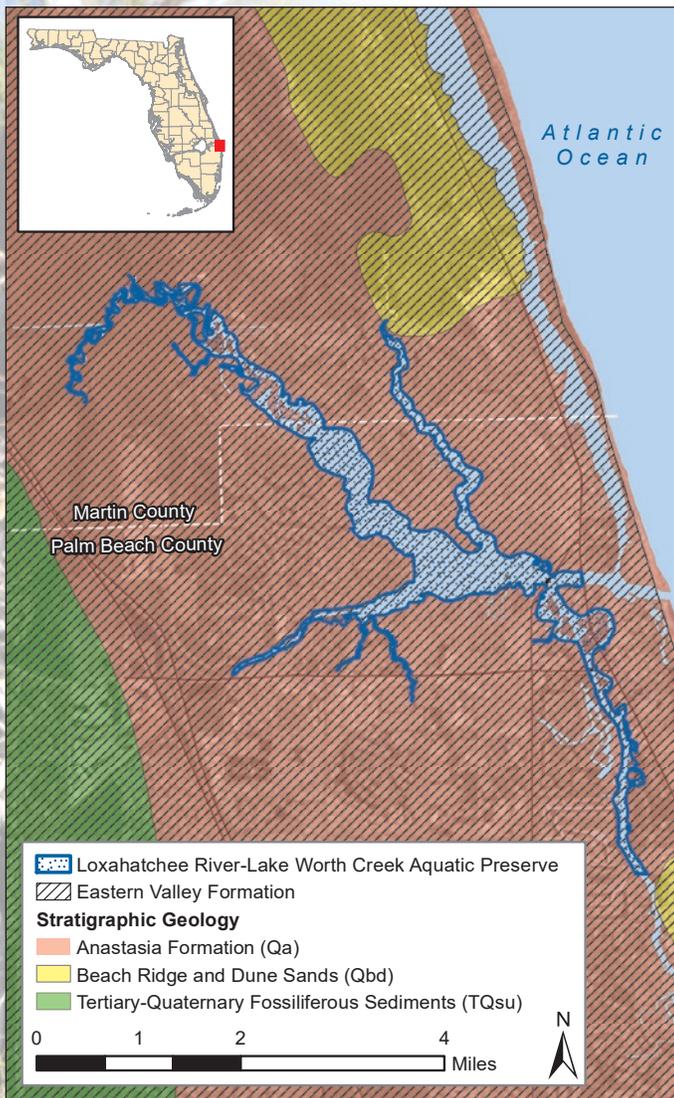
3.3 / Resource Description

Surrounding Population Data and Future Projected Changes

The population in the southeastern United States has been steadily increasing since the 1900s, especially within the state of Florida. The prospect of homesteading, fertile soils for agriculture, and an appeal for raw/untamed nature piqued the interest of more than a half-million migrants during the 1900s. The state population is predicted to be 57 times larger than at the beginning of the 19th century, exceeding 28.5 million people by the year 2030 (Palm Beach County, n.d.-l).

Housing Permits Issued by Year	Town of Jupiter	Jupiter Inlet Colony	Village of Tequesta	Totals
2001	794	0	7	801
2002	984	0	3	987
2003	945	0	61	1,006
2004	676	0	35	711
2005	923	3	13	939
2006	509	2	21	532
2007	207	1	2	210
2008	250	2	2	254
2009	140	1	3	144
2010	178	0	5	183
2011	198	2	2	202
2012	410	3	5	418
2013	919	4	4	927
2014	706	4	2	712
2015	227	2	1	230

Table 1 | Building permits in communities surrounding Loxahatchee River-Lake Worth Creek Aquatic Preserve.



Map 4 | Geomorphology of Loxahatchee River-Lake Worth Creek Aquatic Preserve.

Loxahatchee River-Lake Worth Creek Aquatic Preserve lies within Palm Beach and Martin counties. The population of Palm Beach County grew steadily from 1900 to 1950. From 1950 to 1960, more people came to Palm Beach County than in the previous four decades combined (Forstall, 1995; population.us, 2016). The county's population in 1980 was 576,758 and is predicted to exceed 1.6 million by 2030. This projected population will be more than 2.8 times larger than it was in 1980 (Palm Beach County, n.d.-l). As of 2016, Palm Beach County was the third most populated county in Florida (U.S. Census Bureau, n.d.-b). Although most of Loxahatchee River-Lake Worth Creek Aquatic Preserve is within Palm Beach County, the urban centers surrounding the aquatic preserve only represent approximately five percent of the total county population. A smaller segment of Loxahatchee River Lake Worth Creek Aquatic Preserve lies within Martin County. This county has a much smaller population than Palm Beach County with only 146,318 recorded during the 2010 census (U.S. Census Bureau, n.d.-a, n.d.-c).

The town of Jupiter, the village of Tequesta, and Jupiter Inlet Colony directly impact the aquatic preserve due to their proximity. These combined municipalities have undergone a dramatic increase in population since the 1960s, with the largest increase coming between 1980 to 1990 when more than 19,000 people moved into the Loxahatchee River area (population.us, 2016). There was an increase in these populations from 33,181 in 1990 to more than 60,000 in 2010, nearly doubling in just two decades. These communities encompass a 23-square mile area. The Loxahatchee River area is thriving in recent years, with more people relocating from throughout the state. The communities surrounding the river are anticipated to reach a population exceeding 70,000 by the year 2030 (Palm Beach County, n.d.-l).

In 2010, there were 27,413 available homes for the municipalities surrounding Loxahatchee River-Lake Worth Creek Aquatic Preserve with an 80 percent occupancy (U.S. Census Bureau, n.d.-a, n.d.-b). The available housing today has nearly reached capacity. Housing permits are a significant indicator of a community's future construction activities, retail purchases, and economic stability. The region was hard hit by the national economic and housing crisis of the recent past, but the number of new housing permits indicates a significant recovery within northern Palm Beach County (Palm Beach County, n.d.-k). The continued issuance of new housing permits is a clear indication of the large-scale appeal for the communities that border Loxahatchee River-Lake Worth Creek Aquatic Preserve. While these influxes of people potentially provide economic stability to the northern Palm Beach County region, they adversely increase the demands on the surrounding natural resources, specifically those of the aquatic preserve.

Topography and Geomorphology

Topography is the configuration of a surface including its relief and the position of its natural and man-made features. It can also describe what type of disturbances have occurred with the surrounding geologic formations long ago, in turn, helping to shape the character, drainage patterns, soil types and potential ranges of flora and fauna. Florida is characterized as extremely flat, with relatively little topographic relief in the southern regions. The geological history reflects four previous events of both rising and receding seas. These events have directly influenced the topography of the state and the Loxahatchee River-Lake Worth Creek Aquatic Preserve area (Scott, 2001; Barr, 2009). The high point of Palm Beach County has an elevation of 53 feet. This crest is located east of Lake Worth Creek within the “Bluffs” community in the town of Jupiter at Parcel Control Number 30-43-41-16-02-000-3270 (Peakbagger.com, n.d.). Other generalized elevations in the surrounding area include the town of Jupiter (6.6 feet), the village of Tequesta (9.8 feet) and Jupiter Inlet Colony (6.6 feet). Two other notable locations with greater elevations include Riverbend Park (16 feet) and the grounds of the Jupiter Lighthouse (36 feet).

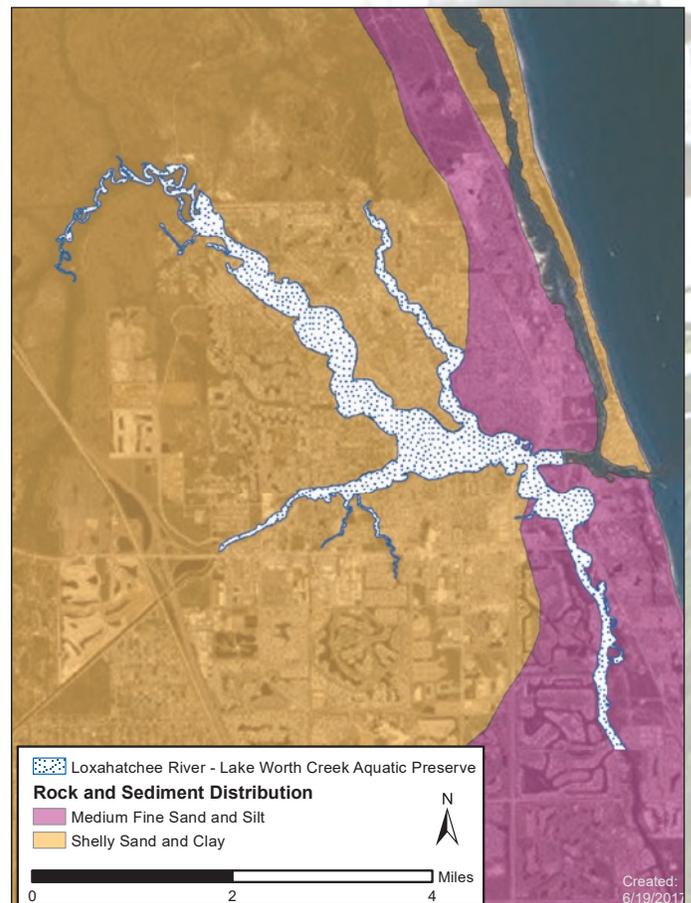
Geomorphology is the study of major landforms, processes, and sediments of a region (British Society of Geomorphology, n.d.). Some of the earliest geological formations began to form during the Tertiary Period and Eocene Epoch (between 54 and 38 million years ago), within the Cenozoic Era (Barr, 2009). The Eocene Epoch marks the first appearance in the fossil record of the two completely marine mammal groups, the cetaceans (whales, porpoises, and dolphins) and the sirenians (akin to the modern manatees and dugongs). In addition, gastropods (a class of mollusks containing snails, slugs, and limpets) underwent great diversification, and many bird orders that were in essence modern appeared during the Eocene (Encyclopedia Britannica, 2013). Loxahatchee River-Lake Worth Creek Aquatic Preserve is located within the southern bounds of the Florida Eastern Valley Formation (see Map 4). The Eastern Valley is composed of long, narrow ridges ranging from six to 30 feet. This formation is bordered to the west by the Osceola Plain, to the east and the south by the Atlantic Coastal Ridge, and to the southwest by the Everglades Formation.

Geology

An additional analysis of the sediment, texture and deposition can be conducted by examining the stratigraphic geology of the southeastern region of the state. The majority of the rock and sediment underlying the aquatic preserve is composed of shelly sand and clay, with medium fine sand and silt composing the eastern part of the aquatic preserve (see Map 5). There are three major stratigraphic formations/categories located in this immediate vicinity including Tertiary-Quaternary Fossiliferous Sediments (TQsu), Anastasia Formation (Qa) and Beach Ridge and Dune Sands (Qbd) (Scott, 2001) (see Map 4).

The TQsu are some of the most abundant mollusk-bearing sediments in the world. These areas of mollusk-dominant sediments are located west of the aquatic preserve. Its eastern boundary is located at the intersection of Interstate-95 and West Indiantown Road. This section of sediments was formed between 5.3 million years ago to 10,000 years ago during the Pliocene and Pleistocene Epochs. The fossiliferous quartz sands and clays are present within these sediments forming part of the surficial aquifer system (Scott, 2001).

The Qa was formed during the Pleistocene Epoch, between 1.8 million years ago and 10,000 years ago. The entire Loxahatchee River-Lake Worth Creek Aquatic Preserve is located within the bounds of the Anastasia Formation. The Qa is comprised of sands and various types of limestone that appear orangish-brown to light gray (Scott, 2001). The formation contains coastal deposits of thick clastic marine sediments holding various fragmented shells, sand, and coquina-limestone. These formations can be seen at Blowing



Map 5 / Rock and sediment types of Loxahatchee River-Lake Worth Creek Aquatic Preserve.

Rocks Preserve in Martin County as well as at the House of Refuge on Hutchinson Island in Martin County (DEP, n.d.-a). The Qa supplements the formation of the surficial aquifer system.

The undifferentiated sediments that form much of the Qbd were deposited during the Pleistocene and Holocene Epochs from 1.8 million years ago to present (Scott, 2001). Two separate sections lie in proximity to Loxahatchee River-Lake Worth Creek Aquatic Preserve. The first outcrop of this sediment can be found at the tip of the North Fork of the Loxahatchee River within Jonathan Dickinson State Park. The Qdb formation is bound easterly by the Indian River and northerly at the intersection of U.S. Highway 1 and southeast Dixie Highway. The second outcrop of the Qdb formation can be found at the end of the Lake Worth Creek section of the aquatic preserve. This five-mile long formation of clayey, silty, and organic sediment is northern-bound by the Marcinski Road area. It then bends towards the coast at Loggerhead Marine-Life Center near Donald Ross Road. Reversing inland, it ends near the middle of Little Lake Worth (to the east) near the intersection of Prosperity Farms Road and PGA Boulevard. The majority of the state is covered with this type of sediment consisting of siliciclastic, organics and freshwater carbonates such as peat. Colors from this sediment layer can vary from light gray, tan, blue-green and olive-green.

Hydrology and Watershed

Loxahatchee River-Lake Worth Creek Aquatic Preserve is within the Lower Loxahatchee River Watershed. Historically, the Loxahatchee River watershed included an area of more than 216 square miles (560 square kilometers). The drainage basin was comprised primarily of pine flatwoods interspersed with cypress sloughs, hardwood swamps, marshes, and wet prairies. Rainfall was directed through natural topography into wetlands, treated by natural biological and chemical action, and slowly released to the Loxahatchee

River and Estuary and the Indian River Lagoon. Today, approximately 168 square miles (434 square kilometers) of the original watershed drain to the Atlantic Ocean through Jupiter Inlet. Development in the watershed, stabilization of the inlet, and dredging of the estuary and river have resulted in saltwater intrusion in the river, destruction of riverine cypress forest along the river, and upstream migration of seagrasses and mangroves (VanArman, Graves, & Fike, 2005).

The Lower Loxahatchee River Watershed is divided into four sub-watersheds along the perimeter of the aquatic preserve: the Lower Loxahatchee River, Upper Loxahatchee River, North Fork of the Loxahatchee River, and Kitching Creek (DEP & SFWMD, 2010). Seventy-five percent of Loxahatchee River-Lake Worth Creek Aquatic Preserve lies within the Lower Loxahatchee River sub-watershed, while the remaining three border the Wild and Scenic portion of the aquatic preserve.

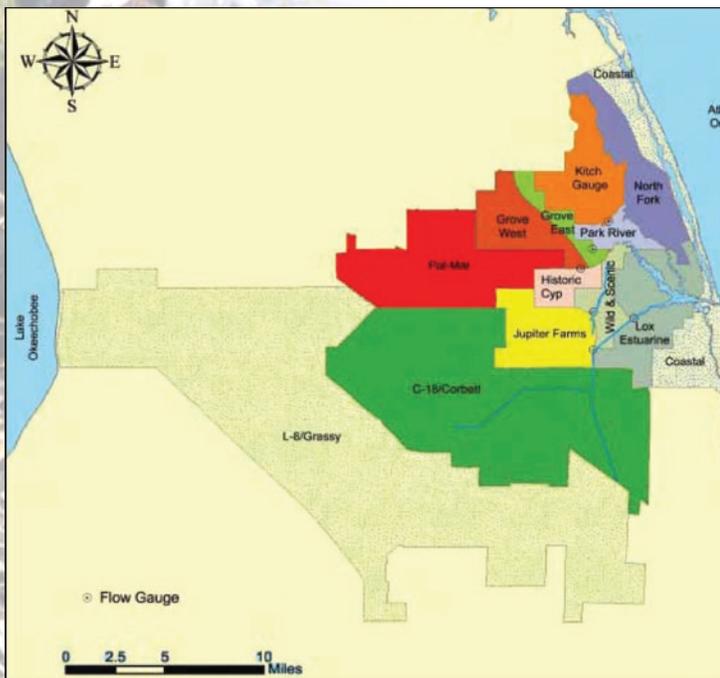
The sub-watersheds convey water through 12 main basins surrounding the aquatic preserve (see Map 6). These main basins include Kitch Gauge, North Fork, Park River, Lox Estuarine,

C-18/Corbett, Historic Cypress Creek, Pal-Mar, Grove West, Grove East, Jupiter Farms, Wild and Scenic, Coastal, and Adjacent Basin (L-8/Grassy) (SFWMD, 2006).

Kitch Gauge is a 16 square mile basin located within Jonathan Dickinson State Park. Nearly 4,650 acres are composed of marsh wetland habitat and contribute water into the Northwest Fork. Kitching Creek also provides flow into the Northwest Fork approximately eight miles up the Loxahatchee River. This basin has a flow gauge monitored by U.S. Geological Survey (USGS) (SFWMD, 2006).

The majority of the North Fork Basin is composed of marsh wetland habitat. This basin provides water to the North Fork of the Loxahatchee River from its 17 square mile area and is not monitored by a flow gauge (SFWMD, 2006).

Nearly 2,480 acres of the Park River Basin is also made up of marsh wetlands. This 4.8 square mile basin provides water to the Northwest Fork of the Loxahatchee River through a series of small creeks



Map 6 | Drainage basins of Loxahatchee River-Lake Worth Creek Aquatic Preserve (SFWMD, 2006).

and tributaries such as Wilson Creek. This creek and others lie within the Boy Scout Camp Grounds of Jonathan Dickinson State Park. The contributions of water from this basin are also not monitored by any flow gauges (SFWMD, 2006).

The Lox Estuarine Basin allocates 10,500 acres of flow into the Central Embayment of the Loxahatchee River. Almost 80 percent of the 21 square mile area is comprised of urbanized land usage. Water from this basin consists of stormwater runoff that discharges into the brackish estuary. The basin experiences heavy recreational use that may exceed the river's carrying capacity. The basin is not monitored by flow gauges (SFWMD, 2006).

The C-18/Corbett Basin is the largest basin in the Loxahatchee River Watershed and is comprised primarily of publicly owned marsh wetland. This basin includes the remnants of the Hungryland and Loxahatchee sloughs, which historically fed the Northwest Fork of the Loxahatchee River. Water from this basin flows to the C-18 Canal, and either flows to the Southwest Fork of the Loxahatchee River through the S-46 Structure or flows through the G-92 Structure to the upper end of Northwest Fork of the Loxahatchee River. Flow gauges are located at the G-92 and the S-46 structures (SFWMD, 2006).

Historic Cypress Creek Basin consists of nearly 3,000 acres of marsh wetland habitat. The five and a half square mile basin lies within lands purchased on behalf of the state and local government. The basin drains into Cypress Creek near the upper bounds of the Northwest Fork approximately 10 miles up the Loxahatchee River. The flows from this basin are not monitored by gauges (SFWMD, 2006).

Adjacent to the Historic Cypress Creek Basin is a large wetland-dominated habitat referred to as the Pal-Mar Basin. This 35.5 square mile basin is located along the western edge of the Loxahatchee River Watershed. Nearly 19,500 acres of the basin consist of a marsh wetland environment. Disturbed by sporadic development, the basin flows into the Northwest Fork of the Loxahatchee River. The flow is not currently monitored (SFWMD, 2006).

The Grove West Basin incorporates nearly 4,100 acres. The 13 square mile basin is utilized for growing crops, primarily citrus, while allowing wildlife to link with natural areas surrounding the watershed. Water contained within the basin is directed to Cypress Creek and flows are monitored at the Cypress Creek flow gauge (SFWMD, 2006).

The Grove East Basin shares a similar role with the Grove West Basin as it predominantly is also composed of citrus, yet provides a valuable greenway for wildlife to connect with large, natural areas within the watershed. Waters that drain from the Grove East Basin enter the Hobe Grove Ditch and Moonshine Creek and eventually flow into the Northwest Fork located nine miles up the Loxahatchee River (SFWMD, 2006).

The Jupiter Farms Basin is 16 square miles. The basin consists of 9,350 acres dominated by residential development known as Jupiter Farms. The water from this basin drains into a stormwater management system overseen by the South Indian River Water Control District and then into the C-14 canal. The canal then provides water to the upper Northwest Fork, also traversing the Lainhart Dam. The G-92 structure connects the C-18 canal to the Jupiter Farms Basin where the flows are monitored along with the Lainhart Dam (SFWMD, 2006).

The Wild and Scenic Basin is seven square miles partially encompassing the Northwest Fork of the Loxahatchee River. Approximately 2,560 acres of the basin entails marsh wetlands and contains the northern portion of the Riverbend Park. The flows leaving the basin are not monitored by gauges (SFWMD, 2006).

The Coastal Basin is a 25 square-mile area that provides commercial, residential and recreational uses. The basin is highly developed with limited concentrations of natural areas, which are isolated in the western bounds of the basin. Water within the basin typically flows to the Atlantic Ocean or the Intracoastal Waterway, as well as the Jupiter Inlet. The flow from the Coastal Basin is not monitored by gauges (SFWMD, 2006).

The L-8/Grassy Basin is 193 square miles adjacent to the Loxahatchee River Watershed, but its contributions and interactions with other basins warrant being noted. The basin contains several locations where drainage enters the C-18/Corbett Basin and transfers water to the Grassy Waters region. The flows from this basin are not monitored by any gauges (SFWMD, 2006).

The aggregation of rainfall and groundwater seepage from shallow aquifers are two primary sources of water for LRLWCAP. These sources accumulate within the Hungryland and Loxahatchee sloughs. Together they form the Grassy Waters Preserve, a West Palm Beach Water Catchment Area (SFWMD, 2006). The water is then drained north by the C-18 canal system until it reaches the G-92 structure. The water is then directed north to the South Indian River Water Control District's C-14 canal and over the Lainhart and Masten dams. The flow then connects with the Northwest Fork of the Loxahatchee River.



Visitors to Jonathan Dickinson State Park can easily access the Loxahatchee River.

The Northwest Fork gains a large volume of water after traversing the dams through a series of creeks which include Kitching and Cypress. The Northwest Fork flows easterly through both Martin and Palm Beach counties as well as Jonathan Dickinson State Park before it winds southeasterly and merges with the Central Embayment.

The headwaters of the North Fork are located between the Atlantic Coastal Ridge of eastern Martin County and the sheet flow from Jonathan Dickinson State Park. The flow then travels southeasterly into the Central Embayment (SFWMD, 2006).

The Southwest Fork of the Loxahatchee River receives flows from the S-46 structure through the channelized C-18 canal. The water from the Southwest Fork then enters the Central Embayment. These conditions typically occur during seasonal high flows for flood control. During periods of low flow, the S-46 structure prevents tidal flows moving upstream from reaching the Corbett Basin. The Southwest Fork is heavily influenced by tidal inundation from the Jupiter Inlet (SFWMD, 2006).

Sections of the Loxahatchee River are designated Outstanding Florida Waters (OFWs), requiring a higher standard of water quality and protection. Upstream of the Florida East Coast bridge, the Southwest, Northwest, and North Forks, are all designated as Class II waterways under Chapter 62-302 "Surface Water Quality Standards," Florida Administrative Code (F.A.C.). The scale of the surface waterbody classifications are arranged in order with Class I surface waters falling under the most stringent water quality protection and standards, and Class V with the least. The Loxahatchee River, including the Wild and Scenic portion of the Northwest Fork, are categorized as Class II waters capable of shellfish propagation or harvesting, Chapter 62-302.400(1) F.A.C. The surface waters of the Loxahatchee River share the water quality criteria of Class III surface waters of fish consumption, recreation and the propagation and maintenance of a productive fish and wildlife population, Chapter 62-302.400(4) F.A.C.

The combination of sub-watersheds, basins, sloughs, and creeks directs water to larger tributaries such as the North Fork and Kitching Creek. The largest tributary within the aquatic preserve is the Northwest Fork. These three waterbodies make up the boundaries of Loxahatchee River-Lake Worth Creek Aquatic Preserve that have been left relatively unaltered in comparison to the remaining tributaries. The Southwest Fork, Limestone Creek, Cypress Creek, and Lake Worth Creek have undergone fluctuations in their hydrology and experienced development along their banks (SFWMD, 2006).

The Loxahatchee River Watershed has historically been defined by the natural areas surrounding it. Over the past 100 years, a compounding number of variables are responsible for the transformation of the watershed. These include the construction of roads, canals, and wellfields amongst others (DEP & SFWMD, 2010). The urbanization and cultivation of crops over the last century have changed the hydrology of the area surrounding the Loxahatchee River to meet the demands of development and agriculture (McPherson et al., 1982; VanArman et al., 2005). To address the requests for new navigational routes and flood control activities, the volume and delivery of freshwater to particular sections of the river have been altered (SFWMD, 2006). A study conducted on the Northwest Fork of the Loxahatchee River by McPherson in 1982 and again referenced in 2002 by the SFWMD, concluded that of the freshwater flow into the river, approximately 77 percent was discharged from the Northwest Fork, 21 percent from the Southwest Fork and two percent from the North Fork. The findings from McPherson and the SFWMD reflect the freshwater contributions each major tributary provides to the overall Loxahatchee River.

The Lainhart and Masten dams were initially constructed in the 1930s by farmers to maintain higher water levels within the upper portions of the Northwest Fork during the dry season. The Lainhart Dam is located at river mile 14.5 and provides approximately 50 percent of the total freshwater flow into the Northwest Fork (SFWMD, 2006). The seasonal contributions of freshwater to the Northwest Fork of the Loxahatchee River can vary widely. The small Masten Dam between 1965 and 2003 averaged 92 cubic feet per second (cfs) of freshwater flow over its bank (SFWMD & DEP, 2006). The Lainhart Dam can withstand up to 90 cfs before waters begin to overflow into the Wild and Scenic portion of the Northwest Fork. The surrounding wetlands are completely inundated when the flow reaches 110 cfs. During the dry season, the freshwater flows at the Lainhart Dam average 70 cfs (SFWMD, 2002). When freshwater flows drop below 35 cfs for more than 20 consecutive days within a given year, it is viewed as a violation of the MFLs as per its adoption in 2003 (SFWMD, 2002). Between the years of 1957 and 1977, the Jupiter Inlet was permanently opened, and large-scale construction projects were undertaken including the C-18 and C-14 canals, and the S-46 and G-92 structures. These events lowered the freshwater availability to the Loxahatchee River while simultaneously allowing for the inundation of tides upstream (SFWMD, 2002).

In 1958, the dredging of the C-18 canal and the construction of the S-46 structure, redirected water to the Southwest Fork of the Loxahatchee River, thereby choking the Northwest Fork of freshwater resources. The S-46 structure can release more than 3,200 cfs of water to the Southwest Fork during extreme flooding events (SFWMD, 2006). The building of the G-92 structure in the mid-1970s purpose was to direct some flow back to the upper portion of the Northwest Fork through the South Indian River Water Control District C-14 canal (SFWMD, 2006). In 1987, to increase the quantity of freshwater flow to the Northwest Fork, a gated device was installed to the G-92 structure that can provide up to 400 cfs of flow to the C-14 canal and to the Northwest Fork. After the improvements, the SFWMD and South Indian River Water Control District entered a consent agreement to allocate 50 cfs of water when available to the Northwest Fork.

The Northwest Fork is the largest tributary of the Loxahatchee River and obtains freshwater from various creeks, canals, and small tributaries. The Northwest Fork is predominately characterized as a freshwater channel, depending on the seasonal contributions from the G-92 structure, Lainhart Dam, Cypress Creek, Kitching Creek and Hobe Grove Ditch (Stoner, Howard, Noel, & Arrington, 2016; SFWMD, 2002). Located ten and a half miles up the Loxahatchee River lies Cypress Creek, which is the second largest contributor of freshwater to the Northwest Fork. Located downstream from Trapper Nelson's site, Cypress Creek obtains its freshwater from draining the southern portion of Pal-Mar Basin. The flows are released from a control structure that is monitored by the Hobe-St. Lucie Conservancy District (SFWMD, 2002, 2006). Kitching Creek, located eight miles upstream, consists of a marsh-wetland habitat. Water levels are higher in this area because the majority of the land is undeveloped, thereby contributing between 11 and 13 percent of the total amount of flows to the Northwest Fork (SFWMD, 2006). Hobe Grove Ditch joins with the Northwest Fork nine miles upstream. The ditch was formally known as Moonshine Ditch and has a control structure operated by the Hobe-St. Lucie Conservancy District. It allocates five percent of the total freshwater flow to the Northwest Fork (SFWMD, 2006). The Hobe Grove Ditch drains the eastern area of the Florida Turnpike, providing flood control to that area. The average depth of the Northwest Fork is between three and six feet. The maximum depth within the upper reaches of the Northwest Fork is commonly found to be less than 10 feet deep while achieving a 16-foot depth near Cypress Creek (Chiu, 1975; SFWMD, 2002).

The location where the three forks of the Loxahatchee River meet is known as the Central Embayment. The central area is over a half square mile in size and contains shallow waters ranging from three and a half to 15 feet deep (SFWMD, 2002). The Central Embayment receives under 300 cfs of freshwater flow from all three tributaries during the wet season. Only one percent of the total flow the Central Embayment receives from tidal forces is due to the permanent opening of the Jupiter Inlet. The Central Embayment is a dynamic ecosystem whose brackish waters support a diverse estuarine fish, benthic fauna and



The sandbars within the embayment are a popular recreation area for boaters.

large oyster reef populations that play a vital biological role in the development of many organisms in the region. This predominately dominated saline environment needs to be monitored to ensure the salinity regime is in the range of 15 parts per thousand (ppt) to 30 ppt to meet the requirements for such organisms to thrive (SFWMD, 2002).

The North Fork of the Loxahatchee River stretches from the Central Embayment north to Jonathan Dickinson State Park. Freshwater flow into the North Fork contributes less than five percent of the total freshwater flow into the Loxahatchee River. Due to the lack of freshwater contributions, the North Fork undergoes tidal inundation five miles upstream with fluctuating salinities from 25 ppt to 14 ppt. The fork has an average depth of three and a half feet encompassing an area of more than 200 acres (SFMWD, 2002).

The Southwest Fork of the Loxahatchee River is heavily impacted from the east by the Jupiter Inlet/Central Embayment's tidal influence. The Southwest Fork is affected to the west by the freshwater releases for flood control from the S-46 structure that the C-18 canal drains from areas and basins further west/southwest (SFWMD, 2002). During periods of heavy rainfall, daily averages of up to 2,500 cfs of freshwater flow can be displaced through the S-46 structure into the Jupiter Inlet.

The Loxahatchee River lies on top of two major aquifers, the shallower surficial aquifer, and the deeper Floridan aquifer (SFWMD, 2002). The Loxahatchee River itself obtains a significant amount of freshwater from groundwater seepage into the upper Northwest Fork region as described in studies from the USGS and SFWMD in 2003 (SFWMD, LRD, & DEP, 2012). On average, the entire Northwest Fork of the Loxahatchee River receives 65 cfs of groundwater seepage. The amount of groundwater seepage decreases as you move further upstream from 42 cfs one mile upstream, to nine cfs three miles further upstream (SFWMD et al., 2012). The rate at which groundwater seeps into the Northwest Fork is also highly dependent on seasonality and the overall condition of the encompassing watershed.

The town of Jupiter's utilities department is responsible for the maintenance and allocation of groundwater withdrawals from four primary distribution facilities within the Loxahatchee River Region. The four assets include the Water Treatment Plant, Central Boulevard High Service Pump Station, Juno Repump Station, and Riverbend Repump Station (Town of Jupiter, 2015a). The recently renewed SFWMD water use permit to operate these facilities and withdraw groundwater is viable until 2030.

The surficial aquifer is a primary source of potable water. The aquifer lays between 80 feet and 180 feet below ground, amongst the differing sediment layers of Pamlico Sand, Anastasia Limestone, shell beds and Caloosahatchee marl (SFWMD, 2002). Freshwater is withdrawn to supply the nanofiltration and ion exchanges treatment plants of the town of Jupiter's utilities department (Town of Jupiter, 2015a). The Jupiter Utilities Surficial Aquifer Raw Water System is part of the desalination facility which includes more than 51 wells (Town of Jupiter, 2012). The shallow non-artesian wells are used to withdraw water from the surficial aquifer. The combined production from the Jupiter Surficial Aquifer Wellfield can withdraw 26 million gallons per day (Town of Jupiter, 2015a).

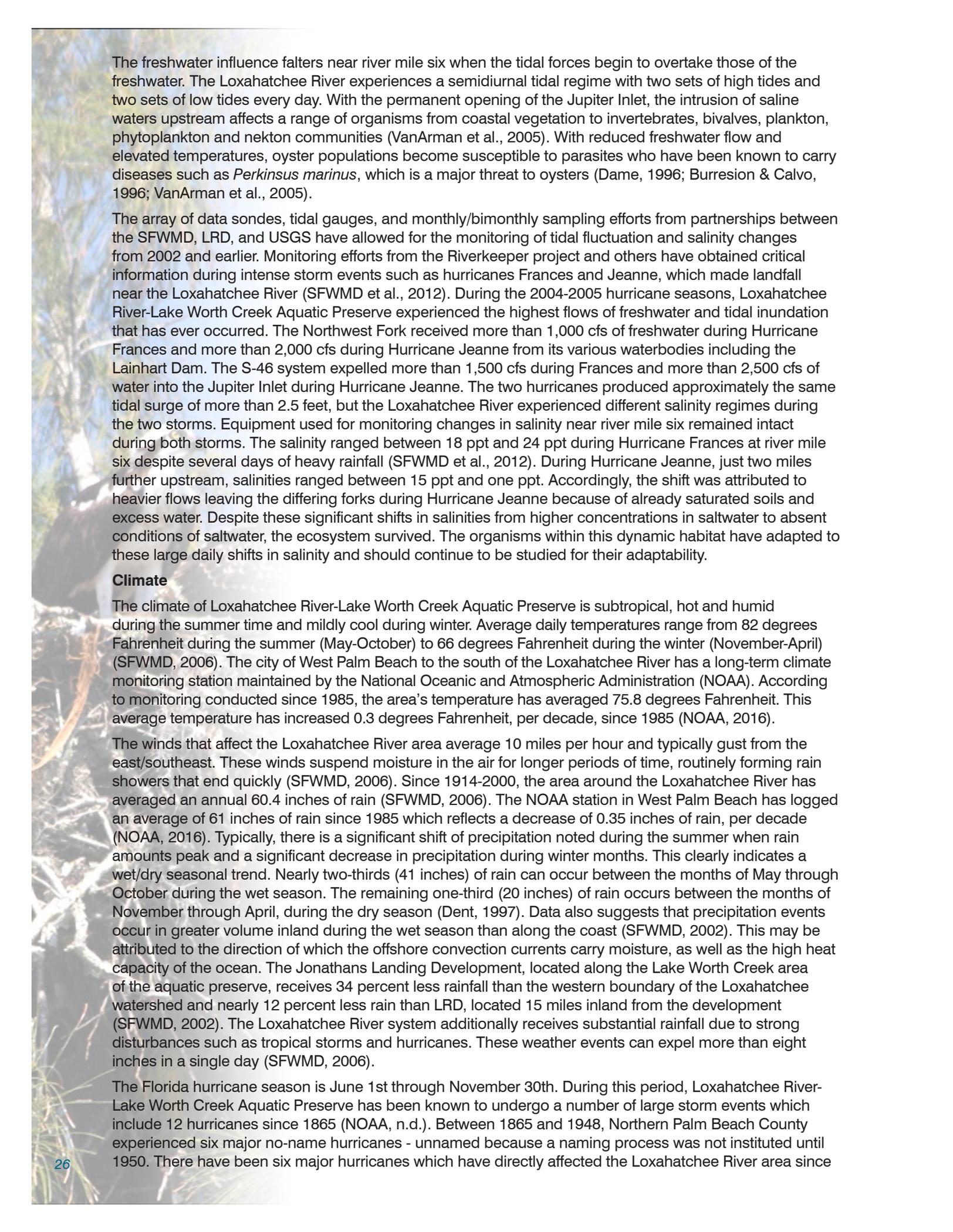
Individual wells can produce 200-800 gallons per minute or 0.3-1.2 million gallons per day of freshwater, depending on the diameter of piping and the location of the wells within the watershed (Town of Jupiter, 2015a). The water quality also varies depending on the location of the well within the watershed. The wells are scattered throughout the western portion of Jupiter, stretching from Central Boulevard south to Heights Boulevard. The wells range from one to 33 years old with the newer wells located in the northwest portion of town and the older wells located to the southwest. As of 2012, 18 wells that are less than 15 years old account for nearly half of all groundwater withdrawals from the surficial aquifer (Town of Jupiter, 2012).

Jupiter Utilities is contemplating an additional wellfield to be located north of Indiantown Road. The purpose of the new wellfield is to meet the demand for groundwater withdrawals of the Jupiter water treatment facilities as well as providing greater dispersion of withdrawals in the encompassing area. The surficial aquifer is replenished from rainfall that percolates through the sediment. Since 2006, the SFWMD, along with representatives from the town of Jupiter and various other consultants, have been in discussions about supplying recharge for the surficial aquifer. Examples of studies under discussion include either diversion of excess surface water runoff from the C-18 canal during high flows, or the delivery of 25 cfs of treated freshwater from the regional desalination plant back to the surficial aquifer (Town of Jupiter, 2012). By recharging the aquifer, several goals could be accomplished such as the Northern Palm Beach County Plan Component of CERP, which serves to mitigate ecological repercussions from groundwater withdrawals. The concepts mentioned above can only be pursued if the SFWMD's MFLs are met, which in the recent past has been an issue.

The deeper Floridan aquifer is separated from the surficial aquifer by several hundred feet of impermeable clay and can reach up to 1,500 feet in depth. The aquifer is composed mostly of limestone and several differing geological formations, some more than 50 million years old (SFWMD, 2002). The Floridan aquifer wellfield of Jupiter has 11 in-service, deep-water wells. The majority of the Floridan aquifer wells are located along the C-18 canal system, southwest of the S-46 structure (Town of Jupiter, 2012). The upper Floridan aquifer deep-water wells have a combined capability of withdrawing 23.5 million gallons per day of brackish groundwater (Town of Jupiter, 2015a). The wells individually have the capability of withdrawing nearly three million gallons per day. Although ranging from eight to 24 years old, these wells are expected to last half a century. The water found deep underground within the Floridan aquifer is rich in minerals and contains high salinities. If the public chooses to utilize this aquifer for potable water, it must first go through a desalination process. The town of Jupiter Floridan aquifer raw water collection piping network guides the brackish groundwater to a reverse osmosis plant for processing (SFWMD, 2006; Town of Jupiter, 2012, 2015a). The Jupiter Utilities desalination facility can produce 30 million gallons of drinking water per day, drawn from both the surficial aquifer and Floridan aquifer, to accommodate nearly 120,000 people around the town of Jupiter, Palm Beach County and Martin County (Town of Jupiter, 2015c).

There are many variables which may influence the distribution of both flora and fauna within the constraints of the aquatic preserve. Studies suggest that the strongest correlation lies between the freshwater inflow and salinity regime carried by tidal forces within the Northwest Fork of the Loxahatchee River (SFWMD et al., 2012). Loxahatchee River-Lake Worth Creek Aquatic Preserve is heavily influenced by freshwater inputs from surrounding tributaries, groundwater inundation, and tidal regimes. Two of the three primary influences were minimized in 1947 with the permanent opening of the Jupiter Inlet by the U.S. Army Corps of Engineers, and in 1950 with the construction of the S-46 structure/C-18 canal, by the SFWMD (VanArman et al., 2005). The fluctuations of salinity throughout the river are responsible for the compartmentalization of both marine-based organisms as well as the terrestrial swamp-marsh vegetative distribution.

Freshwater has a stronger influence on the salinity of the river in the upper portions and plays a less significant role in the lower parts of the river where tidal forces dominate. A threshold is breached when excessive amounts of freshwater impacts organisms negatively, similar to the way that elevated salinity concentrations can impair and lead to increased mortality events of particular species when exposure is prolonged. Bivalve communities such as Eastern oyster (*Crassostrea virginica*), can cope with water bodies' fluctuations in salinity, but become heavily affected during longer exposures. Lower salinities can cause juvenile spat, larvae, and in particular eggs to be suspended unusually higher than normal in the water column and predation events may occur (VanArman et al., 2005). The freshwater wedge that forms from increased freshwater flow can inhibit the successful colonization of habitats in the aquatic preserve. Within the upper portion of the aquatic preserve near river mile nine, the largest contributor of freshwater flow is derived from the Lainhart Dam. As little as 10 cfs of freshwater flow over the Lainhart Dam can alter the salinity regime within the Northwest Fork. To maintain the suggested two ppt salinity threshold near river mile nine requires a minimum of 35 cfs of freshwater to flow over the Lainhart Dam (SFWMD et al., 2012). This establishes the MFL for this portion of the Loxahatchee River.



The freshwater influence falters near river mile six when the tidal forces begin to overtake those of the freshwater. The Loxahatchee River experiences a semidiurnal tidal regime with two sets of high tides and two sets of low tides every day. With the permanent opening of the Jupiter Inlet, the intrusion of saline waters upstream affects a range of organisms from coastal vegetation to invertebrates, bivalves, plankton, phytoplankton and nekton communities (VanArman et al., 2005). With reduced freshwater flow and elevated temperatures, oyster populations become susceptible to parasites who have been known to carry diseases such as *Perkinsus marinus*, which is a major threat to oysters (Dame, 1996; Burrenson & Calvo, 1996; VanArman et al., 2005).

The array of data sondes, tidal gauges, and monthly/bimonthly sampling efforts from partnerships between the SFWMD, LRD, and USGS have allowed for the monitoring of tidal fluctuation and salinity changes from 2002 and earlier. Monitoring efforts from the Riverkeeper project and others have obtained critical information during intense storm events such as hurricanes Frances and Jeanne, which made landfall near the Loxahatchee River (SFWMD et al., 2012). During the 2004-2005 hurricane seasons, Loxahatchee River-Lake Worth Creek Aquatic Preserve experienced the highest flows of freshwater and tidal inundation that has ever occurred. The Northwest Fork received more than 1,000 cfs of freshwater during Hurricane Frances and more than 2,000 cfs during Hurricane Jeanne from its various waterbodies including the Lainhart Dam. The S-46 system expelled more than 1,500 cfs during Frances and more than 2,500 cfs of water into the Jupiter Inlet during Hurricane Jeanne. The two hurricanes produced approximately the same tidal surge of more than 2.5 feet, but the Loxahatchee River experienced different salinity regimes during the two storms. Equipment used for monitoring changes in salinity near river mile six remained intact during both storms. The salinity ranged between 18 ppt and 24 ppt during Hurricane Frances at river mile six despite several days of heavy rainfall (SFWMD et al., 2012). During Hurricane Jeanne, just two miles further upstream, salinities ranged between 15 ppt and one ppt. Accordingly, the shift was attributed to heavier flows leaving the differing forks during Hurricane Jeanne because of already saturated soils and excess water. Despite these significant shifts in salinities from higher concentrations in saltwater to absent conditions of saltwater, the ecosystem survived. The organisms within this dynamic habitat have adapted to these large daily shifts in salinity and should continue to be studied for their adaptability.

Climate

The climate of Loxahatchee River-Lake Worth Creek Aquatic Preserve is subtropical, hot and humid during the summer time and mildly cool during winter. Average daily temperatures range from 82 degrees Fahrenheit during the summer (May-October) to 66 degrees Fahrenheit during the winter (November-April) (SFWMD, 2006). The city of West Palm Beach to the south of the Loxahatchee River has a long-term climate monitoring station maintained by the National Oceanic and Atmospheric Administration (NOAA). According to monitoring conducted since 1985, the area's temperature has averaged 75.8 degrees Fahrenheit. This average temperature has increased 0.3 degrees Fahrenheit, per decade, since 1985 (NOAA, 2016).

The winds that affect the Loxahatchee River area average 10 miles per hour and typically gust from the east/southeast. These winds suspend moisture in the air for longer periods of time, routinely forming rain showers that end quickly (SFWMD, 2006). Since 1914-2000, the area around the Loxahatchee River has averaged an annual 60.4 inches of rain (SFWMD, 2006). The NOAA station in West Palm Beach has logged an average of 61 inches of rain since 1985 which reflects a decrease of 0.35 inches of rain, per decade (NOAA, 2016). Typically, there is a significant shift of precipitation noted during the summer when rain amounts peak and a significant decrease in precipitation during winter months. This clearly indicates a wet/dry seasonal trend. Nearly two-thirds (41 inches) of rain can occur between the months of May through October during the wet season. The remaining one-third (20 inches) of rain occurs between the months of November through April, during the dry season (Dent, 1997). Data also suggests that precipitation events occur in greater volume inland during the wet season than along the coast (SFWMD, 2002). This may be attributed to the direction of which the offshore convection currents carry moisture, as well as the high heat capacity of the ocean. The Jonathans Landing Development, located along the Lake Worth Creek area of the aquatic preserve, receives 34 percent less rainfall than the western boundary of the Loxahatchee watershed and nearly 12 percent less rain than LRD, located 15 miles inland from the development (SFWMD, 2002). The Loxahatchee River system additionally receives substantial rainfall due to strong disturbances such as tropical storms and hurricanes. These weather events can expel more than eight inches in a single day (SFWMD, 2006).

The Florida hurricane season is June 1st through November 30th. During this period, Loxahatchee River-Lake Worth Creek Aquatic Preserve has been known to undergo a number of large storm events which include 12 hurricanes since 1865 (NOAA, n.d.). Between 1865 and 1948, Northern Palm Beach County experienced six major no-name hurricanes - unnamed because a naming process was not instituted until 1950. There have been six major hurricanes which have directly affected the Loxahatchee River area since

1950: Hurricane Isabell (1964); Hurricane David (1979); Hurricane Irene (1999); Hurricane Frances (2004); Hurricane Jeanne (2004); Hurricane Wilma (2005) (NOAA, n.d.), and Hurricane Irma (2017).

Natural Communities

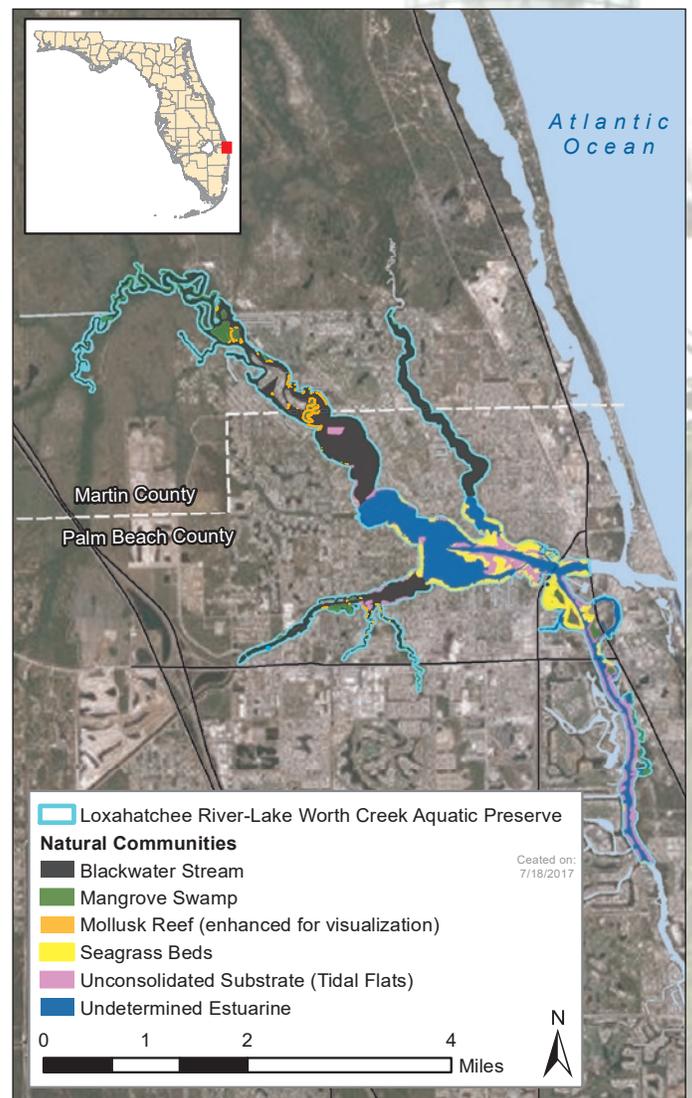
The natural community classification system used in this plan was developed by the Florida Natural Areas Inventory (FNAI) and the Florida Department of Natural Resources, now DEP, and updated in 2010. The community types are defined by a variety of factors, such as vegetation structure and composition, hydrology, fire regime, topography and soil type. The community types are named for the most characteristic biological or physical feature (FNAI, 2010). FNAI also assigns Global (G) and State (S) ranks to each natural community and species that FNAI tracks. These ranks reflect the status of the natural community or species worldwide (G) and in Florida (S). Lower numbers reflect a higher degree of imperilment (e.g., G1 represents the most imperiled natural communities worldwide, S1 represents the most imperiled natural communities in Florida).

Data used to produce a map delineating the major natural community types found in Loxahatchee River-Lake Worth Creek Aquatic Preserve were developed by the FNAI using multiple sources that include but not limited to the SFWMD, 2010; Florida Land Use Cover Forms Classification System, 2010; FNAI data on Element Occurrences, Potential Natural Areas and Areas of Conservation Interest among others. These data are not always based on comprehensive or site-specific field surveys, and no additional fieldwork was conducted for purposes of producing this map. The descriptions of the natural community types found in Loxahatchee River-Lake Worth Creek Aquatic Preserve have been adapted from the Guide to the Natural Communities (FNAI, 2010).

The natural community structure of the aquatic preserve can be broadly categorized based upon its hydrology as either estuarine or riverine in nature. Estuarine zones can be summarized as partially land-locked coastal water bodies that are tidally influenced. While still receiving a significant amount of freshwater, they are dominated by polyhaline and mesohaline salinity regimes (FNAI & Florida Department of Natural Resources, 1990). Riverine zones are characterized and dominated by freshwater sources limited only by downstream tidal influence where supporting oligohaline salinity regimes take effect. These two broad categorical natural communities are dynamic systems that play a role in supporting an array of both submergent and emergent habitats. Such natural communities include mollusk reefs, seagrass beds and mangrove strands which are included in both upper and lower tidal portions of the aquatic preserve's Central Embayment and subsequent tributaries (see Map 7) (DEP & SFWMD, 2010; FNAI, 2010).

FNAI Natural Community Type	Acres	Federal Rank	State Rank	Comments
Blackwater Stream	812	G4	S2	
Mangrove Swamp	65	G5	S4	
Mollusk Reef	10	G3	S3	
Seagrass Beds	152	G2	S2	
Unconsolidated Substrate	105	G5	S5	Acreeage only includes tidal flats, not other forms.
Undetermined Estuarine	593	NA	NA	

Table 2 | Summary of Florida Natural Areas Inventory natural communities in Loxahatchee River-Lake Worth Creek Aquatic Preserve.



Map 7 | Florida Natural Areas Inventory natural communities of Loxahatchee River-Lake Worth Creek Aquatic Preserve.



The aquatic preserve provides visitors a chance to experience the natural beauty of our state.

Blackwater Stream - The water from the upper portion of the Northwest Fork contains a high amount of particulate and dissolved organic matter. The water also contains a leaching, tea-colored substance originating from vegetation along the river's riparian zones, which is referred to as tannin (SFWMD & DEP, 2006). This type of flowing water is known as a blackwater stream. The confines of the blackwater stream region of the aquatic preserve extends from Riverbend Park (outside the boundaries of the aquatic preserve), past Trapper Nelson's historic site (Northern bounds of the Northwest Fork section of the aquatic preserve), downstream until river mile 9.5 (outside of Wild and Scenic portion) and comprise approximately 182 acres. It then meets with the upper portion of the tidally influenced estuarine community. Unusual characteristics of the vegetative distribution along the boundaries of this natural community are that they have a lower plant biodiversity in comparison to other rivers. They also have a canopy typically dominated by one species, as is the case with the riverine portion of the Loxahatchee River. Bald cypress (*Taxodium distichum*) dominate this arm of the river due to a historical hydroperiod and flow rates (SFWMD & DEP, 2006). In 1984, DEP estimated that the bald cypress strands in this region of the river typically range from 300-500 years in age. The blackwater stream natural community of Loxahatchee River–Lake Worth Creek Aquatic Preserve has been affected by the quantity of freshwater flowing from the watershed sources in the same manner that the bald cypress strands have been affected. Due to demands for new developments and alterations to the hydrology of the watershed to support various communities, freshwater deliveries from the C-14 and C-18 canals have been lowered over time. This allows for the saltwater intrusion to make its way further upstream limiting the distribution of both the blackwater stream community as well as the bald cypress strands (SFWMD & DEP, 2006).

Within the Wild and Scenic portion of the Northwest Fork, a similar type of submerged vegetation is present – American tapegrass (*Vallisneria americana*). Tapegrass is not a seagrass, as it is a freshwater plant, but it serves a similar habitat function. LRD and SFWMD documented a dramatic increase in coverage from 2010 to 2013, from one acre to approximately 13 acres in 2013, suggesting that the species is flourishing, and even flowering, under current conditions. There is speculation that the expansion of these grass beds could be related to meeting the recommended minimum flow levels for the river (LRD, 2013). Land management practices within Jonathan Dickinson State Park have provided a level of protection to this habitat through restoration and enhancement projects such as non-native invasive vegetation removal along shorelines. The water quality in the river is monitored at various points along the North and Northwest forks of the Loxahatchee River with levels of quality generally reported as very good. However, during the wet season, high bacterial counts from upstream areas would require seasonal closures of the swimming area located

within the state park, but these are less common now that more areas are on central sewer. Non-native invasive fish are common in the freshwater portion of this ecosystem including tilapia (*Tilapia mariae*), black acara (*Cichlasoma bimaculatum*), armored catfish (*Callichthys callichthys*), walking catfish (*Clarias batrachus*), and vermiculated sailfin catfish (*Pterygoplichthys disjunctivus*) (DEP, 2012).

Mollusk Reefs - Mollusk reefs are communities of sessile organisms from the phylum Mollusca and class Bivalva and are heavily influenced by tidal regimes. These are a valuable ecosystem component of the estuarine habitat which is dominated by the Eastern oyster (FNAI, 2010; SFWMD et al., 2012).

Within Loxahatchee River-Lake Worth Creek Aquatic Preserve, populations of another oyster species, the flat tree oyster (*Isognomon alatus*), have been noted in higher abundance near the Jupiter Inlet and infrequently within the Central Embayment. The flat tree oyster populations tend to settle on a differing substrate, preferring seawalls and pilings rather than forming consolidated bars (SFWMD et al., 2012). The areas conducive for the development of mollusk reefs within Loxahatchee River-Lake Worth Creek Aquatic Preserve show preference to the Central Embayment, the Northwest Fork, and the Southwest Fork. The Loxahatchee River has historically had a robust population of oysters as evidenced by indigenous Native American tribes constructing their shell mounds. Early in the 1900s, locals residing in this area used the shell spoils as a foundation medium on which their roadways were built (SFWMD et al., 2012).

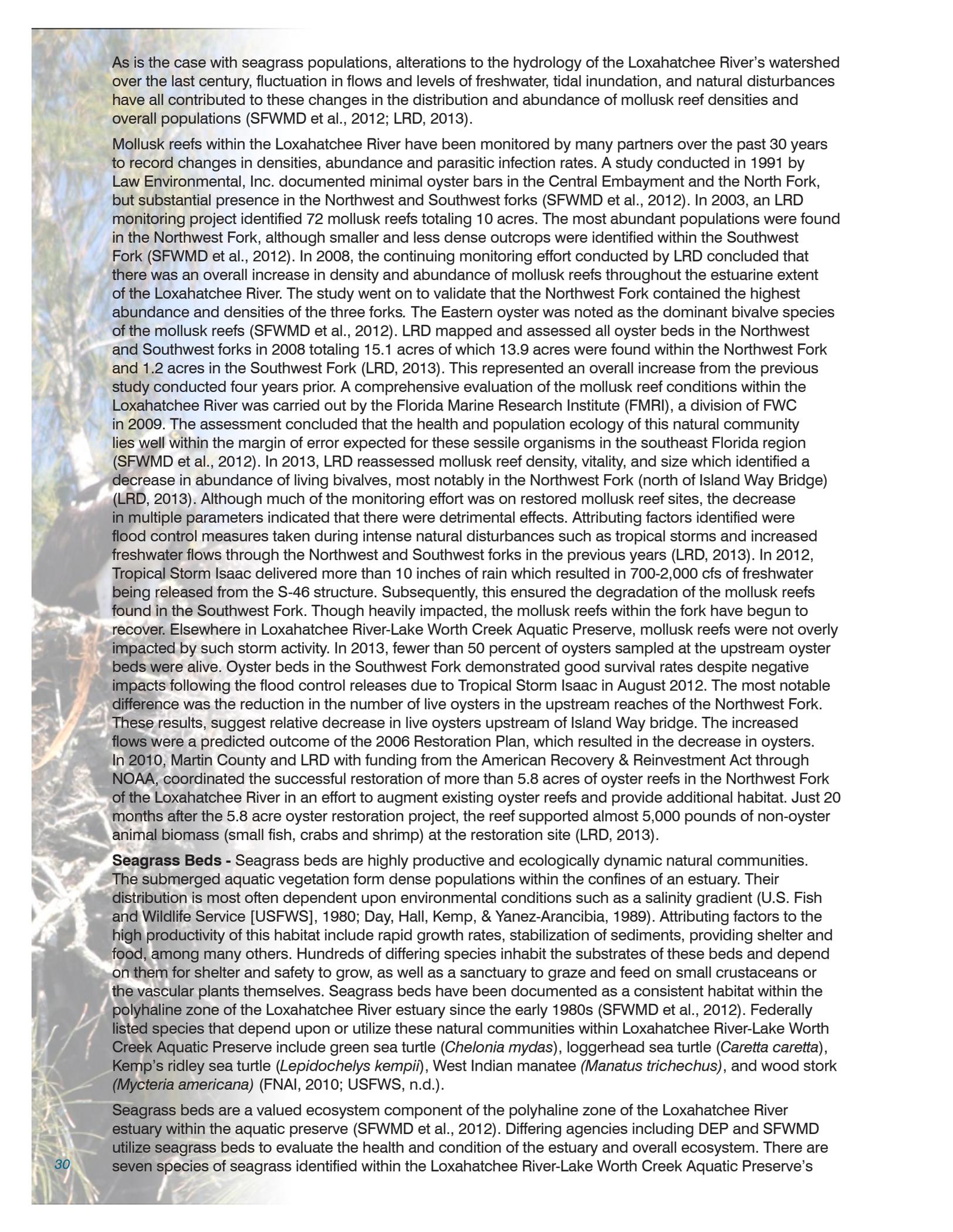
Extensive oyster bars existed near the vicinity of the Florida East Coast Railroad trestle near the mouth of the estuary. These bars occupied a significant portion of the narrowest part of the Loxahatchee River Estuary. The oyster bars were considered a major cause of the deteriorating condition of the river by local government and residents due to their restrictive effects on tidal and freshwater flow that are vital to the self-cleaning capacity of the river. They were also thought to inhibit boating. (Chiu, 1975). The oyster bars were removed between August 5, 1976 and August 29, 1977. A study was conducted by Chiu in 1975 to determine the effect of removing the oyster bars on tidal ranges, tidal currents and saltwater intrusion. The study concluded that dredging the oyster bars to a depth of six feet below mean sea level under and adjacent to the Florida East Coast Railroad trestle and A1A bridges would decrease the tidal range on the east side of the bridge and the time phase will be delayed about five minutes. The tide range on the west side of the bridges would increase about three percent and the tidal time phase would advance about five minutes. The model predicted an increase peak flood tidal flow of 320 feet/second and the peak volume would increase by 4 x 10⁶ feet. The model also predicted that the high water slack salinity profiles would move 260 feet to 600 feet further inland. This model was also used to predict the effect of removing the sandbars adjacent to the Florida East Coast Railroad trestle and A1A bridge along with the oyster bars. This modification resulted in a predicted further inland movement of the high slack salinity profiles by 350 feet to 900 feet. (SFWMD, 2002).



Lush beds of American tapegrass can be found in areas of the aquatic preserve that have not experienced saltwater intrusion.



Oysters are a keystone species in the aquatic preserve, and are closely monitored by many groups working within the Loxahatchee.



As is the case with seagrass populations, alterations to the hydrology of the Loxahatchee River's watershed over the last century, fluctuation in flows and levels of freshwater, tidal inundation, and natural disturbances have all contributed to these changes in the distribution and abundance of mollusk reef densities and overall populations (SFWMD et al., 2012; LRD, 2013).

Mollusk reefs within the Loxahatchee River have been monitored by many partners over the past 30 years to record changes in densities, abundance and parasitic infection rates. A study conducted in 1991 by Law Environmental, Inc. documented minimal oyster bars in the Central Embayment and the North Fork, but substantial presence in the Northwest and Southwest forks (SFWMD et al., 2012). In 2003, an LRD monitoring project identified 72 mollusk reefs totaling 10 acres. The most abundant populations were found in the Northwest Fork, although smaller and less dense outcrops were identified within the Southwest Fork (SFWMD et al., 2012). In 2008, the continuing monitoring effort conducted by LRD concluded that there was an overall increase in density and abundance of mollusk reefs throughout the estuarine extent of the Loxahatchee River. The study went on to validate that the Northwest Fork contained the highest abundance and densities of the three forks. The Eastern oyster was noted as the dominant bivalve species of the mollusk reefs (SFWMD et al., 2012). LRD mapped and assessed all oyster beds in the Northwest and Southwest forks in 2008 totaling 15.1 acres of which 13.9 acres were found within the Northwest Fork and 1.2 acres in the Southwest Fork (LRD, 2013). This represented an overall increase from the previous study conducted four years prior. A comprehensive evaluation of the mollusk reef conditions within the Loxahatchee River was carried out by the Florida Marine Research Institute (FMRI), a division of FWC in 2009. The assessment concluded that the health and population ecology of this natural community lies well within the margin of error expected for these sessile organisms in the southeast Florida region (SFWMD et al., 2012). In 2013, LRD reassessed mollusk reef density, vitality, and size which identified a decrease in abundance of living bivalves, most notably in the Northwest Fork (north of Island Way Bridge) (LRD, 2013). Although much of the monitoring effort was on restored mollusk reef sites, the decrease in multiple parameters indicated that there were detrimental effects. Attributing factors identified were flood control measures taken during intense natural disturbances such as tropical storms and increased freshwater flows through the Northwest and Southwest forks in the previous years (LRD, 2013). In 2012, Tropical Storm Isaac delivered more than 10 inches of rain which resulted in 700-2,000 cfs of freshwater being released from the S-46 structure. Subsequently, this ensured the degradation of the mollusk reefs found in the Southwest Fork. Though heavily impacted, the mollusk reefs within the fork have begun to recover. Elsewhere in Loxahatchee River-Lake Worth Creek Aquatic Preserve, mollusk reefs were not overly impacted by such storm activity. In 2013, fewer than 50 percent of oysters sampled at the upstream oyster beds were alive. Oyster beds in the Southwest Fork demonstrated good survival rates despite negative impacts following the flood control releases due to Tropical Storm Isaac in August 2012. The most notable difference was the reduction in the number of live oysters in the upstream reaches of the Northwest Fork. These results, suggest relative decrease in live oysters upstream of Island Way bridge. The increased flows were a predicted outcome of the 2006 Restoration Plan, which resulted in the decrease in oysters. In 2010, Martin County and LRD with funding from the American Recovery & Reinvestment Act through NOAA, coordinated the successful restoration of more than 5.8 acres of oyster reefs in the Northwest Fork of the Loxahatchee River in an effort to augment existing oyster reefs and provide additional habitat. Just 20 months after the 5.8 acre oyster restoration project, the reef supported almost 5,000 pounds of non-oyster animal biomass (small fish, crabs and shrimp) at the restoration site (LRD, 2013).

Seagrass Beds - Seagrass beds are highly productive and ecologically dynamic natural communities. The submerged aquatic vegetation form dense populations within the confines of an estuary. Their distribution is most often dependent upon environmental conditions such as a salinity gradient (U.S. Fish and Wildlife Service [USFWS], 1980; Day, Hall, Kemp, & Yanez-Arancibia, 1989). Attributing factors to the high productivity of this habitat include rapid growth rates, stabilization of sediments, providing shelter and food, among many others. Hundreds of differing species inhabit the substrates of these beds and depend on them for shelter and safety to grow, as well as a sanctuary to graze and feed on small crustaceans or the vascular plants themselves. Seagrass beds have been documented as a consistent habitat within the polyhaline zone of the Loxahatchee River estuary since the early 1980s (SFWMD et al., 2012). Federally listed species that depend upon or utilize these natural communities within Loxahatchee River-Lake Worth Creek Aquatic Preserve include green sea turtle (*Chelonia mydas*), loggerhead sea turtle (*Caretta caretta*), Kemp's ridley sea turtle (*Lepidochelys kempii*), West Indian manatee (*Manatus trichechus*), and wood stork (*Mycteria americana*) (FNAI, 2010; USFWS, n.d.).

Seagrass beds are a valued ecosystem component of the polyhaline zone of the Loxahatchee River estuary within the aquatic preserve (SFWMD et al., 2012). Differing agencies including DEP and SFWMD utilize seagrass beds to evaluate the health and condition of the estuary and overall ecosystem. There are seven species of seagrass identified within the Loxahatchee River-Lake Worth Creek Aquatic Preserve's



As freshwater flows are manipulated, mangroves have encroached into the Loxahatchee River.

estuarine system: manatee grass (*Syringodium filiforme*), turtle grass (*Thalassia testudinum*), Johnson's seagrass, paddle grass (*Halophila decipiens*), star grass (*H. engelmanni*), shoal grass (*Halodule wrightii*), and widgeon grass (*Ruppia maritima*) (SFWMD, et al., 2012). Johnson's seagrass is of great importance as it was the first marine-based plant species to be listed under the federal Endangered Species Act. Since 1998, Johnson's seagrass has been listed as a threatened species (National Marine Fisheries Service, 2007). The Loxahatchee River estuarine zone within the aquatic preserve contains the most abundant population of Johnson's seagrass on the east coast. Shoal grass and Johnson's seagrass are the two most dominant species of seagrass communities found within Loxahatchee River–Lake Worth Creek Aquatic Preserve (SFWMD et al., 2012). Various factors have contributed to changing the size and distribution of the seagrass beds throughout the Loxahatchee River. Fluctuations in salinity due to alterations in freshwater flow into the estuarine habitat, either by design or due to natural disturbances, are a major influence on this variability. Beginning in 1981, several organizations and agencies have evaluated the Loxahatchee River's seagrass bed communities. From the early 1980s, a generalized increase in seagrass coverage was observed. High rainfall in 1995 induced a dramatic impact on the distribution and abundance of the natural community. This resulted in a decrease in percent coverage of seagrass beds throughout the aquatic preserve but not to the degree that hurricanes Frances and Jeanne provided nine years later. Various agencies and organizations including SFWMD, DEP, LRD, and Jupiter Inlet District documented the decrease of seagrass beds post-hurricanes (SFWMD et al., 2012; LRD, 2013). Since the hurricane disturbances, much of Loxahatchee River–Lake Worth Creek Aquatic Preserve's seagrass bed natural communities have been in post-hurricane recovery. Nearly all monitoring sites experienced an increase in abundance, yet have not achieved the coverage of pre-hurricane conditions (LRD, 2013). Softer, organic rich sediments are found in the upper regions of the estuarine zone of the Loxahatchee River. This muck is a contributing factor to the limitation of seagrass beds upstream as well as the decrease in salinity. Tropical Storm Isaac caused significant and sustained decline in manatee grass at the North Bay and Sand Bar areas of the Loxahatchee River. As documented by ongoing monitoring by LRD, seagrasses are gradually declining (B. Howard & A. Arrington, personal communication, January 29, 2018).

Mangrove Swamps - Mangrove swamp communities within the Loxahatchee River are dominated by emergent vegetation such as red and black mangroves, constituting more than 40 percent of the river's shoreline (VanArman et al., 2005). These fragmented/fringe islands and mangrove swamp communities occur along the brackish, estuarine, low energy shorelines of the central embayment, tributaries, and creeks (FNAI, 2010). Four species of mangrove occur within the Loxahatchee River-Lake Worth Creek Aquatic



Reduced freshwater input to the Northwest Fork of the Loxahatchee River has allowed mangroves to establish in areas historically dominated by large cypress trees.

Preserve boundaries and are listed below by its zonation pattern from marine to riverine: red mangrove, black mangrove (*Avicenna germinans*), white mangrove (*Laguncularia racemosa*), and buttonwood (*Conocarpus erectus*). These dynamic vegetative communities are highly specialized and known for thriving in saline to hypersaline conditions through morphological and physiological adaptations. One such example involves the excretion of salt from leaves as done by both red and black mangroves. Another adaptation is present in the formation of thick succulent-like leaves that can collect salt and then be discarded as leaf litter as is the case with white mangroves. Mangrove swamp communities are biologically diverse, hosting hundreds of species ranging from mollusk, crustaceans, fish, and birds. Species including double-crested cormorant (*Phalacrocorax olivaceus*), great blue heron (*Ardea herodias*), brown pelican (*Pelecanus occidentalis*), and anhinga (*Anhinga anhinga*) utilize the mangrove canopies as rookeries and for courtship. Fish, including mangrove (or dog) snapper (*Lutjanus griseus*), sheepshead (*Archosargus probatocephalus*) and various snook species (*Centropomus* spp.), capitalize on the elaborate root structures of red and black mangroves. These root structures, referred to as prop roots and pneumatophores, provide spawning and refuge from predators while increasing their chances of achieving sexual maturity.

The distribution of mangrove swamp communities were significantly altered within Loxahatchee River-Lake Worth Creek Aquatic Preserve in the past century. Shoreline development, dredge and fill practices, navigational improvements, and modification to freshwater flows within the Loxahatchee watershed have all contributed to the internal shift in the distribution of the tidal swamp community (VanArman et al., 2005). A primary contributing factor to this change in distribution has been the permanent opening of the Jupiter Inlet. This action allowed saltwater to penetrate further upstream, inundating the soils and sediment to an extent where it became toxic to other vegetative communities that were not adapted to such conditions. An example of the impact is the freshwater swamp natural communities that were historically dominated by bald cypress are now dominated by salt-tolerant species (VanArman et al., 2005; SFWMD & DEP, 2006; DEP & SFWMD, 2010). A major ecological process that drives trophic structure and productivity in estuarine and coastal systems is quality and quantity of biological material that is transported from the adjacent watershed and river into the estuary and converted to biomass of estuarine and marine organisms. This shift from cypress dominated to mangrove dominated shoreline will have significant unpredictable effects on productivity and diversity of coastal ecosystems. Coastal salt marsh and mangrove communities have been almost eliminated from the estuarine portions of the North Fork and Southwest Fork due to shoreline development, as well as the areas around Lake Worth Creek (VanArman et al., 2005).



American alligators are a common sight along the northern portions of the Loxahatchee River.

Unconsolidated Substrate - The foundation of natural communities such as salt marshes, seagrasses, and mollusk reefs are developed and often dependent on the establishment and success of unconsolidated substrates such as mud flats and tidal flats. The unconsolidated substrate is characterized as expansive, relatively open areas of subtidal, intertidal, and supratidal zones which lack dense populations of sessile flora and fauna species. Although these extensive natural communities appear void of life, it is in fact to the contrary. Tidal flats, mud flats, and sand bars provide infaunal organisms a substrate to burrow as well as providing a feeding ground for bottom dwelling fish. Unconsolidated substrates are important in that they form the foundation for the development of other riverine and estuarine natural communities when conditions become appropriate. Unconsolidated substrate communities are associated with and often grade into mollusk reefs, mangrove swamps, and seagrass beds. Sand bars found within the aquatic preserve are also an important recreational area drawing boaters and kayakers. Dredging of private and public channels as well as boat traffic within the Loxahatchee River has disturbed much of the unconsolidated substrate. Seagrass beds once found near the Central Embayment have gradually converted to unconsolidated substrate due to a gradual decline.

Native Species

Loxahatchee River-Lake Worth Creek Aquatic Preserve is a highly productive habitat where a wide variety of flora and fauna reside. Factors such as climate, vegetation, and tidal connectivity allow for a diverse population of species. Included in this population are some that are native or listed as Endangered, Threatened, or Species of Special Concern by either the federal government or by FWC. More than 250 species of fish representing 78 families have been identified within the Loxahatchee River and its estuary (Christensen, 1965).

Several bird species create rookeries within the surrounding vegetation of the Loxahatchee River including common species such as great blue heron, snowy egret (*Egretta thula*), white ibis (*Eudocimus albus*) and osprey (*Pandion haliaetus*). Frequently, these birds prey upon a variety of common fish species such as red drum (*Sciaenops ocellatus*), mangrove snapper, Crevalle jack (*Caranx hippos*) and Florida gar (*Lepisosteus platyrhincus*). These species reside within the Loxahatchee River estuary and central embayment to the Wild and Scenic portion of the river (Christensen, 1965). Various common flora species reside within or along the banks of Loxahatchee River-Lake Worth Creek Aquatic Preserve such as bald cypress, cabbage palm, seagrape (*Coccoloba uvifera*), and slash pine (*Pinus elliotii*). Such flora species provide nutrients, refuge, and courting habitat for the bird species mentioned above. Other flora species along the banks of the aquatic preserve include various ferns, mangroves and even gumbo limbo (*Bursera simaruba*).



Osprey are commonly found around the aquatic preserve.

Listed Species

Loxahatchee River-Lake Worth Creek Aquatic Preserve provides crucial habitat for several species that are either federally or state designated as Threatened, Endangered, or Species of Special Concern (SSC) under Chapters 68A-27 and 5B-40 F.A.C. and the Endangered Species Act. There are currently numerous listed species that are noted within or along the shoreline of the aquatic preserve (Gissendanner, 1984; DEP, 2012; SFWMD, 2006).

The only listed plant species occurring in the aquatic preserve is the federally-listed Threatened Johnson's seagrass. This species was the first and only marine plant to be listed under the Endangered Species Act and provides shelter and nursery habitat for benthic organisms within the aquatic preserve. This species also provides sustenance for other endangered or threatened species including the West Indian manatees and green sea turtles (National Marine Fisheries Service, 2015).

Several faunal species are listed as either SSC, Threatened, or Endangered such as the American alligator (*Alligator mississippiensis*) (federally Threatened due to similarity of appearance to American crocodile [*Crocodylus acutus*]), Florida pine snake (*Pituophis melanoleucus mugitus*) (Threatened) and gopher tortoise (*Gopherus polyphemus*) (Threatened) (FWC, 2017). The opossum pipefish is a circumtropical (organisms which occur around the tropics of the world) species that was designated as a Species of Concern through NOAA's National Marine Fisheries Service in 1991 due to habitat destruction (associated with seawall, dock, and rip rap construction) and, isolation from habitat due to water control structures and degraded water quality. Predictable breeding adult populations in Florida are limited to the tributaries of the Indian River Lagoon (IRL) (e.g. St. Lucie and Loxahatchee rivers) (Gilmore, 1992, 1999). The Eastern indigo snake (*Drymarchon corais couperi*) is also listed by the state and federal government as Threatened. The construction of residential communities in the vicinity of the aquatic preserve has forced many of the terrestrial species from their native habitats and closer to the river edge. Aquatic species have also been affected by the expansion of development with the alteration of hydrology and freshwater flows into the Loxahatchee River. These species have also been forced to either relocate or adapt to the changing environmental conditions. Palm Beach County's Department of Environmental Resources Management conducts grid transects to assess the abundance and distribution of green turtles (*Chelonia mydas*) which have been documented in the lower estuary portion of the Loxahatchee River and the Jupiter Inlet. (M. Mitchell, personal communication, February 8, 2018).

Mammals that are state listed SSC include the Sherman's fox squirrel (*Sciurus niger shermani*). The only federal and state listed mammal within the aquatic preserve boundary is the West Indian manatee.



Along many developed shorelines, non-native, invasive vegetation have become well established.

This herbivorous species thrives within the ecotones between marine habitats and freshwater habitats. They typically follow the submerged aquatic vegetation distribution that constitutes the majority of the species diet. According to FWC manatee mortality data for 2016, watercrafts were the second highest cause of manatee mortality after perinatal (manatees under 150 cm [~five feet] in total length which are not determined to have died due to human-related causes) deaths (FWC, 2016). The Loxahatchee River has been designated as a critical habitat for West Indian manatee by the USFWS. Their goal is to protect the species from further detrimental effects from anthropogenic interactions and in time, increase populations statewide.

Birds comprise the largest number of protected species within Loxahatchee River-Lake Worth Creek Aquatic Preserve. Avian species are ecologically important within the Loxahatchee River ecosystem as they function as environmental indicator species. The differing avian species' presence provides scientists an insight into how the natural communities, water quality conditions, and anthropogenic activity are affecting the surrounding habitats. Species that are federally or state listed as Threatened include the roseate spoonbill (*Platalea ajaja*), tricolored heron (*Egretta tricolor*), little blue heron (*E. caerulea*), reddish egret (*E. rufescens*), black skimmer (*Rynchops niger*), Southeastern American kestrel (*Falco sparverius paulus*), least tern (*Sternula antillarum*), Florida sandhill crane (*Grus canadensis pratensis*), and wood stork, (FWC, 2017). These species are highly dependent on the tidal and freshwater swamp natural communities to reproduce, predate, and roost. Federally and state listed birds that are classified as Endangered include the Kirtland's warbler (*Dendroica kirtlandii*), red-cockaded woodpecker (*Picoides borealis*), and Everglades snail kite (*Rostrhamus sociabilis plumbeus*) (FWC, 2017). The red-cockaded woodpecker has not been seen in the park since 1983. A complete list of federal and state listed species is included in Appendix B.3.2.

Invasive Non-native and/or Problem Species

In 2008, DEP cataloged more than 80 invasive, non-native species within and immediately adjacent to Loxahatchee River-Lake Worth Creek Aquatic Preserve. Examples of invasive, non-native flora include sword fern (*Nephrolepis cordifolia*), Old World climbing fern (*Lygodium microphyllum*), Brazilian pepper (*Schinus terebinthifolius*), Australian pine (*Casuarina* spp.), arrowhead vine (*Syngonium podophyllum*), wild taro (*Colocasia esculenta*), Asian marsh weed (*Limnophilia sessiliflora*), and Indian swamp weed (*Hygrophilia polysperma*), Java plum (*Syzigium cumini*), strawberry guava (*Psidium cattleianum*), and melaleuca (*Melaleuca quinquenervia*) (DEP & SFWMD, 2010). The spread of Java plum from the Trapper Nelson Historical Site went unchecked from the time Nelson planted them (prior to 1968) until 2005 when contracted arborists removed large seed trees to protect the district's historic structures. Subsequently,

state park staff and contractors have been removing Java plum from the surrounding floodplain swamp and mangrove swamp (DEP, 2012). Extensive residential and commercial development, as well as alterations to the hydrology of the Loxahatchee River-Lake Worth Creek watershed have contributed to the expansion and prevalence of species such as Brazilian pepper and melaleuca. Brazilian pepper, along with many other Florida Exotic Pest Plant Council Category I plant species outcompete and often replace native vegetation. This is a result of anthropogenic effects such as those mentioned previously, and dispersion via migratory fruit-eating birds and mammals (FWC, n.d.).

There are several invasive, non-native aquatic vegetation species found in the upper regions of Loxahatchee River-Lake Worth Creek Aquatic Preserve, including water hyacinth (*Eichhornia crassipes*) and water lettuce (*Pistia stratiotes*) (DEP & SFWMD, 2010). The above listed freshwater-dependent Category I invasive plant species have widespread detrimental effects on the functionality of ecosystems. These two species have tremendous growth rates that can quickly encompass the entire surface of water bodies, impeding the survival and reproductive abilities of native submerged species such as American tapegrass. They also contribute to declining water quality by depleting dissolved oxygen concentrations. Species such as water lettuce and, water hyacinth, often require mechanical removal by entire departments. These species have the capability to impede navigation if not properly controlled and removed. Most of the shoreline along the Lake Worth Creek portion of the aquatic preserve is developed residential housing. The vegetation along the banks consists primarily of turf grass, along with non-native ornamentals.

Examples of invasive, non-native fish include sailfin catfish, blue tilapia (*Oreochromis aureus*), grass carp (*Ctenopharyngodon idella*), and Mayan cichlid (*Cichlasoma urophthalmus*). Due to rapid growth rates and high dietary requirements, they are classified as Conditional Species under rules regulating non-native species, Section 68-5.002 F.A.C., meaning no person shall import into the state, sell, possess, or transport any live specimens of the species, or hybrids or eggs thereof, except by permit. They are detrimental to native species as they often reproduce in greater abundance and at higher rates while simultaneously consuming

available sources of food. Perhaps the greatest threat from invasive, non-native species within Loxahatchee River-Lake Worth Creek Aquatic Preserve is the intrusion and establishment of lionfish (*Pterois volitans* and *P. miles*) populations. These species have been recorded by several agencies and researchers including Florida International University, LRD, FWC, and DEP. These venomous predators have been documented within the aquatic preserve since 2010, expanding their presence to Pennock Point, the meeting point of the Southwest Fork and the Central Embayment (Jud, Layman, Lee, & Arrington, 2011). The only limiting factor to the species continuing their migration upstream is the increase of freshwater concentrations and subsequent decrease in salinity approaching the Northwest and North forks. Lionfish have the potential to cause catastrophic effects on nearshore reefs and estuaries through predation events



The lighthouse is a Jupiter landmark which draws many tourists to the area.

of juvenile fisheries and crustaceans. The two invasive species were introduced unintentionally to the system through anthropogenic activities. The invasive lionfish have taken advantage of the shoreline hardening and development activities such as sea walls, rip-rap, dock pilings and abandoned crab traps which provide structure for the species to ambush passing prey (Jud et al., 2011). Zac Jud, a former Florida International University post graduate student and researcher of lionfish, was quoted by the Palm Beach Post in 2010 stating “The damage lionfish can cause touches everyone. Economically, it hurts the fishing and tourism; they eat non-stop, all day long” (DiPaolo, 2010). Active, long-term monitoring of these two venomous fish as well as increasing efforts to remove them, is in the public interest as well as beneficial to the aquatic preserve.

There are also a variety of non-native animals including feral pigs (*Sus scrofa*), nine-banded armadillos (*Dasypus novemcinctus*), Cuban anole (*Anolis sagrei*), Cuban treefrogs (*Osteopilus septentrionalis*), and greenhouse frogs (*Eleutherodactylus planirostris*). Feral pigs commonly root up wetland vegetation in and around the floodplain and their population levels are managed through a trapping program. The other animals listed above are generally left unmanaged because of the high degree of difficulty in their removal (DEP & SFWMD, 2010).

Archaeological and Historical Resources

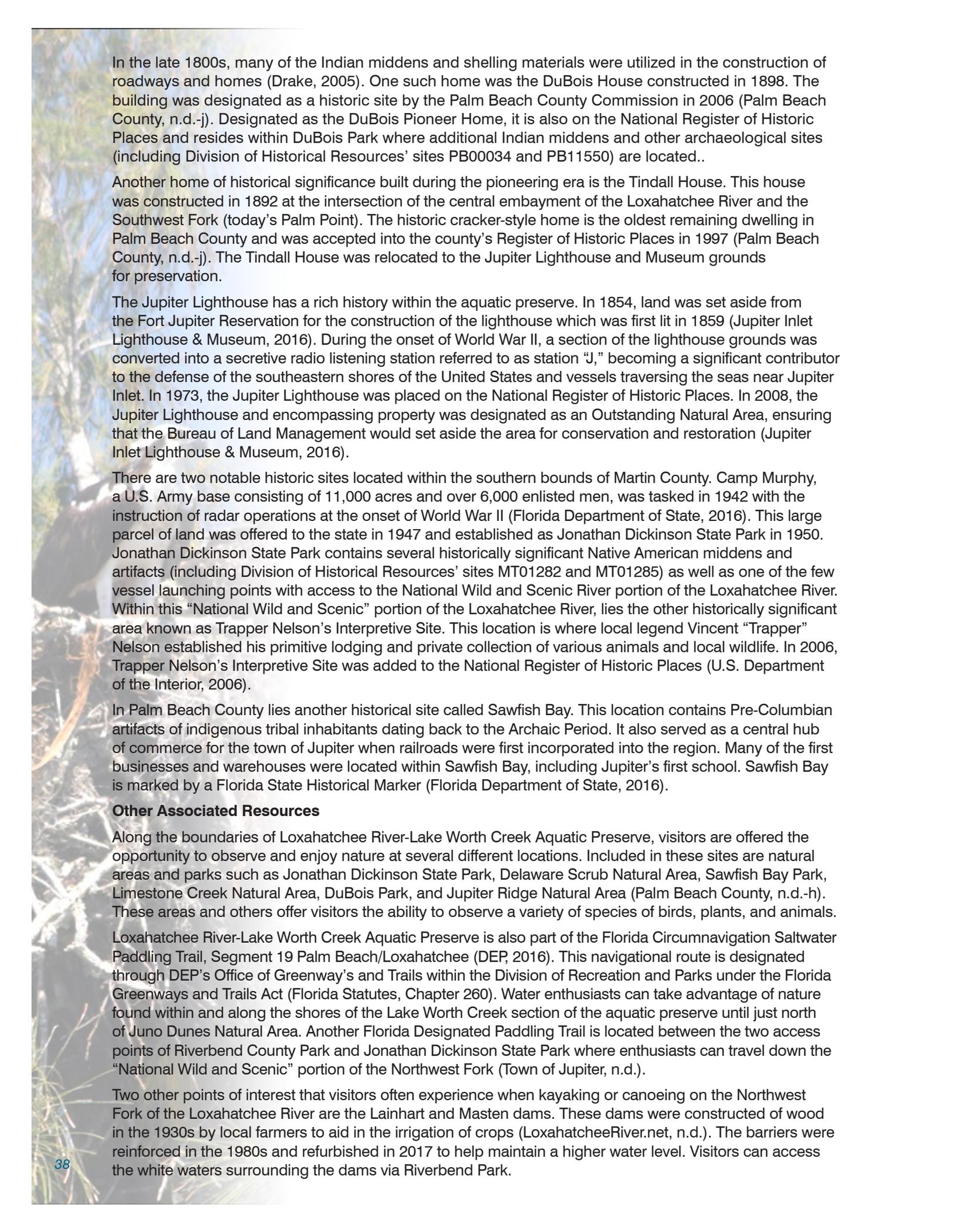
The Florida Division of Historical Resources maintains an inventory of the cultural resources of the state in its Florida Master Sites File system. Palm Beach and southern Martin counties contain diverse, culturally rich historic and archeological sites around Loxahatchee River-Lake Worth Creek Aquatic Preserve (see Map 8). There are several sites totaling more than 2600 acres that have been identified by the Florida Department of State’s Division of Historical Resources as areas of significant archaeological importance surrounding the aquatic preserve, which reflect a vibrant history spanning thousands of years (see Appendix B.5). It should be noted that archaeological sites and historical resources are protected (Chapter 267, Florida Statutes) and are not to be disturbed unless prior permission is granted from the Department of State’s Division of Historical Resources.

During the Archaic Period, more than 5,000 years ago, Native Americans were constructing middens along the banks of the Loxahatchee River in areas such as Sawfish Bay. Experts have unearthed polished greenstone axe heads, pottery and other artifacts that date back from 5000 B.C. to 500 B.C. from such Indian middens (Historical Society of Palm Beach County, 2009a). Two such indigenous Native American tribes, the Jeaga (Yay-ga) and Jobe (Ho-bay), were located along the east coast of Florida, ranging 160 miles - from present day Titusville to West Palm Beach (Historical Society of Palm Beach County, 2009a). Members of these tribes established settlements along the banks of the Loxahatchee River. These tribes did not focus on the cultivation of crops, but rather the hunting and gathering of shellfish, fish, deer, raccoon, and berries. Due to a predominant diet of shellfish, the Jeaga people concentrated the disposal of the shell and bones into mounds called middens. These middens grew from one generation to the next and over time became large enough to support the construction of culturally significant buildings, subsequently protecting them from flooding events.

The Indian middens were described in a journal in 1696 by Jonathan Dickinson during his time of captivity by the Jeaga people. He transcribed the unique wigwam style homes that his captors placed atop large shell mounds overlooking Jupiter Inlet (Historical Society of Palm Beach County, 2009a).



Map 8 | Cultural sites associated with Loxahatchee River-Lake Worth Creek Aquatic Preserve. Note: Sensitive sites have been omitted from the map.



In the late 1800s, many of the Indian middens and shelling materials were utilized in the construction of roadways and homes (Drake, 2005). One such home was the DuBois House constructed in 1898. The building was designated as a historic site by the Palm Beach County Commission in 2006 (Palm Beach County, n.d.-j). Designated as the DuBois Pioneer Home, it is also on the National Register of Historic Places and resides within DuBois Park where additional Indian middens and other archaeological sites (including Division of Historical Resources' sites PB00034 and PB11550) are located..

Another home of historical significance built during the pioneering era is the Tindall House. This house was constructed in 1892 at the intersection of the central embayment of the Loxahatchee River and the Southwest Fork (today's Palm Point). The historic cracker-style home is the oldest remaining dwelling in Palm Beach County and was accepted into the county's Register of Historic Places in 1997 (Palm Beach County, n.d.-j). The Tindall House was relocated to the Jupiter Lighthouse and Museum grounds for preservation.

The Jupiter Lighthouse has a rich history within the aquatic preserve. In 1854, land was set aside from the Fort Jupiter Reservation for the construction of the lighthouse which was first lit in 1859 (Jupiter Inlet Lighthouse & Museum, 2016). During the onset of World War II, a section of the lighthouse grounds was converted into a secretive radio listening station referred to as station "J," becoming a significant contributor to the defense of the southeastern shores of the United States and vessels traversing the seas near Jupiter Inlet. In 1973, the Jupiter Lighthouse was placed on the National Register of Historic Places. In 2008, the Jupiter Lighthouse and encompassing property was designated as an Outstanding Natural Area, ensuring that the Bureau of Land Management would set aside the area for conservation and restoration (Jupiter Inlet Lighthouse & Museum, 2016).

There are two notable historic sites located within the southern bounds of Martin County. Camp Murphy, a U.S. Army base consisting of 11,000 acres and over 6,000 enlisted men, was tasked in 1942 with the instruction of radar operations at the onset of World War II (Florida Department of State, 2016). This large parcel of land was offered to the state in 1947 and established as Jonathan Dickinson State Park in 1950. Jonathan Dickinson State Park contains several historically significant Native American middens and artifacts (including Division of Historical Resources' sites MT01282 and MT01285) as well as one of the few vessel launching points with access to the National Wild and Scenic River portion of the Loxahatchee River. Within this "National Wild and Scenic" portion of the Loxahatchee River, lies the other historically significant area known as Trapper Nelson's Interpretive Site. This location is where local legend Vincent "Trapper" Nelson established his primitive lodging and private collection of various animals and local wildlife. In 2006, Trapper Nelson's Interpretive Site was added to the National Register of Historic Places (U.S. Department of the Interior, 2006).

In Palm Beach County lies another historical site called Sawfish Bay. This location contains Pre-Columbian artifacts of indigenous tribal inhabitants dating back to the Archaic Period. It also served as a central hub of commerce for the town of Jupiter when railroads were first incorporated into the region. Many of the first businesses and warehouses were located within Sawfish Bay, including Jupiter's first school. Sawfish Bay is marked by a Florida State Historical Marker (Florida Department of State, 2016).

Other Associated Resources

Along the boundaries of Loxahatchee River-Lake Worth Creek Aquatic Preserve, visitors are offered the opportunity to observe and enjoy nature at several different locations. Included in these sites are natural areas and parks such as Jonathan Dickinson State Park, Delaware Scrub Natural Area, Sawfish Bay Park, Limestone Creek Natural Area, DuBois Park, and Jupiter Ridge Natural Area (Palm Beach County, n.d.-h). These areas and others offer visitors the ability to observe a variety of species of birds, plants, and animals.

Loxahatchee River-Lake Worth Creek Aquatic Preserve is also part of the Florida Circumnavigation Saltwater Paddling Trail, Segment 19 Palm Beach/Loxahatchee (DEP, 2016). This navigational route is designated through DEP's Office of Greenway's and Trails within the Division of Recreation and Parks under the Florida Greenways and Trails Act (Florida Statutes, Chapter 260). Water enthusiasts can take advantage of nature found within and along the shores of the Lake Worth Creek section of the aquatic preserve until just north of Juno Dunes Natural Area. Another Florida Designated Paddling Trail is located between the two access points of Riverbend County Park and Jonathan Dickinson State Park where enthusiasts can travel down the "National Wild and Scenic" portion of the Northwest Fork (Town of Jupiter, n.d.).

Two other points of interest that visitors often experience when kayaking or canoeing on the Northwest Fork of the Loxahatchee River are the Lainhart and Masten dams. These dams were constructed of wood in the 1930s by local farmers to aid in the irrigation of crops (LoxahatcheeRiver.net, n.d.). The barriers were reinforced in the 1980s and refurbished in 2017 to help maintain a higher water level. Visitors can access the white waters surrounding the dams via Riverbend Park.



Much of the natural shorelines of the Loxahatchee River and Lake Worth Creek have been lost to development.

3.4 / Values

The primary economic driver in Florida is tourism. In 2015, Florida set a record with 105 million visitors, exceeding 2014's high by more than six percent (Flgov.com, 2016). The year of 2015 was the fifth consecutive year that the state exceeded its previous record. Of the 105 million tourists that visited Florida, nearly 90 million were of domestic origin, 11 million from overseas, and 4 million from Canada. In 2015, the tourism industry produced more than 1.1 million jobs within the state, which is a 4.7 percent increase from the previous year (Flgov.com, 2016).

Visitors from throughout the United States and around the world visit southeast Florida for many reasons such as its mild winter temperatures, abundant sunshine, recreational activities, and various natural parks or preserves. Loxahatchee River-Lake Worth Creek Aquatic Preserve is publicly owned and both economically and ecologically valuable to the southeast region of Florida. The aquatic preserve provides residents and visitors a location for recreational and commercial activities such as boating, fishing, and observing nature.

The Loxahatchee River and its tributaries provide diverse recreational and commercial fishing such as blue crab, striped mullet, common snook, and tarpon (DEP, n.d.-c). Although there are currently no formal working waterfronts, commercial fishermen, charter boat captains, and eco-tour guides utilize these waters to provide paying customers a personal experience with nature that cannot be found elsewhere. Differing habitats such as mangroves, freshwater swamps, seagrass beds and oyster patch reefs are conducive for juvenile fishes and nesting birds. Cypress swamps, pine uplands, freshwater marshes, mangrove swamps, and hardwood hammocks all thrive within or along the shores of the Loxahatchee River. These provide adequate refuge for threatened species such as the sandhill crane and the wood stork. They also offer refuge for various endangered species such as the West Indian manatee, piping plover (*Charadrius melodus*), and Everglades snail kite (U.S. Fish and Wildlife Service, n.d.).

These differing habitats help support the population of the surrounding area by providing fertile soils, food, storm protection, flood control, water filtration and recreation. Developing an estimated total ecosystem service value for Loxahatchee River-Lake Worth Creek Aquatic Preserve would be difficult in addition to possibly understating its significance within the surrounding community. As stated by former Florida Senator Ken Pruitt in regards to the aquatic preserve, "the federal government has recognized its importance; the state of Florida has, and the local communities have" (LRD, n.d.). The U.S. government has designated the upper portion of the Northwest Fork as a National Wild and Scenic River which

supports such a statement. Less than a quarter of one percent of the nation's rivers, and only two rivers in Florida, are protected under this designation

The town of Jupiter averages a temperature of 75 degrees Fahrenheit and 235 days of sunshine (Town of Jupiter, 2015b). Between late November and early April, approximately 12,500 visitors join the 56,000 year-round residents (Villella, 2014). These visitors, known as snowbirds, and other tourists provide a season of increased income for the local and state economies. Most snowbirds come to this area to experience nature such as those provided by the waters of the aquatic preserve.

More than 70 percent of the residents in Jupiter are homeowners. Their property taxes (known as ad valorem), contribute the largest source (40 percent) of funding for Jupiter's general operations (Town of Jupiter, 2015a). The appeal of Loxahatchee River-Lake Worth Creek Aquatic Preserve is demonstrated by adjoining homes possessing the highest property values in the area, thereby providing the most income from ad valorem taxes. These ad valorem taxes generated more than 17 million dollars in funding in 2015 (Town of Jupiter, 2015b).

Since the recession, Jupiter has broadened its economic portfolio by investing in emerging new technologies and growing a biotech industry (Villella, 2014). Much of the driving force behind these new initiatives originate from Florida Atlantic University's Jupiter campus, where the Scripps Research Institute and Max Planck Florida Institute for Neuroscience are located, as well as the Center for Environmental Studies and the Hibbel Museum of Art.

3.5 / Citizen Support Organizations, Working Groups, and Nongovernmental Organizations

Intergovernmental working groups, environmental centers and volunteer citizen groups play an important role in the preservation and enhancement of Loxahatchee River-Lake Worth Creek Aquatic Preserve. Through partnerships created among the various nongovernmental organizations, educational organizations, and citizens, numerous opportunities for protection, research and enhancement of the aquatic preserve are fulfilled.

Friends of the Spoil Islands, Inc. (FOSI) is the official citizen support organization (CSO) of the IRLAP office. Created through a Memorandum of Agreement with DEP on October 13, 2014 (Appendix A.4), FOSI is

governed by an independent elected board. The mission of the group is to work in conjunction with IRLAP staff to assist in the preservation, restoration and enhancement of the Indian River Lagoon Aquatic Preserve spoil islands and educating others about the importance of the spoil islands as valuable educational, recreational, and conservation resources. FOSI consists of local citizens and business owners committed to the protection of the IRL by working with individuals, groups, and agencies for the enhancement of the islands and waters of the IRL. (www.friendsofspoilislands.org)

Wildpine Ecological Laboratory (WildPine Lab) is a state-certified laboratory and a program of LRD which provides scientific staff, equipment and professional analysis of daily plant operations for LRD's wastewater treatment plant, as well as conducting an extensive river research program. The WildPine Lab maintains the plant's safety standards through continuous monitoring and testing, ensuring the operations of the plant remain in compliance with all state and federal standards. Ecological studies conducted by the staff, from the monitoring of seagrasses to oyster reefs to water quality, are critical to the management of the watershed. The lab also houses an extensive library of past and present data and reports pertaining



Once slated for development, Fullerton Island is now a public park for kayakers, boaters and hikers.

to the river, collected by various agencies over the last thirty years, and offers opportunities for public involvement, such as a community volunteer water quality monitoring program, and internships for high school and college students. (www.loxahatcheeriver.org/river/wildpine-laboratory)

The Loxahatchee River Center (River Center) is a program of LRD, dedicated to the preservation of the Loxahatchee River through environmental stewardship, with quality education programs, exhibits and meaningful events. The center, which is free to the public, houses numerous aquaria depicting the different habitats found within the river, and is the home of LRD's environmental education program. (www.lrdrivercenter.org/)

Hobe Sound Nature Center, Inc. is a private, non-profit organization, dedicated to environmental awareness and education. The center is a cooperating association with the U.S. Fish and Wildlife Service and is located at the Hobe Sound National Wildlife Refuge. Hobe Sound Nature Center offers both on and off-site native wildlife presentations and field experiences to local natural areas. (www.hobesoundnaturecenter.com)

Loxahatchee River Historical Society was established in 1971, and incorporated in 1972. The Loxahatchee River Historical Society is a 501(c)3 nonprofit dedicated to the preservation of the area's unique and diverse heritage, operating key historical sites and museum with a focus on educating the public. As stewards of the Jupiter Inlet Lighthouse and Museum and a partner in the National Conservation Lands, the Loxahatchee River Historical Society preserves and interprets the dynamic heritage, ancient cultural history, and sensitive natural systems of the Jupiter Inlet Lighthouse Outstanding Natural Area and the Loxahatchee River region. (www.jupiterlighthouse.org)

Busch Wildlife Sanctuary was originally founded in 1983 with the primary mission of wildlife rehabilitation by caring for sick, injured, and orphaned wild animals. In 1997, the sanctuary developed a partnership with LRD, which resulted in the construction of the sanctuary's current facility located on LRD property. The sanctuary provides medical and rehabilitative care to more than 5,000 wild animals each year with the ultimate goal of returning recovered animals to their natural habitats. Annually, more than 100,000 children and adults visit the sanctuary and participate in environmental programs, tours, and exhibits. (www.buschwildlife.org)



Anchor from the Spanish vessel "San Miguel Arcangel", which wrecked in 1659.

3.6 / Adjacent Public Lands and Designated Resources

Surrounding Loxahatchee River-Lake Worth Creek Aquatic Preserve are a variety of natural areas, parks and preserves (see Map 9). Each plays a role in the conservation of natural communities and organisms as well as provide opportunities for the public to observe and participate in such dynamic habitats and scenic beauty. Conservation lands that are important to the aquatic preserve and the surrounding communities include Blowing Rocks Preserve, Jones Creek Preserve, Jones Creek Headwaters, and Sims Creek



A hike to the top of Hobe Tower in Jonathan Dickinson State Park provides a view of the scrub habitat, the Jensen Beach to Jupiter Inlet Aquatic Preserve, as well as the Atlantic Ocean.

Preserve. There are numerous natural areas within and around Loxahatchee River-Lake Worth Creek Aquatic Preserve including C-18 Triangle Natural Area, Loxahatchee River Management Area, Cypress Creek Natural Area, Delaware Scrub Natural Area, Jackson Riverfront Pines Natural Area, Jupiter Inlet Lighthouse Outstanding Natural Area, Jupiter Mangroves Natural Area, Limestone Creek Natural Area, and North Jupiter Flatwoods Natural Area. There are several county and state parks available for residents or visitors to enjoy including Carlin Park, Coral Cove Park, DuBois Park, Jonathan Dickinson State Park, Jupiter Beach Park, Loxahatchee River Park, and Riverbend Park. There are also areas that do not fall under these previous categories but are significant to the surrounding communities including Fullerton Island, Jones Creek Hammock, and open spaces at Todd Street and Washington Street.

Blowing Rocks Preserve, located on Jupiter Island, at the southernmost tip of the Indian River Lagoon is managed by The Nature Conservancy. The preserve runs for one mile from north to south – and from the Atlantic Ocean on the east to the Indian River Lagoon on the west. Originally infested by non-native, invasive vegetation, the preserve has been restored to reflect what South Florida barrier islands looked like a century ago. During high tides, water is sprayed skyward as the sea breaks against the Anastasia Limestone shoreline with plumes reaching 50 feet or higher (The Nature Conservancy, n.d.). Native habitats include beach dune, coastal strand, tropical hardwood hammock and mangrove swamp that provide refuge for a variety of organisms including threatened or listed species. Hawley Educational Center was built in 1996, and hosts exhibits and a winter lecture series about The Nature Conservancy's efforts to protect native habitats, plants and animals in Florida and around the world. The Nature Conservancy staff share best practices with land managers and owners throughout the region, and collaborate with local, state and federal agencies to restore coastal habitat (The Nature Conservancy, n.d.).

Jones Creek Preserve is part of the Jupiter Open Space program. This 1.34-acre property aids in the protection of water resources that flow into the Loxahatchee River. Located along Indiantown Road among shopping centers and residential neighborhoods, this small preserve was selected as an open space project, in part, for its value in preserving and restoring the area's water resources. The soils are sandy, and the area is comprised of a small upland section, mangroves, and wetland habitat. A kayak launch will eventually be constructed at the site.

Jones Creek Hammock is a 22-acre preserve located behind the North County Aquatic Complex, featuring parking, a nature trail, and boardwalk. The area has a mix of four different natural communities including pine flatwoods, mangrove swamp, cypress slough, and oak hammock. The historic headwaters of Jones Creek contains a cypress slough, home to a 400-year-old cypress tree, and a high diversity of

local wildlife. The Jones Creek Hammock was added to the Jupiter Open Space Program in 2006 and opened to the public in 2007. (Town of Jupiter, 2012).

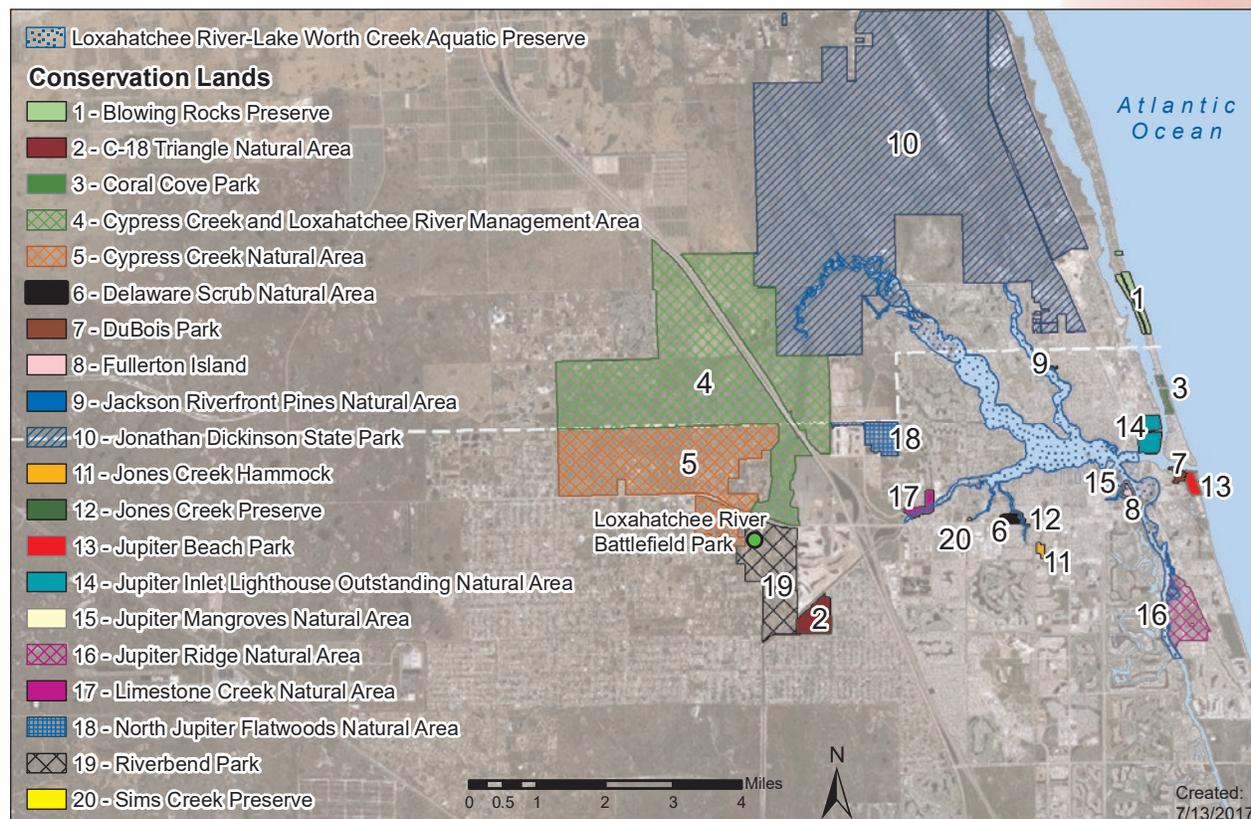
Grassy Waters Preserve Grassy Waters Preserve is a 23 square mile wetlands ecosystem that serves as the freshwater supply for the city of West Palm Beach and the towns of South Palm Beach and Palm Beach Island. Historically, Grassy Waters was both a key component of the Greater Everglades watershed and the headwaters of the Northwest Fork of the Loxahatchee River. In addition to meeting local demands for freshwater, Grassy Waters Preserve also provides hands-on educational experiences for learners of all ages. Access to this historic wetland reconnects visitors with the natural heritage of West Palm Beach. Trails are accessible to the public free of charge. Experienced naturalists also provide guided canoe and hiking programs for the public, merit badge programs for scouts, and free field trips for local schools (<http://wpb.org/grassywaters/>).

Sims Creek Preserve is 3.0-acres located near Center Street. Purchased in 2005, the preserve is dominated by slash pines and mixed hardwood communities. A major component of the creation of this area as a preserve is the protection of the shallow, tidal flow creek that establishes the boundary of the preserve to the east and south. Through the management of the preserve, the water resources of the sensitive tidal creek will be improved. (Town of Jupiter, 2013)

C-18 Triangle Natural Area is 102.5 acres located south of the C-18 canal in the northwest corner of the Palm Beach Country Estates, and the southeast corner of Riverbend Park. This natural area contains more than 100 acres of wetland habitat that often floods with nearly three feet of water during the peak of the wet season. The C-18 Triangle Natural Area is also part of the Northeast Everglades Natural Area and contains a variety of feeding and roosting opportunities for wading birds (Palm Beach County, n.d.-a).

Cypress Creek and Loxahatchee River Management Area is 512 acres and includes the Wild and Scenic portion of the Northwest Fork and extends south to Indiantown Road concluding at the northern boundary of the Riverbend Park. This natural area contains significant historic and cultural resources including Trapper Nelson's property, and is a popular destination of visitors to the area. There are several natural communities located in this area including floodplain forests, pine flatwoods, and oak hammocks (SFWMD, 2013).

Cypress Creek Natural Area contains more than 2,000 acres including the Cypress Creek tributary. Development, mining, and agriculture heavily impacted Cypress Creek Natural Area. Drainage ditches constructed in the 1950s altered the water flow through the property. Melaleuca and Australian-pine trees



Map 9 / Conservation lands adjacent to Loxahatchee River-Lake Worth Creek Aquatic Preserve.

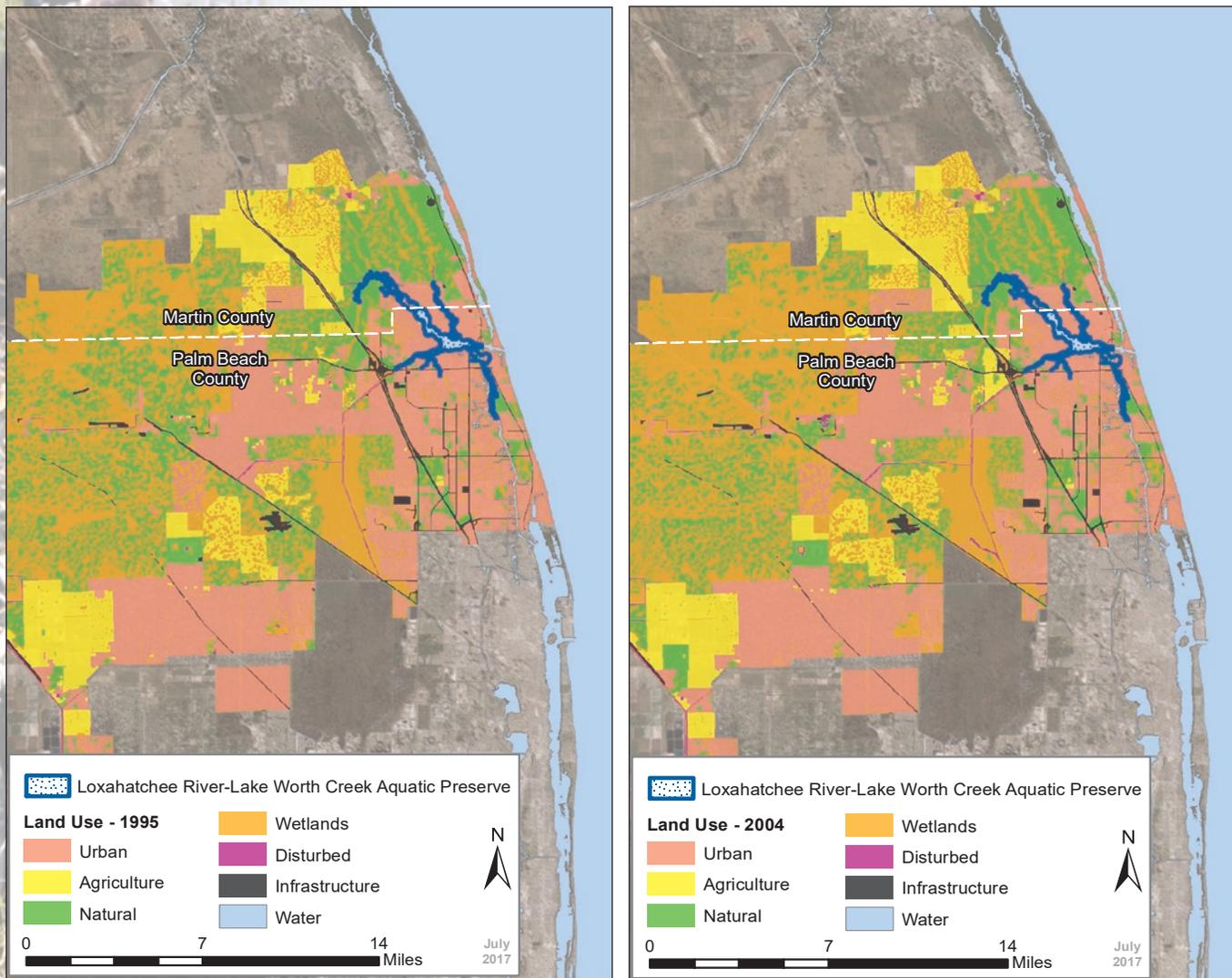
gained a foothold in disturbed areas and expanded throughout the site. The primary management goal for this natural area is controlling non-native, invasive species. This natural area contains hiking and equestrian trails connecting Jonathan Dickinson State Park and the Pal Mar lands to the west through the Indiantown Grade (SFWMD, 2013).

Delaware Scrub Natural Area is 16 acres and contains four differing habitats including pine flatwoods, scrub, mangroves, and cypress swamp. This natural area provides visitors an opportunity to observe some of the last remaining old growth cypress trees left in Palm Beach County through use of its observation platform, kayak/canoeing landing, hiking trails, and 300-foot boardwalk (Town of Jupiter, 2013).

Fullerton Island is a 12-acre island located in the Lake Worth Creek portion of the aquatic preserve and provides passive recreation for boaters. Nonnative vegetation was removed from the islands along with nearly 60,000 cubic yards of sand to create five acres of wetland habitat such as seagrass and mangroves. Public amenities include a day-use floating dock with six slips, a picnic area and an informational kiosk. Access is by boat only (DiPaolo, 2017).

Jackson Riverfront Pine Natural Area consists of three acres located along the banks of the North Fork of the Loxahatchee River. It contains many natural communities including scrubby flatwoods, xeric hammocks, mangrove swamps, and upland scrub habitat. This natural area is home to a number of listed species. The natural area is also part of the Northeast Everglades Natural Area (Palm Beach County, n.d.-e).

Jupiter Inlet Lighthouse Outstanding Natural Area is 120 acres located within the boundary of Loxahatchee River-Lake Worth Creek Aquatic Preserve. This nationally recognized outstanding natural area has played a major role in the history of the region and state. It is also archaeologically significant, though surrounded by heavy development. The communities found in this natural area include scrub, mangrove



Map 10 | Land use surrounding Loxahatchee River-Lake Worth Creek Aquatic Preserve (1995 and 2004).

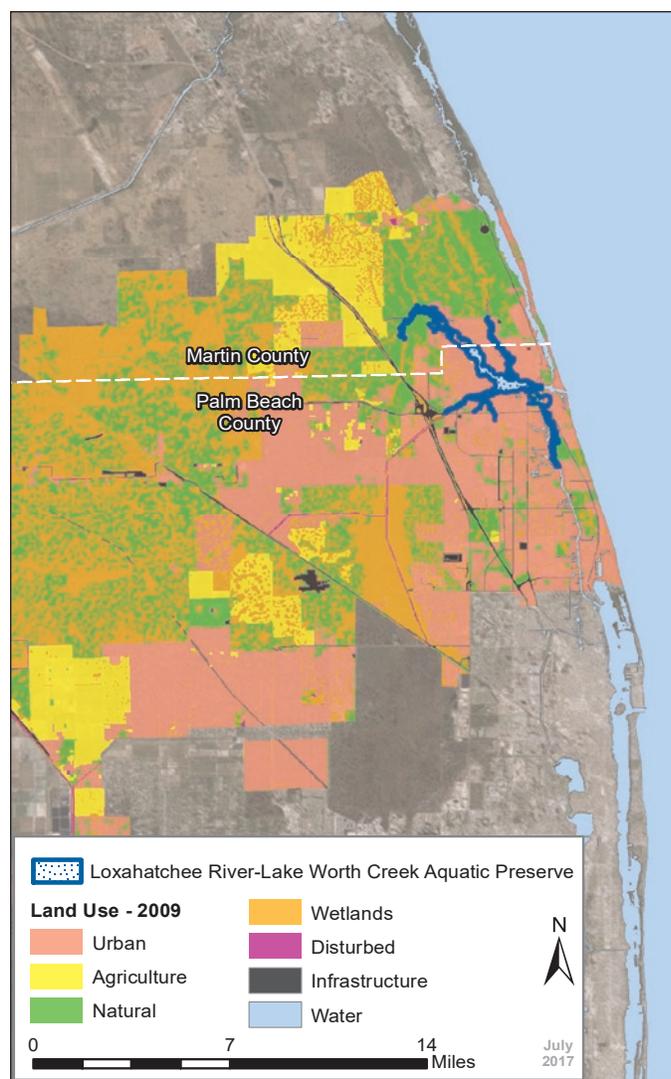
swamp, low hammock, and maritime hammock which are habitat for more than 25 federally/state listed species. The natural areas hiking trails, boardwalk, lighthouse, man-made lagoon and museum receive more than 75,000 visitors annually (Jupiter Inlet Lighthouse & Museum, n.d.).

Jupiter Mangroves Natural Area is a small, 1-acre, tract located to the west of Fullerton Island. It consists of mangrove dominated vegetation, and provides fish, birds and other species habitat to roost, mate, and develop within Loxahatchee River-Lake Worth Creek Aquatic Preserve.

Jupiter Ridge Natural Area, a 274-acre section of the Northeast Everglades Natural Area, shares a 7,600-foot shoreline along the Intracoastal Waterway within Loxahatchee River-Lake Worth Creek Aquatic Preserve. Major efforts have been made on behalf of Palm Beach County to decrease the erosion to this natural area from boat wakes through the construction of 23 limestone oyster reef breakwaters in seven different zones to protect 6,000 feet of habitat and shoreline (Palm Beach County, 2011).

Limestone Creek Natural Area, a 52-acre parcel, is located at the western boundary of the Southwest Fork. This natural area is also within the southwestern boundary of Loxahatchee River-Lake Worth Creek Aquatic Preserve and is recognized as part of the Northeast Everglades Natural Area. The public has access to a 150-foot fishing pier, observation platform, and hiking trails to observe the variety of local plant and animal communities located along the perimeter of the C-18 canal (Town of Jupiter, 2013).

North Jupiter Flatwoods Natural Area is 160 acres, located near the Jupiter Community Park. The natural area provides visitors the opportunity to use hiking trails, fishing pier, and observation platform to admire nature. There is also a boardwalk that allows the public to walk through a cypress dome ecosystem. The North Jupiter Flatwoods Natural Area is part of the Northeast Everglades Natural area and links conservation lands to the Loxahatchee River (Palm Beach County, n.d.-i).



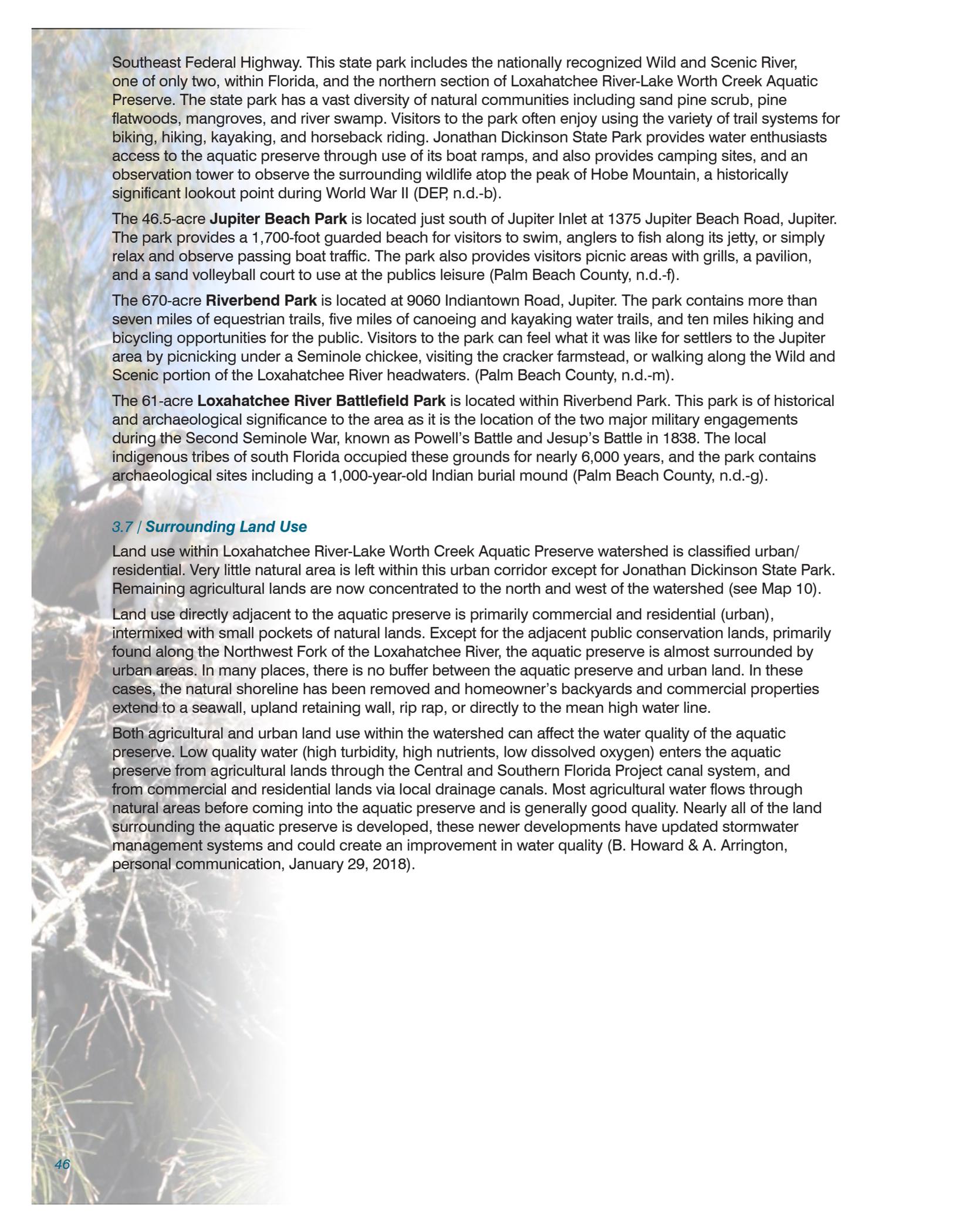
Map 10 | Land use surrounding Loxahatchee River-Lake Worth Creek Aquatic Preserve (2009)

There are seven parks within or near Loxahatchee River-Lake Worth Creek Aquatic Preserve. The 120-acre **Carlin Park** is located along the Atlantic Ocean at 400 South State Road A1A, just off the Lake Worth Creek section of the aquatic preserve. The park offers visitors the opportunity to snorkel along its 3,000-foot guarded beach and facilities, including bocce ball areas, tennis courts, sand volleyball courts, playgrounds, running courses, and picnic shelters with grills (Palm Beach County, n.d.-b).

The 15-acre **Coral Cove Park** lays within the Indian River Lagoon, north of the Jupiter Inlet at 1600 Beach Road, Tequesta. This small park provides 600-feet of intracoastal waterway beachfront, and includes picnic areas with grills and playgrounds for the youth (Palm Beach County, n.d.-c).

The 19-acre **DuBois Park** located at 19075 DuBois Road contains one of the most historical beachfronts in Palm Beach County. With 1,200-feet of beach, and 100-feet of guarded swimming lagoon, visitors can enjoy the aquatic habitat and diversity of local wildlife of Loxahatchee River-Lake Worth Creek Aquatic Preserve. DuBois Park also contains the historical DuBois Pioneer home, a historical and archaeological relic of the initial settlement of the Jupiter Inlet area. It is on the National Register of Historic Places, and the property also contains an Indian mound. Visitors can take advantage of any of the 17 daytime boat slips or use the launch ramp for their canoes or kayaks (Palm Beach County, n.d.-d).

The 10,500-acre **Jonathan Dickinson State Park** is located just south of Stuart at 16450



Southeast Federal Highway. This state park includes the nationally recognized Wild and Scenic River, one of only two, within Florida, and the northern section of Loxahatchee River-Lake Worth Creek Aquatic Preserve. The state park has a vast diversity of natural communities including sand pine scrub, pine flatwoods, mangroves, and river swamp. Visitors to the park often enjoy using the variety of trail systems for biking, hiking, kayaking, and horseback riding. Jonathan Dickinson State Park provides water enthusiasts access to the aquatic preserve through use of its boat ramps, and also provides camping sites, and an observation tower to observe the surrounding wildlife atop the peak of Hobe Mountain, a historically significant lookout point during World War II (DEP, n.d.-b).

The 46.5-acre **Jupiter Beach Park** is located just south of Jupiter Inlet at 1375 Jupiter Beach Road, Jupiter. The park provides a 1,700-foot guarded beach for visitors to swim, anglers to fish along its jetty, or simply relax and observe passing boat traffic. The park also provides visitors picnic areas with grills, a pavilion, and a sand volleyball court to use at the public's leisure (Palm Beach County, n.d.-f).

The 670-acre **Riverbend Park** is located at 9060 Indiantown Road, Jupiter. The park contains more than seven miles of equestrian trails, five miles of canoeing and kayaking water trails, and ten miles hiking and bicycling opportunities for the public. Visitors to the park can feel what it was like for settlers to the Jupiter area by picnicking under a Seminole chickee, visiting the cracker farmstead, or walking along the Wild and Scenic portion of the Loxahatchee River headwaters. (Palm Beach County, n.d.-m).

The 61-acre **Loxahatchee River Battlefield Park** is located within Riverbend Park. This park is of historical and archaeological significance to the area as it is the location of the two major military engagements during the Second Seminole War, known as Powell's Battle and Jesup's Battle in 1838. The local indigenous tribes of south Florida occupied these grounds for nearly 6,000 years, and the park contains archaeological sites including a 1,000-year-old Indian burial mound (Palm Beach County, n.d.-g).

3.7 / *Surrounding Land Use*

Land use within Loxahatchee River-Lake Worth Creek Aquatic Preserve watershed is classified urban/residential. Very little natural area is left within this urban corridor except for Jonathan Dickinson State Park. Remaining agricultural lands are now concentrated to the north and west of the watershed (see Map 10).

Land use directly adjacent to the aquatic preserve is primarily commercial and residential (urban), intermixed with small pockets of natural lands. Except for the adjacent public conservation lands, primarily found along the Northwest Fork of the Loxahatchee River, the aquatic preserve is almost surrounded by urban areas. In many places, there is no buffer between the aquatic preserve and urban land. In these cases, the natural shoreline has been removed and homeowner's backyards and commercial properties extend to a seawall, upland retaining wall, rip rap, or directly to the mean high water line.

Both agricultural and urban land use within the watershed can affect the water quality of the aquatic preserve. Low quality water (high turbidity, high nutrients, low dissolved oxygen) enters the aquatic preserve from agricultural lands through the Central and Southern Florida Project canal system, and from commercial and residential lands via local drainage canals. Most agricultural water flows through natural areas before coming into the aquatic preserve and is generally good quality. Nearly all of the land surrounding the aquatic preserve is developed, these newer developments have updated stormwater management systems and could create an improvement in water quality (B. Howard & A. Arrington, personal communication, January 29, 2018).



One of the largest paddle events on the aquatic preserve, the River Paddle, is organized by Club Scrub. Photo courtesy of the Jenison family.

Part Two

Management Programs and Issues

Chapter Four

The Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Programs and Issues

The work performed by the Florida Coastal Office (FCO) is divided into components called management programs. In this management plan all site operational activities are explained within the following four management programs: Ecosystem Science, Resource Management, Education and Outreach, and Public Use.

The hallmark of Florida's Aquatic Preserve Program is that each site's natural resource management efforts are in direct response to, and designed for unique local and regional issues. When issues are addressed by an aquatic preserve it allows for an integrated approach by the staff using principles of the Ecosystem Science, Resource Management, Education and Outreach, and Public Use Programs. This complete treatment of issues provides a mechanism through which the goals, objectives and strategies associated with an issue have a greater chance of being met. For instance, an aquatic preserve may address declines in water clarity by monitoring levels of turbidity and chlorophyll (Ecosystem Science - research), planting eroded shorelines with marsh vegetation (Resource Management - habitat restoration), creating a display or program on preventing water quality degradation (Education and Outreach), and offering training to municipal officials on retrofitting stormwater facilities to increase levels of treatment (Education and Outreach).

Issue-based management is a means through which any number of partners may become involved with an aquatic preserve in addressing an issue. Because most aquatic preserves are endowed with very few staff, partnering is a necessity, and by bringing issues into a broad public consciousness partners who

wish to be involved are able to do so. Involving partners in issue-based management ensures that a particular issue receives attention from angles that the aquatic preserve may not normally address.

This section will explore issues that impact the management of Loxahatchee River-Lake Worth Creek Aquatic Preserve directly, or are of significant local or regional importance that the aquatic preserve's participation in them may prove beneficial. While an issue may be the same from preserve to preserve, the goals, objectives and strategies employed to address the issue will likely vary depending on the ecological and socioeconomic conditions present within and around a particular aquatic preserve's boundary. This management plan will characterize each of the issues of the Loxahatchee River-Lake Worth Creek Aquatic Preserve and delineate the unique goals, objectives and strategies that will set the framework for meeting the challenges presented by the issues.

Each issue will have goals, objectives and strategies associated with it. Goals are broad statements of what the organization plans to do and/or enable in the future. They should address identified needs and advance the mission of the organization. Objectives are a specific statement of expected results that contribute to the associated goal, and strategies are the general means by which the associated objectives will be met. Appendix D contains a summary table of all the goals, objectives, strategies, and cost estimates associated with each issue.

To be successful, the strategies identified in this plan will be accomplished in partnership with local citizens, city, county, state and federal officials, colleges and universities students and faculty, non-governmental organizations and the business community. Full implementation of the strategies identified in this management plan is dependent upon administrative support for reassigning or otherwise acquiring staff, volunteers, contractual services, equipment, training, and supplies. Management will seek additional administrative staff support to process grants and contracts to expand its ability to pursue outside funding.

4.1 / The Ecosystem Science Management Program

The Ecosystem Science Management Program supports science-based management by providing resource mapping, modeling, monitoring, research and scientific oversight. The primary focus of this program is to support an integrated approach (research, education and stewardship) for adaptive management of each site's unique natural and cultural resources. FCO ensures that, when applicable, consistent techniques are used across sites to strengthen Florida's ability to assess the relative condition of coastal resources. This enables decision-makers to more effectively prioritize restoration and resource protection goals. In addition, by using the scientific method to create baseline conditions of aquatic habitats, the Ecosystem Science Management Program allows for objective analyses of the changes occurring in the state's natural and cultural resources.

4.1.1 / Background of Ecosystem Science at Loxahatchee River-Lake Worth Creek Aquatic Preserve

There is a vast amount of ecosystem science being conducted throughout the Loxahatchee River-Lake Worth Creek Aquatic Preserve by numerous organizations. Prior to current management, little ecosystem science work was conducted by Indian River Lagoon Aquatic Preserves (IRLAP) staff in the Loxahatchee River-Lake Worth Creek Aquatic Preserve, as the staff is tasked with monitoring six other aquatic preserves spanning six counties. The Loxahatchee River District's (LRD) Wildpine Ecological Laboratory (WildPine Lab) has been the lead partner in conducting ecosystem science within Loxahatchee River-Lake Worth Creek Aquatic Preserve, as has the South Florida Water Management District (SFWMD). Since 1971, LRD has been working to preserve and protect the Loxahatchee River through an innovative wastewater treatment and reuse program and an active river research, monitoring, and restoration program (LRD, 2013). The river monitoring work, conducted by LRD's WildPine Lab, includes the Riverkeeper water quality project to assess the water quality of nearly 30 parameters (including total nitrogen, total phosphorus, Chlorophyll a, fecal coliform bacteria, etc.) at 39 sites throughout the watershed. A data sonde project uses autonomous instrumentation to collect near-continuous (15 or 30-minute intervals) data on water temperature, salinity, and pH at seven sites throughout the Loxahatchee River. Seagrass monitoring and mapping includes bi-monthly assessment of seagrasses at five sites throughout the river including large scale mapping projects completed in 2007, 2010, and 2014. Oyster monitoring includes assessing oyster recruitment, density, size, and survival throughout the estuary's oyster beds as well as completed oyster restoration projects. Martin County and LRD, with funding from the American Recovery and Reinvestment Act through the National Oceanic and Atmospheric Administration, coordinated the successful restoration of more than 5.8 acres of oyster reefs in the Northwest Fork of the Loxahatchee River. Just 20 months after the 5.8-acre oyster restoration project, the reef supported almost 5,000

pounds of non-oyster animal biomass (small fish, crabs and shrimp) at the restoration site. The LRD also conducted oyster restoration at nine residential docks in coordination with The Nature Conservancy.

Other organizations working within the aquatic preserve include University of Florida, Florida International University, and Palm Beach County. IRLAP staff has currently partnered with Florida Fish and Wildlife Conservation Commission (FWC) and Florida Atlantic University's Harbor Branch Oceanographic Institute to begin oyster health indices monitoring throughout the seven aquatic preserves managed by the office, including Loxahatchee River-Lake Worth Creek Aquatic Preserve. These new projects will allow IRLAP staff to establish partnerships with other groups working in the aquatic preserve.

4.1.2 / Current Status of Ecosystem Science at Loxahatchee River-Lake Worth Creek Aquatic Preserve

There is a very large and committed group of partners and agencies that conduct extensive monitoring, modeling and research in the Loxahatchee River-Lake Worth Creek Aquatic Preserve. The group includes LRD, SFWMD, Palm Beach County Department of Environmental Resources Management, FWC, Harbor Branch Oceanographic Institute, Florida Department of Environmental Protection (DEP) Division of Environmental Assessment and Restoration Bureau of Watershed Restoration, Smithsonian Marine Research Institute, county agencies, Florida Department of Agriculture and Consumer Services, Florida Department of Health, and numerous other groups. The Ecosystem Science Management Program within the Loxahatchee River-Lake Worth Creek Aquatic Preserve is geared to assist various partner agencies and/or university researchers with ongoing research and monitoring efforts. The IRLAP office manages seven aquatic preserves from Volusia County south to Palm Beach County. It is challenging to maintain a regular research or monitoring presence within these seven aquatic preserves because of their sizes, distances and the logistics between them. Therefore, FCO fosters strong working partnerships with multiple agencies and researchers, and assists with equipment and staff as needed to complete research projects and monitoring efforts.

4.2 / The Resource Management Program

The Resource Management Program addresses how FCO manages Loxahatchee River-Lake Worth Creek Aquatic Preserve and its resources. The primary concept of the Loxahatchee River-Lake Worth Creek Aquatic Preserve Resource Management projects and activities are guided by FCO's mission statement: Conserving and restoring Florida's coastal and aquatic resources for the benefit of people and the environment. FCO's sites accomplish resource management by physically conducting management activities on the resources for which they have direct management responsibility, and by influencing the activities of others within and adjacent to their managed areas and within their watershed. Watershed and adjacent area management activities, and the resultant changes in environmental conditions, affect the condition and management of the resources within their boundaries. FCO managed areas are especially sensitive to upstream activities affecting water quality and quantity. FCO works to ensure that the most effective and efficient techniques used in management activities are used consistently within our sites, throughout our program, and when possible, throughout the state. The strongly integrated Ecosystem Science, Education and Outreach and Public Use programs, provide guidance and support to the Resource Management Program. These programs work together to provide direction to the various agencies that manage adjacent properties, our partners and our stakeholders. Loxahatchee River-Lake Worth Creek Aquatic Preserve also collaborates with these groups by reviewing various protected area management plans. The sound science provided by the Ecosystem Science Program is critical in the development of effective management projects and decisions. The nature and condition of natural and cultural resources within Loxahatchee River-Lake Worth Creek Aquatic Preserve are diverse. This section explains the history and current status of our Resource Management efforts.

4.2.1 / Background of Resource Management at Loxahatchee River-Lake Worth Creek Aquatic Preserve

During the past century, water and land management activities through the Loxahatchee River watershed, such as the construction of canals for drainage and discharges to provide flood protection, as well as conversion of natural and agricultural areas to residential development, have altered the hydrology of the system. Rates of discharges during the wet season have increased, while saltwater intrusion and aquifer drying have increased during the dry season. When excessive discharges of fresh water are made into the estuary portion of the river during the wet season, rapid changes in salinity occur resulting in destruction of benthic and seagrass communities in the estuary, displacement of fishes and stress or damage to offshore reef communities (VanArman, Graves, & Fike, 2005). In contrast, a

reduction in the flow of fresh water in the Northwest Fork has allowed the upstream intrusion of saltwater in the river which has resulted in the loss of cypress trees and replacement by mangroves (Rodis, 1973). The toxic effect of saltwater penetration into floodplain soils explains the replacement of cypress trees in the floodplain by salt tolerant mangroves. Salt penetration into soils occurs due to upstream movement of saltwater in the river channel and reduced seepage of fresh ground water from adjacent uplands (VanArman et al., 2005).

The ecosystem alterations caused by the manipulation of water quantity and timing have not only affected the vegetation structure of Loxahatchee River-Lake Worth Creek Aquatic Preserve, but may also have supported an increase in the invasive Indo-Pacific lionfish in the river. Increases in estuarine salinity, resulting from reduced freshwater flows caused by water management policies and increased saltwater intrusion due to dredging and sea level rise, have allowed lionfish to colonize estuarine habitats far from the ocean (Jud, Layman, & Nichols, 2015).

4.2.2 / Current Status of Resource Management at Loxahatchee River-Lake Worth Creek Aquatic Preserve

Comprehensive Everglades Restoration Plan - First authorized in 1948, the Central and Southern Florida Project is a multi-purpose project designed to provide flood control, water control, and water supply to an area stretching from Orlando to Florida Bay. Cooperatively managed by the U.S. Army Corps of Engineers and SFWMD, the project has performed its intended purposes well. The project, however, has also significantly contributed to the decline of south Florida ecosystems. In 1992 and 1996, the Water Resources Development Acts directed the U.S. Army Corps of Engineers to evaluate impacts of the Central and Southern Florida Project and to recommend improvements and modifications to restore the south Florida ecosystem while still meeting water resource needs. The resulting comprehensive plan was approved in the Water Resources Development Act of 2000 and is known as the Comprehensive Everglades Restoration Plan (CERP). The plan provides a framework and guide to restore, protect, and preserve the water resources of central and southern Florida, including portions of the Indian River Lagoon. The plan includes more than 60 elements and is estimated to take at least 30 years to complete. A major component of CERP, the Loxahatchee River Watershed Restoration Plan, addresses water delivery to the Loxahatchee River. The purpose of the project is to restore and sustain the overall quantity, quality, timing and distribution of freshwater to the river, as well as to reconnect the area's wetlands and watersheds that form the historic headwaters for the river (U.S. Army Corps of Engineers, n.d.).

Permitting – Aquatic preserve staff provide comments on Environmental Resource Permits submitted for lease or construction activities on sovereign submerged lands within the aquatic preserve. Dredging and construction projects permitted within the aquatic preserve must be in the public interest (18-20, Florida Administrative Code [F.A.C.]). Beneficial public interest projects (e.g., mapping efforts, habitat creation, water quality improvements, shoreline stabilization with native plants, planting of native emergent and submergent vegetation, etc.) are identified by aquatic preserve staff and can then be recommended to DEP and SFWMD regulatory offices. Regular dissemination of information learned through the ecosystem science program to regulatory staff needs to improve. Aquatic preserve staff plan to provide regulatory staff with resource updates for the aquatic preserve and offer one boat tour of the aquatic preserve each year to help familiarize new staff with the aquatic resources and discuss specific regulatory and resource protection issues within the aquatic preserve, as well as providing vessel support when needed to conduct compliance inspections. The ecosystem science data is used to support the aquatic preserve rule (18-20, F.A.C.) that directly relate to development adjacent to the aquatic preserve, and allows regulatory staff to minimize the amount of natural resource impacts within the aquatic preserve. Aquatic preserve staff have established regular communication with DEP Southeast District regulatory staff and routinely receive notices of proposed activities within the aquatic preserve.

Mitigation - Impacts to natural resources must be avoided and minimized by applicants wishing to construct within the aquatic preserve (18-20, F.A.C.). Regardless of compromising efforts to minimize impacts, often times resources are degraded or completely removed from the aquatic preserve through the regulatory process and must be mitigated. In such situations, aquatic preserve staff are able to use information gained through multiple partners to recommend mitigation options (e.g., land acquisition, hydrologic restoration, water quality improvement projects, shoreline stabilization with native plants, planting of emergent and submergent vegetation, etc.) that would directly benefit the quality of natural resources within the aquatic preserve. A list of potential mitigation options for the aquatic preserve, such as muck removal, will be established for quick reference and consideration by aquatic preserve and regulatory staff. Compared to the high amount of visible resources, mainly seagrass and mangroves, in the adjacent estuarine Jensen Beach to Jupiter Inlet Aquatic Preserve, the upper reaches of Loxahatchee River-Lake Worth Creek Aquatic Preserve are a fresh, blackwater system that supports cypress and

mangroves as well as other emergent vegetation. Much of the northwest portion of the aquatic preserve are publicly owned lands, such as Jonathan Dickinson State Park and Riverbend Park, and therefore not subject to private development. The shorelines along the southeastern portions of the aquatic preserve are privately owned and most have been converted to hardened structures. One of the most beneficial options for mitigation in these areas includes restoring shorelines to a more natural state, which would provide habitat for aquatic plants and animals, and can help to reduce stormwater runoff, thus helping to improve water quality. No land clearing or ground disturbance, above or below the mean high water line, will be undertaken by staff until the Division of Historical Resources has provided a review and recommendations for the proposed activity.

Incident Response - As aquatic preserve staff are regularly out in the field, they are also tasked with documenting violations within the aquatic preserve and transmitting them to DEP and SFWMD Compliance and Enforcement staff or FWC law enforcement, and working with compliance and enforcement staff to help resolve complaints and violations. Most incidents in the aquatic preserve involve harassment of wildlife, reports of illegal fishing activities (e.g., use of gill nets), unlawful speed, cutting of mangroves along the more developed areas, and potential permit violations. Observed violation are documented by aquatic preserve staff and depending on the reported incident, aquatic preserve staff coordinates with FWC wildlife officers, DEP or SFWMD compliance and enforcement staff. Maintaining a strong partnership with compliance and enforcement staff is critical to the success of incident response within the aquatic preserve. Aquatic preserve staff also encourage stewardship among homeowners, who often serve as the eyes and ears of the aquatic preserve. Future coordination with law enforcement officials will help aquatic preserve staff document additional incidents and incident locations within the aquatic preserve. Identified trends will be documented and discussed with law enforcement officials for localized support.

4.2.3 / Resource Management Issue

Issue One: Water Quantity and Quality

SFWMD developed a Minimum Flows and Levels (MFL) Rule in 2003 (Chapter 40E, F.A.C.). The intent of the MFL criteria is to protect the remaining floodplain swamp community from significant harm. According to 40E-8, F.A.C, a MFL violation occurs within the Northwest Fork of the Loxahatchee River when an exceedance of the minimum flow criteria occurs more than once every six years. An “exceedance” is defined as when Lainhart Dam flows to the Northwest Fork of the river decline below 35 cubic feet per second (cfs) for more than 20 consecutive days within any given calendar year or when the 20-day moving average salinity measured at river mile 9.2 exceeds two practical salinity units.

LRD’s WildPine Lab collects and analyzes surface water samples for 29 parameters at 39 sites located in the Loxahatchee River, its major tributaries, and associated waters (see Map 10). Most sites are sampled bi-monthly (round symbols) with a subset of between 10 to 15 sites (square symbols) sampled every month. DEP has established Numerical Nutrient Criteria water quality standards that serve as the new benchmark. Results from this water quality monitoring program are used to establish baseline conditions prior to modification of freshwater inflows resulting from CERP and the Northwest Fork Restoration Plan (LRD, 2013). Annual water quality results for total nitrogen, total phosphorus and chlorophyll *a* are evaluated against the DEP Numerical Nutrient Criteria. While most of the waters within the aquatic preserve are classified as Class II waters with the designated use for the harvesting and propagation of shellfish, fecal coliform bacteria results are scored relative to DEP’s Water Quality Criteria for recreational waters. The Class II use is evaluated by the Shellfish Section within Florida Department of Agriculture and Consumer Services. DEP adopted new recreational bacteria criteria in 2016 which replaces fecal coliforms with *E. coli* in fresh water and enterococci in marine waters.

Based on LRD’s evaluation, recent total nitrogen results for nearly all sites meet the Numeric Nutrient Criteria with no more than one exceedance in a three-year period. Only one site in the northern part of the watershed has not meet the Numeric Nutrient Criteria for total nitrogen. Five sites have not meet the Numerical Nutrient Criteria for total phosphorus. LRD regularly conducts analysis of key water quality parameters (including phosphorus, fecal coliform bacteria and sucralose) to assess the relative contribution of anthropogenic versus wildlife contributions of nutrients and bacteria (LRD, 2013). The presence of sucralose at several sites indicates pollutants from septic systems are entering into surface waters.

Wildlife (e.g, raccoons and wading birds) also may be contributing to elevated fecal bacteria and phosphorus concentrations, however, unpublished data from the LRD and the town of Jupiter indicates that sediments, leaf debris and grass clippings may contribute to high bacteria levels. Station 88, a former agriculture site just west of I-95/Florida Turnpike and north of State Road 706/Indiantown Road,

also indicated persistently high phosphorus results (LRD, 2013), but has significantly improved water quality at the site with the development of Sonoma Isles and their stormwater management system.

Annual fecal coliform bacteria and one of the few areas east of I-95 shows exceed DEP's water quality standards for three sites in the watershed, with one site (107), a tributary in the Northwest Fork, showing chronic issues with very high fecal bacteria and phosphorus concentrations. Sites 73 and 75, located in the brackish tributaries that serve as extensive urban drainage areas and flow into the Southwest Fork, also show frequent problems with fecal bacteria counts (see Map 11). EPA and DEP have established a Total Maximum Daily Load (TMDL) for fecal coliform bacteria in this water body, Water Body Identification (WBID) number 3226C. Improvements will be required as part of future basin management action plans (LRD, 2013). LRD's septic to sewer conversion is scheduled to be largely completed for areas east of I-95 by 2020. This neighborhood sewer conversion project has been ongoing since the 70s, and all new development in the area is on sewer, leaving very little residential areas on septic.

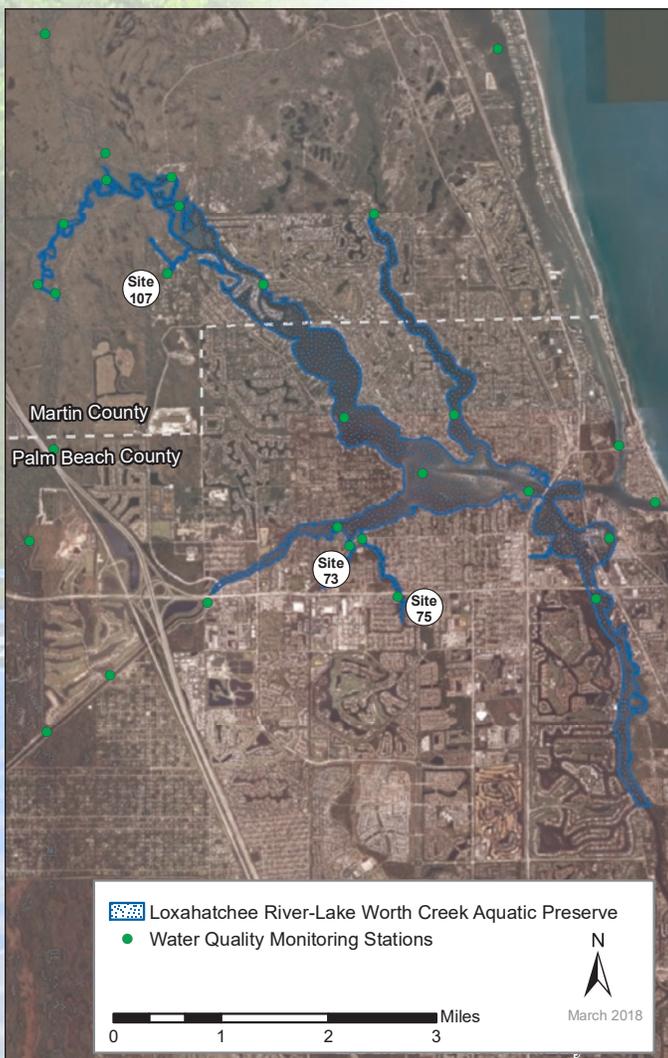
A major component of CERP, the Loxahatchee River Watershed Restoration Plan, addresses water delivery to the Loxahatchee River. The purpose of the project is to restore and sustain the overall quantity, quality, timing and distribution of freshwater to the river, as well as to reconnect the area's wetlands and watersheds that form the historic headwaters for the river (U.S. Army Corps of Engineers, n.d.). The objectives for the Loxahatchee River Watershed Restoration project are to improve water

distribution and timing to restore the natural system's ecological function, rehydrate natural areas that have been hydrologically impacted by excessive draining and water diversion, re-establish connections among natural areas that have become spatially and/or hydrologically fragmented, improve timing and distribution of water from the upstream watershed to increase the resiliency of freshwater riverine habitats to future sea-level changes. The goal of these actions is to help restore more natural water deliveries, promote improved health and functionality of wetland and upland areas and increase the quantity and quality of habitat available for native wildlife and vegetation (U.S. Army Corps of Engineers, 2015).

Goal 1 / Improve water quality where necessary within Loxahatchee River-Lake Worth Creek Aquatic Preserve to meet the needs of the natural resources and the surrounding populations.

Objective 1.1 / Improve freshwater quality/quantity of the Northwest Fork and Loxahatchee River Watershed.

Ongoing research conducted by LRD has determined that during the wet season, the objective for water managers is to minimize the intensity and frequency of flood control releases. These large freshwater releases reduce salinities in the estuary to levels that harm estuarine and marine flora and fauna with oyster and seagrasses. When flows at the primary flood control structure (S-46) were less than 300 cfs, harmful salinity variability within the estuary was significantly reduced. Seagrasses are likely stressed by salinities less than 15 parts per thousand (ppt), which occurs when flow through the S-46 flood control structure is greater than 600 cfs. These findings suggest that within the Loxahatchee River system a longer duration lower-flow release is preferred to heavy flows for a shorter period (i.e., pulsed flows) (LRD, 2013).



Map 11 / Water quality sampling in the watershed of Loxahatchee River-Lake Worth Creek Aquatic Preserve.

Integrated Strategies

1.1.1 / Support restoration efforts that will benefit Loxahatchee River-Lake Worth Creek Aquatic Preserve. Meeting the MFLs established for the Northwest Fork of the Loxahatchee River would accomplish many of the restoration and management goals proposed within this and other management plans for the river. Distinguishing between the correct time to allow larger quantities of freshwater through

the aquatic preserve, and when not to, has been historically challenging. It has unintentionally contributed to the degradation of the aquatic preserve at various periods in time (DEP & SFWMD, 2010).

Performance Measure: Support and promote strategies that will result in improved water quantity and quality in the aquatic preserve.

1.1.2 / Support efforts to evaluate and update flood control measures with the potential to impact the aquatic preserve. Collaborate with interested stakeholders to review and comment on issues that may arise related to flood control measures and releases.

Performance Measure: Participate in water quality/quantity meetings.

1.1.3 / Review permit applications for projects within the aquatic preserve that could alter hydrology or water quality. There are a large number of agencies and non-profits involved in management and research within the Loxahatchee River-Lake Worth Creek Aquatic Preserve. Aquatic preserve staff will work with partners to support proposed projects by attending meetings, providing comments and recommendations, reviewing permit applications and drafting letters of support for restoration projects.

Performance Measure: Review permit applications for projects within the aquatic preserve.

1.1.4 / Increase public awareness about water quality issues within the aquatic preserve and how activities in the watershed impact the aquatic preserve. Develop educational materials and outreach programs to present to local groups, discussing water quality issues and how local activities may impact the aquatic preserve.

Performance Measures:

1. Develop educational programs that promote the benefits of limiting turf grass, using Florida-friendly landscaping, proper disposal of grass clippings, limiting fertilizers, and other Best Management Practices.
2. Work with agencies and local governments to establish incentive programs to reduce turf-grass area, promote native landscaping, living shorelines, and promote other means of water conservation.
3. Conduct educational programs and provide exit surveys to gauge understanding of water quality issues among residents, including seasonal residents.

Objective 1.2 / Collaborate with groups conducting water quality data collection within the aquatic preserve to stay informed about water quality status, and disseminate information to the public.

LRD created Project Riverkeeper in 1973 to focus on water quality monitoring within the Loxahatchee River watershed. Data obtained through this program help water managers to evaluate and document the condition and ecological health of the river and to determine the location and extent of water quality issues that require attention. This data provides the most recent characterization of water quality in the river and with some historical perspective.

Integrated Strategies

1.2.1 / Coordinate with the entities collecting water quality data to help disseminate information in a way that promotes local knowledge.

Multiple agencies and non-profits, including citizen scientists, work throughout Loxahatchee River-Lake Worth Creek Aquatic Preserve collecting and compiling water quality data, including DEP staff. Recommendations to help improve the quality of water within the aquatic preserve will be included in all educational and outreach activities conducted by aquatic preserve staff.



Water quality is monitored remotely throughout the aquatic preserve.

Performance Measure: Promote LRD water quality tracking data website and reports.

1.2.2 / Assess compiled data to identify status, trends and information gaps, and build on existing monitoring efforts to address information gaps. Aquatic preserve staff will work with SFWMD, DEP Division of Environmental Assessment and Restoration lab, Riverkeeper Project and the WildPine Lab to determine where there are information gaps related to water quality monitoring within Loxahatchee River-Lake Worth Creek Aquatic Preserve. Because many entities are currently conducting water sampling, collaboration with these groups will help avoid a duplication of efforts and will better help cover the entire aquatic preserve.

Performance Measures:

1. Develop a prioritized list of monitoring and research needs to address the water quality sampling in the aquatic preserve.
2. Reassess annually whether gaps in monitoring are eliminated and the aquatic preserve is monitored more consistently.

Objective 1.3 / Reduce water quality impacts caused by stormwater and septic system sources within the watershed. Since the inception of LRD in 1971, the wastewater utility has converted more than 85 percent of the homes within their service area from septic systems to the centralized sewer collection system.

Integrated Strategies

1.3.1 / Support local government efforts to convert high-priority areas to sewer. Meet with local utility managers and local and state regulatory staff to discuss the need to convert high priority areas from on-site sewage disposal systems or septic systems to sewer, document limiting factors that could prevent conversion, and help find solutions.

Performance Measures:

1. Provide letters of support for utility managers' efforts for septic-to-sewer conversions.
2. Produce summaries from meetings with local utility managers and local and state regulatory staff to discuss the need to convert high priority areas to sewer.

1.3.2 / Support projects to enhance stormwater and sewage treatment in the Loxahatchee River-Lake Worth Creek Aquatic Preserve basin. In order to meet TMDLs, county and local municipalities have implemented numerous stormwater and wastewater retrofits throughout the Loxahatchee River-Lake Worth Creek Aquatic Preserve watershed.

Performance Measure: Produce letters of support for stormwater and wastewater retrofit projects.

Issue Two: Invasive Species

Invasive non-native species have negative effects on the natural communities in which they invade by threatening the structure and function of diverse native ecosystems. FWC's Invasive Plant Management Section is the lead agency responsible for coordinating and funding statewide programs for controlling invasive aquatic and upland plants on public conservation lands and waterways throughout the state. The section also ensures that beneficial native aquatic plants in Florida's rivers are protected through its permitting programs and funding research to find cost-effective management techniques. The United States Geological Survey (USGS) houses a database for Nonindigenous Aquatic Species, which serves as a central repository for sightings of introduced aquatic species. The program provides scientific reports, online queries, spatial data, distribution maps, and general information to scientists, land managers and the public on invasive species. Identifying the presence of non-native species and addressing their increase is crucial to protecting native plants and animals and their habitat within the aquatic preserve. Both FWC and USGS have programs in place to help agencies address the problem of non-native and invasive plants and animals including detection and response. During the 2018-2019 fiscal year, FWC-Aquatic Habitat Restoration/Enhancement Subsection plans to partner with Jonathan Dickinson State Park for two aquatic habitat projects in the Loxahatchee River. One project will involve planting wetland trees (mainly cypress and pond apple) along the shores of the Northwest Fork (FWC cost = app. \$30,000). The second project will involve aerial herbicide treatments to invasive Carolina willow in the North Fork within the state park property (FWC cost = app. \$10,000). IRLAP staff will assist as requested. Using these programs will allow IRLAP staff to document and develop programs to address the issue of non-native, invasive species within the aquatic preserve.

Goal 1 / Identify non-native plant and animal species and document their location within the aquatic preserve to develop strategies to reduce their abundance.

Objective 1.1 / Conduct monitoring to establish baseline data on non-native plant and animal species within the aquatic preserve.

Integrated Strategies

1.1.1 / Develop monitoring protocols throughout the aquatic preserve to quantify non-native plant and animal species. Work with FWC and USGS programs to develop a monitoring and reporting protocol to detect the present of non-native species. Use the existing USGS database to track sightings and reports of non-native aquatic species.

Performance Measure: Develop a geographic information system (GIS) database and maps of non-native plant and animal species within the aquatic preserve.

1.1.2 / Coordinate with other agencies for funding opportunities in controlling non-native species.

DEP and FWC are the lead agencies for control and eradication of many non-native plants and animals. IRLAP staff will work with government agencies to implement eradication strategies for non-native species within the aquatic preserve.

Performance Measure: Document acreage and number of non-native plants and animals removed from the aquatic preserve.

Objective 1.2 / Identify and promote activities throughout the aquatic preserve to increase public awareness of the impact of non-native species and prevent further propagation of new species.

Integrated Strategies

1.2.1 / Develop educational programs for dive shops, local groups, and schools to create awareness of the problems caused by non-native species.

Performance Measure: Conduct educational programs on the problems associated with lionfish and other non-native species within the aquatic preserve.

1.2.2 / Support projects and events that promote local awareness of the problem of introducing non-native species to an ecosystem: Work with various stakeholder groups in the area to develop educational activities and material that help promote the removal of non-native species throughout the area.

Performance Measure: Invasive species educational materials developed and distributed.



Lionfish have been found up to four miles (6.6 km) up the Loxahatchee River. Photo courtesy of D. Zach Jud, PhD.

Issue Three: Loss of Natural Community Function and Species Diversity

Development and manipulation of water flows has created numerous resource management issues throughout the Loxahatchee River-Lake Worth Creek Aquatic Preserve, not only affecting water quantity and quality, but also species composition and distribution, habitat alteration, and facilitation of invasive species that can further exacerbate these problems.

Anthropogenic alteration of freshwater inflow into coastal rivers and estuaries may affect the behavior of estuarine organisms that evolved under natural flow patterns. In coastal rivers throughout the Caribbean and the tropical and subtropical Western Atlantic, common snook represents an amphidromous top predator fish that can move freely between marine and riverine habitats. Because of the economic and ecological importance of common snook, and the widespread alteration of freshwater inflow in coastal systems, it is critical to understand how freshwater inflow in flow-controlled estuaries affects snook behavior (Jud, 2014), as well as other recreationally and commercially important species. These same anthropogenic reductions in freshwater inflow and increased saltwater intrusion have also led to

a severe degradation of cypress and oyster reef habitats in the Loxahatchee River. These disturbances combined to increase overall salinity in the estuary, resulting in an upstream shift in the optimal salinity zone for oysters (i.e., 10-28 ppt) (Loosanoff, 1965). As a foundation species, oysters provide food, shelter, and nursery habitat for a wide variety of estuarine organisms, including numerous ecologically and economically important fishes (Jud, 2014). As natural habitats such as oyster reefs decline in abundance, the desire to develop restoration projects to offset the loss of ecological function of habitats may actually further alter the population dynamics of species in these habitats.

In addition to the dramatic watershed changes, shoreline and benthic communities have been severely impacted by shoreline alterations and adjacent upland activities. Shoreline and intertidal areas of the Loxahatchee River-Lake Worth Creek Aquatic Preserve that once were populated by cypress trees, leather ferns, mangroves and other emergent and submergent vegetation now support very little vegetation, or have suffered a change in composition due to alterations in freshwater inputs. In many areas, seawalls, docks, and rip rap have replaced mangroves and seagrass. The natural shoreline that once helped stabilize the substrate, dissipate wave action, filter stormwater runoff, and provide quality habitat for aquatic species has been replaced by hardened structures. These alterations not only eliminate natural habits, but, Jud (2014) identified an association between lionfish abundance and anthropogenically created habitats (e.g., docks, sea walls, submerged debris), suggesting that human-driven changes in habitat availability may facilitate estuarine invasion of these fish.

Despite their ecological and economic importance, estuaries may be one of the most human-impacted types of ecosystems globally – impacts (e.g., shoreline development, pollution, dam construction, dredging) that have led to precipitous declines in estuarine taxa. The overwhelming cause of these declines has been habitat alteration/destruction and direct over-exploitation of organisms (Lotze et al., 2006)

Humans are drastically altering estuarine ecosystems in another general way; proactive attempts to restore or recreate particular aspects of ecosystem structure and function that have been lost through previous disturbance. As habitat alteration continues seemingly unabated, restoration projects are becoming an increasingly important tool to combat anthropogenic disturbances (Jud, 2014).

Goal 1 / Protect the aquatic preserve from impacts related to land use changes that disrupt ecological functions of the natural resources.

Objective 1.1 / Coordinate with regulatory programs, local government, and adjacent land owners to reduce impacts to the aquatic preserve from adjacent development activities.

Integrated Strategies

1.1.1 / Review and provide recommendations for local comprehensive plans that address development and water quality adjacent to the aquatic preserve. Because the Loxahatchee River has a large group of government agencies that oversee its management, aquatic preserve staff must coordinate with these agencies as they develop management plans for the watershed to ensure that all the plans have the same goals to reduce impacts and protect the aquatic preserve and surrounding areas.

Performance Measure: Produce recommendation for local comprehensive plans that support the Loxahatchee River-Lake Worth Creek Aquatic Preserve management plan and other related plans.

1.1.2 / Comment on proposed large-scale coastal developments adjacent to Loxahatchee River-Lake Worth Creek Aquatic Preserve and its watershed. Large developments adjacent to the aquatic preserve, and projects within it, have the potential to impact the aquatic preserve positively through improvements to stormwater management systems. Permit applications for proposed development will be reviewed and recommendations to help minimize impacts will be submitted by aquatic preserve staff.

Performance Measure: Produce written comments to regulatory and planning staff that suggest ways to minimize impacts and improve water quality to the aquatic preserve.

1.1.3 / Comment on permit applications for construction activities and leases on sovereign submerged lands within the aquatic preserve. Comments on environmental resource permit applications for construction activities within the aquatic preserve will be submitted to DEP and SFWMD regulatory staff. It is important that these comments suggest ways to minimize or improve impacts to the aquatic preserve and support eco-friendly engineering designs. A maintained list of high priority projects that could help applicants meet the public interest requirements outlined in the aquatic preserve rule (Chapter 18-20 F.A.C.) will also be provided to regulatory staff.

Performance Measures:

1. Produce written comments to regulatory staff that suggests ways to minimize or improve impacts to the aquatic preserve.



Development along the aquatic preserve has limited public access and eliminated natural habitats.

2. Develop and maintain a list of high priority projects that would help proposed activities meet the public interest requirements within the aquatic preserve.

1.1.4 / Promote the use of soft, living shorelines to decrease erosion and protect the water quality and resources within and upstream of the aquatic preserve. Most hardened shorelines within the aquatic preserve are devoid of aquatic vegetation which is important for absorbing wave energy, improving water quality, and providing habitat for aquatic species and birds. Staff will create GIS maps that show the extent of hardened shorelines within the aquatic preserve and draft recommendations for the use of living shorelines to riparian homeowners and regulatory staff when shoreline erosion is a concern. If a structure is unavoidable, aquatic preserve staff will support the use of upland retaining walls that use best management practices with the goal of establishing dense emergent vegetation planted on the seaward side to help provide the energy absorption, water quality, and habitat benefits offered by unaltered shorelines.

Performance Measure: Produce letters of recommendation and promote the use of living shorelines along Loxahatchee River-Lake Worth Creek Aquatic Preserve.

Objective 1.2 / Inform local residents about their contribution to global issues that impact the aquatic preserve.

Integrated Strategies

1.2.1 / Provide hands-on volunteer opportunities within the aquatic preserve to promote knowledge through personal interactions. Without direct interaction with Loxahatchee River-Lake Worth Creek Aquatic Preserve, it may be challenging for locals to fully appreciate the potential affect that climate change and sea level rise may have on the aquatic preserve and surrounding lands. Aquatic preserve staff will organize volunteer opportunities that allow direct interaction with the Loxahatchee River-Lake Worth Creek Aquatic Preserve to facilitate understanding of the potential transformations that climate change and sea level rise may have on the aquatic preserve and surrounding lands. This will not only allow residents to understand the connection between sustainable decisions made at home and the quality of the aquatic preserve, but also provide valuable assistance necessary to accomplish the action strategies outlined in this plan. Promotion of volunteer opportunities will occur through an e-mail-based distribution list, and various media outlets social media, radio,



Shoreline development can involve the preservation of natural habitat and still provide access.

television, newspaper announcements, etc.) to increase local knowledge and understanding while helping to improve the quality of the aquatic preserve.

Performance Measure: Track participation from organized volunteer events that facilitate understanding of the potential transformations that climate change and sea level rise may have on the aquatic preserve and surrounding lands.

1.2.2 / Inform residents about climate change and sea-level rise, and how these changes can affect the aquatic preserve. Information about climate change and the impacts that sea-level rise will most likely have on natural resources within the aquatic preserve (e.g. oyster reefs and mangroves) and adjacent land will be incorporated into education and outreach events and documents.

Performance Measure: Develop educational materials that incorporate information on ways that climate change may affect the aquatic preserve.

Goal 2 / Implement management practices that maintain or improve viable habitats and populations within the aquatic preserve.

Objective 2.1 / Establish and implement routine biological monitoring programs for essential habitats and rare and listed species. Work with local agencies and research organizations.

Integrated Strategies

2.1.1 / Assist partners with natural resource monitoring efforts. Staff from the WildPine Lab, Florida Atlantic University, Jonathan Dickinson State Park, and SFWMD currently monitor natural resources within the Loxahatchee River system. Aquatic preserve staff will coordinate with these groups to provide assistance with current monitoring efforts.

Performance Measure: Produce natural resource monitoring reports, such as floodplain vegetation monitoring, oyster reef, seagrass, fish, bird, and invertebrate monitoring.

2.1.2 / Maintain a comprehensive species inventory. The existing species inventory database (including source data) will be maintained by aquatic preserve staff as new species are documented in the aquatic preserve. Species may be documented through peer-reviewed literature, personal observations from aquatic preserve staff or other users, and photographs. To ensure accuracy, aquatic preserve staff will verify newly documented species within the aquatic preserve. The species list will be available on the Loxahatchee River-Lake Worth Creek Aquatic Preserve website.

Performance Measure: Create an annually updated species list for the aquatic preserve to be posted on the Loxahatchee River-Lake Worth Creek Aquatic Preserve website.

4.3 / *The Education and Outreach Management Program*

The Education and Outreach Management Program components are essential management tools used to increase public awareness and promote informed stewardship by local communities. Education programs include on and off-site education and training activities. These activities include: field studies for students and teachers; the development and distribution of media; the distribution of information at local events; the recruitment and management of volunteers; and, training workshops for local citizens and decision-makers. The design and implementation of education programs incorporates the strategic targeting of select audiences. These audiences include all ages and walks of life; however, each represents key stakeholders and decision-makers. These efforts by the Education and Outreach Program allow the aquatic preserve to build and maintain relationships and convey knowledge to the community; invaluable components to successful management.

4.3.1 / *Background of Education and Outreach at Loxahatchee River-Lake Worth Creek Aquatic Preserve*

The IRLAP office is small, remote, and not well-suited for on-site educational programs. The majority of the aquatic preserve's Education and Outreach has been in the form of volunteer coordination and outreach. The Loxahatchee River Center has a large facility located within the aquatic preserve where educational activities are conducted by their staff, as does Jonathan Dickinson State Park. It is important that aquatic preserve staff support the Loxahatchee River Center's educational efforts by providing support staff, boats, technical assistance, and educational materials produced through the IRLAP office to increase local knowledge of the aquatic preserve. It is also important for aquatic preserve staff to facilitate communication with Jonathan Dickinson State Park Elsa Kimbell Environmental Education and Research Center staff. The center provides educational exhibits and park staff conduct ranger guided tours along Loxahatchee River-Lake Worth Creek Aquatic Preserve.

4.3.2 / *Current Status of Education and Outreach at Loxahatchee River-Lake Worth Creek Aquatic Preserve*

The primary form of outreach for the aquatic preserve has been the delivery of presentations at various group meetings and use of educational displays and field equipment demonstrations at local events and festivals hosted by other environmental educators and conservation groups. IRLAP staff has collaborated with other citizen support organizations (CSO), including Friends of Jonathan Dickinson State Park Club Scrub special committee to assist with their events on the Loxahatchee River such as the River Paddle. Over the years, aquatic preserve staff have keyed in on the educational materials and information that have been of most interest to local residents attending the outreach events. Gradual incorporation of new approaches based on these observations has facilitated communication and understanding during these organized events.

Volunteers – IRLAP volunteers have traditionally helped with the aquatic preserves in the mid-range of IRLAP's management responsibility (Banana River Aquatic Preserve, Indian River-Malabar to Vero Beach Aquatic Preserve, Indian River-Vero Beach to Ft. Pierce Aquatic Preserve, and Jensen Beach to Jupiter Inlet Aquatic Preserve), primarily with work on the spoil islands. More emphasis needs to be placed on Loxahatchee River-Lake Worth Creek Aquatic Preserve and other two aquatic preserves (Mosquito Lagoon Aquatic Preserve and North Fork, St. Lucie Aquatic Preserve) managed by the office. These projects include, but are not limited to, construction and maintenance of educational kiosks at public access points, assistance with bird monitoring, resource management surveys, citizen patrolling, clean-up, outreach opportunities, information gathering, and office-related projects.



IRLAP staff collect oysters from a natural reef to conduct health and histology studies.

As the volunteer network for the aquatic preserve increases and the CSO, Friends of the Spoil Islands, becomes more active, aquatic preserve staff would like to interact with Jonathan Dickinson State Park's CSO, Friends of Jonathan Dickinson State Park, and Club Scrub, as well as LRD's Loxahatchee River Center. Programs that benefit both the state park land as well as the aquatic preserve (e.g. non-native species removal, educational programs, community based clean-up events) may be of interest to all the groups of volunteers.

Signage - Signage within and at access points to the aquatic preserve needs to be improved. Access within Loxahatchee River-Lake Worth Creek Aquatic Preserve exists through four public boat ramps and one public marina. The four public boat ramps include: Burt Reynolds Park East, Burt Reynolds Park West, Waterway Park, and Jonathan Dickinson State Park. The only public marina within the aquatic preserve is JIB Yacht Club and Marina. There are three private marinas within the aquatic preserve: Loggerhead Marina, Castaways Marina, and The Bluff's Marina. There are also several kayak launching areas including Inlet Village Park, Burt Reynolds Park, Loxahatchee River Center, DuBois Park, Jupiter Beach Park, Sawfish Bay Park, Jonathan Dickinson State Park, and Limestone Creek Natural Area (Palm Beach County, 2015; Town of Jupiter, n.d.) (see Map 12).

Future efforts to install educational signage that inform users about the aquatic preserve are a high priority for aquatic preserve staff and will be coordinated with Jonathan Dickinson State Park staff and Palm Beach County Department of Parks and Recreation.

4.3.3 / Education and Outreach Issue

Issue Four: Public Involvement

There is a lack of knowledge regarding Loxahatchee River-Lake Worth Creek Aquatic Preserve, not only among residents and the general population, but also among numerous stakeholder groups including governmental agencies throughout the area. While many people are aware that the Loxahatchee River holds the Wild and Scenic designation, few people realize that it is also an aquatic preserve. Limited staff has resulted in little work being conducted by the IRLAP office in Loxahatchee River-Lake Worth Creek Aquatic Preserve, as most efforts focus on the Indian River Lagoon system to the north. This has created a lack of recognition of the aquatic preserve, although LRD has developed a large citizen support base, and

has fostered wonderful stewardship of the river among local residents and businesses. IRLAP staff will work with these groups to promote awareness of the aquatic preserve and look for ways to collaborate on outreach projects as well as research.

Goal 1 / Increase public involvement and awareness of the aquatic preserve, the work conducted in it, and its significance.

Objective 1.1 / Promote awareness of the aquatic preserve and its significance to local residents.

Outreach for Loxahatchee River-Lake Worth Creek Aquatic Preserve has historically focused on participation in events organized by other organizations. In the future, staff would like to reach out to several target audiences by delivering presentations to appropriate homeowner associations, local businesses, and environmental groups to promote knowledge and stewardship of the aquatic preserve. Aquatic preserve staff will also coordinate with Jonathan Dickinson State Park staff and LRD to incorporate presentations about the aquatic preserve and the associated resources into their education programs.

Integrated Strategies

1.1.1 / Install signage at access points informing about the aquatic preserve. Currently, only two public access points have signage posted that indicate that the waterway is an aquatic preserve. Because of the lack of signage at the public access points, rapid population growth, and a high number of tourists, most visitors are unaware that the Loxahatchee River and Lake Worth Creek are an aquatic preserve.

Performance Measure: Install signs at access points to and the aquatic preserve.



Aquatic preserve information signage on a public boat ramp within Jonathan Dickinson State Park.

1.1.2 / Develop outreach materials and use social media to promote awareness of the aquatic preserve. IRLAP staff will work with DEP press office to develop educational materials providing information about the aquatic preserve.

Performance Measure: Produce educational materials to be distributed at outreach events and visitor centers.

1.1.3 / Provide educational boat tours to inform the public about the effect of watershed practices on the aquatic preserve’s natural resources. Partnerships with eco-tour operators and Jonathan Dickinson State Park staff will be formed to organize boat tours within the aquatic preserve to discuss the effect of watershed practices (urban and agricultural) on the aquatic preserve’s natural resources.

Performance Measures:

1. Host at least two boat tours per year in the aquatic preserve, and track participation.
2. Provide text to tour operators with information about the aquatic preserve to be delivered during regular tours.

1.1.4 / Create and promote a homeowner’s guide to living on Loxahatchee River-Lake Worth Creek Aquatic Preserve. Aquatic preserve staff will research, draft, print, and distribute an educational package that includes environmentally responsible alternatives to traditional practices for riparian homeowners within the aquatic preserve watershed. Associated materials will include recommendations for retention of stormwater, native landscaping and lawn care that span the wide salinity range (fresh to brackish) along the aquatic preserve, alternatives for cleaning docks and boats, watershed history that highlights alterations and their effects on the Loxahatchee River-Lake Worth Creek Aquatic Preserve, an aquatic preserve boundary map, a list of phone numbers for common questions and concerns, information on how to minimize individual carbon footprints, and a list of volunteer opportunities within the aquatic preserve. The homeowner’s guide will support such existing programs as the Florida Yards Program and DEP’s boat and dock Best Management Practices. Packages will be distributed by local volunteers and staff at a workshop designed to provide hands-on opportunities to promote the information presented in the guide. Packages will also be distributed at outreach events and meetings with homeowners’ associations.

Performance Measures:

1. Produce a homeowner’s guide to living on Loxahatchee River-Lake Worth Creek Aquatic Preserve.
2. Organize a workshop with hands-on demonstrations and vendors that support the information incorporated into the homeowner’s guide.



Map 12 / Public access for Loxahatchee River-Lake Worth Creek Aquatic Preserve.

4.4 / The Public Use Management Program

The Public Use Management Program addresses the delivery and management of public use opportunities at the aquatic preserve. The components of this program focus on providing the public recreational opportunities within the site’s boundaries which are compatible with resource management objectives. The goal for public access management in FCO managed areas is to promote and manage public use of our aquatic preserves and reserves that supports the research, education, and stewardship mission of FCO.

While access by the public has always been a priority, the conservation of FCO's sites is the primary management concern for FCO. It is essential for staff to analyze existing public uses and define management strategies that balance these activities where compatible in a manner that protects natural, cultural and aesthetic resources. This requires gathering existing information on use, needs, and

opportunities, as well as a thorough consideration of the existing and potential impacts to critical upland, wetland and submerged habitats. This includes the coordination of visitor program planning with social science research. One of FCO's critical management challenges during the next 10 years is balancing anticipated increases in public use with the need to ensure preservation of site resources. This section explains the history and current status of our Public Use efforts.



4.4.1 / Background of Public Use at Loxahatchee River-Lake Worth Creek Aquatic Preserve

The area surrounding Loxahatchee River-Lake Worth Creek Aquatic Preserve has a very strong boating community due to its proximity to the Jupiter Inlet. Many homes along the aquatic preserve have private, residential docks, and there are many waterfront businesses that cater to the boating community. Access to the waterways is a big concern among residents and government agencies.

4.4.2 / Current Status of Public Use at Loxahatchee River-Lake Worth Creek Aquatic Preserve

Loxahatchee River-Lake Worth Creek Aquatic Preserve currently contains four public boat ramps and one public marina. The three public boat ramps include Burt Reynolds Park East, Burt Reynolds Park West, Waterway Park, and Jonathan Dickinson State Park. The only public marina within the aquatic preserve is JIB Yacht Club and Marina. There are six private marinas within the aquatic preserve boundaries—Suntex Marina, Castaways Marina, Harbourside Place Marina, Jupiter Inlet Marina, Jupiter Yacht Club Marina, and The Bluff's Marina. Loxahatchee River-Lake Worth Creek Aquatic Preserve also contains several kayak launching areas including Inlet Village Park, Burt Reynolds Park and Loxahatchee River Center, DuBois Park, Jupiter Beach Park, Sawfish Bay Park, Jonathan Dickinson State Park, and Limestone Creek Natural Area (Palm Beach County, 2015; Town of Jupiter, n.d.).

Consumptive Use - Fishing and crabbing are popular consumptive uses of the aquatic preserve. Monofilament line from fishing activities is regularly seen around boat ramps and fishing piers, or entangled on shoreline vegetation. Support from local volunteers will be requested to help remove monofilament line on and around the

public boat ramps and fishing piers located within the aquatic preserve. Educational programs are expected to cultivate a sense of stewardship and behavioral change. Monofilament recycling containers are currently located at Burt Reynolds Park East and West and at JIB Yacht Club and Marina. Staff will work with local governments and FWC to install the polyvinyl chloride (PVC) monofilament containers at all public boat ramps and fishing piers along the aquatic preserve and coordinate with volunteers to monitor and maintain the containers.

Non-Consumptive Use - The most popular non-consumptive use of the aquatic preserve is boating. Clean boating practices will be advocated to the boating community through a stronger partnership

Public access to the aquatic preserve is available at Jonathan Dickinson State Park.



Stand up paddle boarding has become very popular along the aquatic preserve. Photo: Alexandra Menk.

with DEP's Clean Marina Program and managers of public boat ramps and marinas. Aquatic preserve staff will also promote low-impact recreational opportunity (e.g. canoeing, kayaking and stand up paddle boarding) to help prevent unforeseen damage to natural resources within the aquatic preserve. Stand-up paddle boarding has become a very popular activity in Loxahatchee River-Lake Worth Creek Aquatic Preserve, and many groups provide guided tours, stand up paddle boarding yoga, and night time paddle events.

4.4.3 / **Public Use Issue**

Issue Four: Public Involvement (continued)

Goal 2 / Encourage user experience and public recreation opportunities consistent with natural resources conservation.

Objective 2.1 / Increase public access and low impact recreational opportunities on Loxahatchee River-Lake Worth Creek Aquatic Preserve.

Integrated Strategies

2.1.1 / Create partnerships with private businesses, concessionaires, and launch site managers who operate in the area to encourage activities that protect the natural resources of the aquatic preserve, while promoting low impact recreational opportunities.

Performance Measure: Report workshops conducted for outfitters to provide impact on low-impact activities in the aquatic preserve.

2.1.2 / Support additional low impact recreational opportunities within the aquatic preserve. Staff will collaborate with Citizen Support Organizations currently working within the aquatic preserve to provide technical and vessel support for any low impact activities that promote sustainable public use of the aquatic preserve.

Performance Measures:

1. Track the number of events in which IRLAP staff participate.
2. Compile information from user surveys for IRLAP events.

Objective 2.2 / Inform residents and visitors about actions they can take to conserve and restore resources in Loxahatchee River-Lake Worth Creek Aquatic Preserve.

Integrated Strategies

2.2.1 / Promote Leave No Trace principles for recreational users within the aquatic preserve. The IRLAP office is a partner with the Leave No Trace Center for Outdoor Ethics. This partnership allows the office the use of Leave No Trace material and literature to promote principles that reduce impacts to natural areas.

Performance Measures:

1. Host Leave No Trace workshops to user groups around the aquatic preserve.
2. Compile information from user surveys for IRLAP events.

2.2.2 / Coordinate community-based cleanup events in conjunction with local groups and CSOs.

Aquatic preserve staff will organize two community-based clean-up events within the aquatic preserve each year.

Performance Measure: Conduct two clean-up events per year and create event summaries.



Boat tours, and canoe and kayak rentals are available at Jonathan Dickinson State Park.



Slash pine along the banks of the Loxahatchee River

Part Three

Additional Plans

Chapter Five

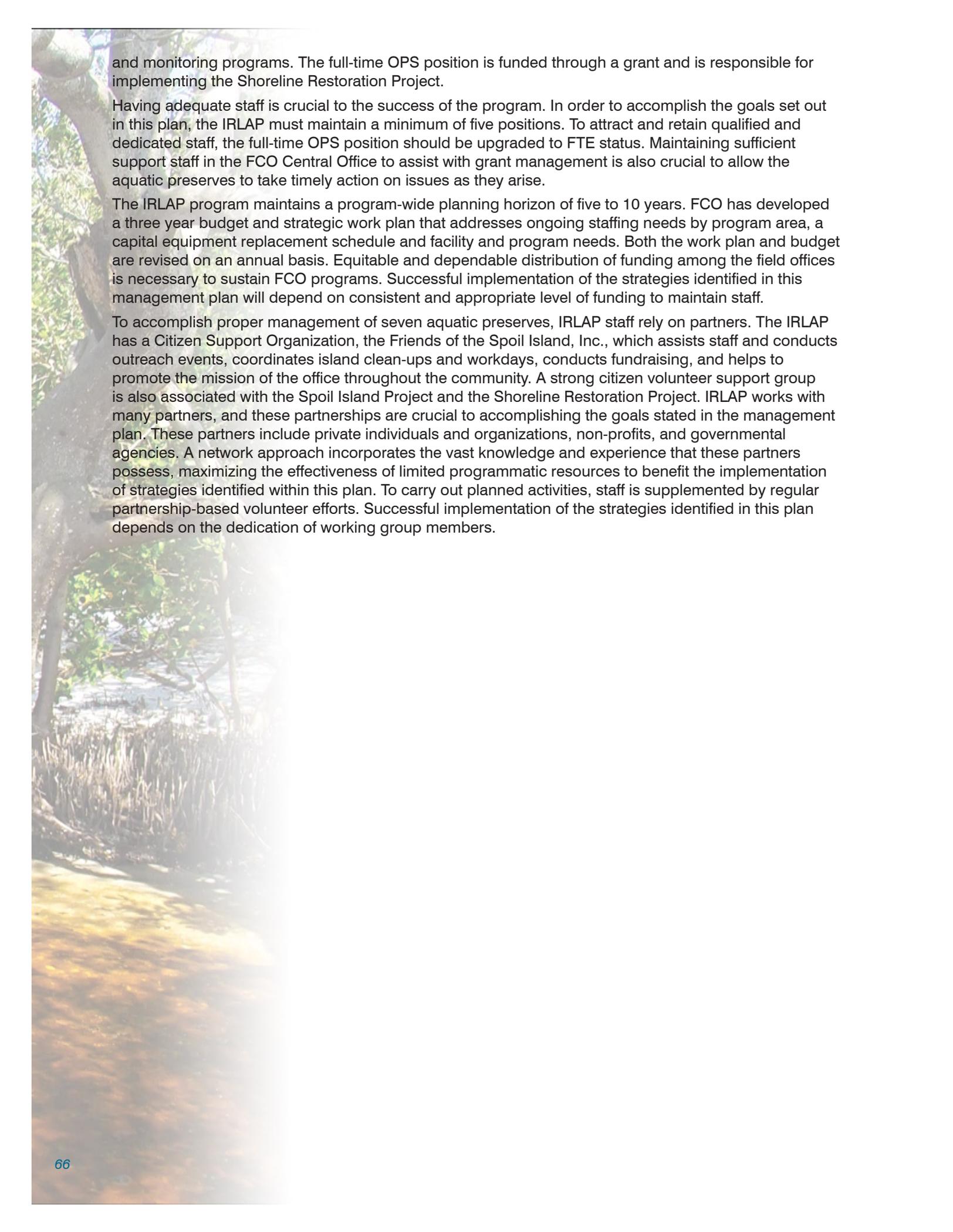
Administrative Plan

The mission of the Indian River Lagoon Aquatic Preserves (IRLAP) is to effectively implement the management plans for seven aquatic preserves under the charge of the Florida Coastal Office (FCO). These seven aquatic preserves are located within six adjacent counties and together total approximately 107,700 acres (436 km²) of sovereign submerged lands extending a distance of more than 150 miles (241 km).

Through a community-based program, the field office strives to:

1. Implement FCO's programs consistent with all Florida Department of Environmental Protection (DEP) regulations, policies and procedures;
2. Accurately provide fiscal tracking;
3. Manage contracts and grants; and
4. Provide all pertinent information to the FCO Central Office in Tallahassee.

As of fiscal year 2016-2017 the IRLAP staff includes four full time equivalent (FTE) (permanent) positions and one full time Other Personal Services (OPS) position. The four FTE positions include: an Environmental Specialist III, serving as the aquatic preserve manager; an Environmental Specialist II overseeing education, research, and volunteer coordination; an Environmental Specialist I coordinating the Spoil Island Project, and; an Environmental Specialist I supporting the resource management



and monitoring programs. The full-time OPS position is funded through a grant and is responsible for implementing the Shoreline Restoration Project.

Having adequate staff is crucial to the success of the program. In order to accomplish the goals set out in this plan, the IRLAP must maintain a minimum of five positions. To attract and retain qualified and dedicated staff, the full-time OPS position should be upgraded to FTE status. Maintaining sufficient support staff in the FCO Central Office to assist with grant management is also crucial to allow the aquatic preserves to take timely action on issues as they arise.

The IRLAP program maintains a program-wide planning horizon of five to 10 years. FCO has developed a three year budget and strategic work plan that addresses ongoing staffing needs by program area, a capital equipment replacement schedule and facility and program needs. Both the work plan and budget are revised on an annual basis. Equitable and dependable distribution of funding among the field offices is necessary to sustain FCO programs. Successful implementation of the strategies identified in this management plan will depend on consistent and appropriate level of funding to maintain staff.

To accomplish proper management of seven aquatic preserves, IRLAP staff rely on partners. The IRLAP has a Citizen Support Organization, the Friends of the Spoil Island, Inc., which assists staff and conducts outreach events, coordinates island clean-ups and workdays, conducts fundraising, and helps to promote the mission of the office throughout the community. A strong citizen volunteer support group is also associated with the Spoil Island Project and the Shoreline Restoration Project. IRLAP works with many partners, and these partnerships are crucial to accomplishing the goals stated in the management plan. These partners include private individuals and organizations, non-profits, and governmental agencies. A network approach incorporates the vast knowledge and experience that these partners possess, maximizing the effectiveness of limited programmatic resources to benefit the implementation of strategies identified within this plan. To carry out planned activities, staff is supplemented by regular partnership-based volunteer efforts. Successful implementation of the strategies identified in this plan depends on the dedication of working group members.



The Indian River Lagoon Aquatic Preserves field office is located within the Miller-Wild tract.

Chapter Six

Facilities

Facilities - The Indian River Lagoon Aquatic Preserves' (IRLAP) primary field office is located in Ft. Pierce at the Miller-Wild tract, a subparcel in, and managed by, Savannas Preserve State Park. Office components consist of: one 1,456 square foot modular building with five offices, which was built in 2003 and has a design life of 30 years; three portable sheds purchased in 2001, 2002 and 2006, and; an open two-bay pole barn for boat storage built in 2004 and reroofed in 2016 that has a design life of 20 years. The office was not leveled properly when it was placed on the property in 2003. Due to this oversight, the sides of the office were settling and the building was separating down the ridge line. The office was relocated on-site in 2009 to remedy the situation.

The northern satellite field office is a 476-square foot modular building constructed in 1997 at St. Sebastian River Preserve State Park in Fellsmere and has been occupied by IRLAP staff since summer 2008. The state park has agreed to the use of a shared wet laboratory for calibrating water quality monitoring equipment located at the park's new St. Sebastian River Preserve State Park Visitor's Center.

A native plant nursery for the Shoreline Restoration Project (SRP) is housed at the southern entrance to St. Sebastian River Preserve State Park in Indian River County. This nursery, manned by volunteers, reduces costs by growing and staging mangroves and other plants for the shoreline and spoil island restoration projects, and provides education and outreach event opportunities. The SRP also has use of a horse stable to store field equipment within the park.

Future construction and maintenance needs include, but are not limited to:

1. Regrade the dirt driveway to the compound in Ft. Pierce;
2. Maintain the septic tank and connect to St. Lucie County utilities when possible;
3. Repair and replace central air and heating system;
4. Vessel and vehicle replacement;
5. Acquire additional modular building to conduct educational outreach events and increase office workspace;

Vehicles and Vessels - As part of the program's strategic planning cycle, all vehicles and vessels in the program undergo routine inspection and maintenance by staff or an authorized vendor. The condition of all vehicles and vessels in the program are evaluated annually. The need to replace equipment is expected during the next ten years.

Current vessels and functions:

1. **19' Carolina Skiff with 115 horsepower Yamaha four-stroke engine** - Acquired in 2001 for field work in shallow coastal waters within IRLAP. The Carolina Skiff has a wide (six foot) beam and a side console which makes it an excellent vessel for hauling field equipment to monitoring and enhancement sites. (40.2 hours on the engine at the beginning of 2017.)
2. **19' Twin Vee Bay Cat with 115 horsepower Yamaha four-stroke engine** - Acquired in 2007 for field work in coastal waters in IRLAP and near shore reef environments. (63.5 hours on the engine at the beginning of 2017.)
3. **18' Parker Center Console with 115 horsepower Mercury two-stroke engine** – Acquired in 2001 for fieldwork in waters within IRLAP. (116 hours on the engine at the beginning of 2017.)
4. **11' Jon Boat with 15 horsepower Johnson four-stroke engine** – Acquired in 2008 for support of SRP and transporting equipment in narrow shallow waters.
5. **Four kayaks, ranging in size from nine to ten feet.**

Current vehicles and functions:

1. **2007 Ford F-150, crew cab, 4x4 pickup** (with topper) – Used to transport up to four staff or volunteers, heavy equipment, and/or towing boats. Used to support all programs, long-distance travel, training, and coordination meetings. (83,000 miles at the beginning of 2017.)
2. **Two 2002 Ford Explorers** - One was acquired for IRLAP to transport up to four staff or volunteers, equipment, and is used to support all programs, long-distance travel, training and coordination meetings. The other was acquired for SRP. (153,000 and 153,075 miles, respectively, at the beginning of 2017.)
3. **2008 Chevy Silverado** – Used for boat towing and general office travel. (171,000 miles at the beginning of 2017.)
4. **Enclosed trailer** – Acquired in 2008 and used by SRP to transport equipment and supplies.
5. **Flatbed trailer** – Acquired in 2015 for transporting oyster bagging supplies.
6. **2017 Ford F-250** – Acquired in 2017 and used to transport staff, heavy equipment, and/or for towing boats.

Furniture and Office Equipment - Replacement of office furniture and other equipment such as cabinets, desks, and phones needs to occur as necessary. All fulltime staff were provided new computers in 2013 and 2014. A desktop was acquired for the office administrator and remains as a local data server to help offset the slow network connection, while field staff were provided laptops with docking capabilities at either office. The IRLAP staff share a tablet computer for field data acquisition.

Upon the approach of a hurricane, all vessels and vehicles of the aquatic preserve office will be secured following the procedures outlined in the IRLAP Hurricane Plan, which is updated annually.

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Legal Documents

A.1 / Aquatic Preserve Resolution

WHEREAS, the State of Florida, by virtue of its sovereignty, is the owner of the beds of all navigable waters, salt and fresh, lying within its territory, with certain minor exceptions, and is also the owner of certain other lands derived from various sources; and

WHEREAS, title to these sovereignty and certain other lands has been vested by the Florida Legislature in the State of Florida Board of Trustees of the Internal Improvement Trust Fund, to be held, protected and managed for the long range benefit of the people of Florida; and

WHEREAS, the State of Florida Board of Trustees of the Internal Improvement Trust Fund, as a part of its overall management program for Florida's state-owned lands, does desire to insure the perpetual protection, preservation and public enjoyment of certain specific areas of exceptional quality and value by setting aside forever these certain areas as aquatic preserves or sanctuaries; and

WHEREAS, the ad hoc Florida Inter-Agency Advisory Committee on Submerged Land Management has selected through careful study and deliberation a number of specific areas of state-owned land having exceptional biological, aesthetic and scientific value, and has recommended to the State of Florida Board of Trustees of the Internal Improvement Trust Fund that these selected areas be officially recognized and established as the initial elements of a statewide system of aquatic preserves for Florida;

NOW, THEREFORE, BE IT RESOLVED by the State of Florida Board of Trustees of the Internal Improvement Trust Fund:

THAT it does hereby establish a statewide system of aquatic preserves as a means of protecting and preserving in perpetuity certain specially selected areas of state-owned land: and

THAT specifically described, individual areas of state-owned land may from time to time be established as aquatic preserves and included in the statewide system of aquatic preserves by separate resolution of the State of Florida Board of Trustees of the Internal Improvement Trust Fund; and

THAT the statewide system of aquatic preserves and all individual aquatic preserves established thereunder shall be administered and managed, either by the said State of Florida Board of Trustees of the Internal Improvement Trust Fund or its designee as may be specifically provided for in the establishing resolution for each individual aquatic preserve, in accordance with the following management policies and criteria:

- (1) An aquatic preserve is intended to set aside an exceptional area of state-owned land and its associated waters for preservation essentially in their natural or existing condition by reasonable regulation of all human activity which might have an effect on the area.
- (2) An aquatic preserve shall include only lands or water bottoms owned by the State of Florida, and such private lands or water bottoms as may be specifically authorized for inclusion by appropriate instrument from the owner. Any included lands or water bottoms to which a private ownership claim might subsequently be proved shall upon adjudication of private ownership be automatically excluded from the preserve, although such exclusion shall not preclude the State from attempting to negotiate an arrangement with the owner by which such lands or water bottoms might be again included within the preserve.
- (3) No alteration of physical conditions within an aquatic preserve shall be permitted except: (a) minimum dredging and spoiling for authorized public navigation projects, or (b) other approved activity designed to enhance the quality or utility of the preserve itself. It is inherent in the concept of the aquatic preserve that, other than as contemplated above, there be: no dredging and filling to create land, no drilling of oil wells or excavation for shell or minerals, and no erection of structures on stilts or otherwise unless associated with authorized activity, within the confines of a preserve - to the extent these activities can be lawfully prevented.
- (4) Specifically, there shall be no bulkhead lines set within an aquatic preserve. When the boundary of a preserve is intended to be the line of mean high water along a particular shoreline, any bulkhead line subsequently set for that shoreline will also be at the line of mean high water.
- (5) All human activity within an aquatic preserve shall be subject to reasonable rules and regulations promulgated and enforced by the State of Florida Board of Trustees of the Internal Improvement Trust Fund and/or any other specifically designated managing agency. Such rules and regulations shall not interfere unduly with lawful and traditional public uses of the area, such as fishing (both sport and commercial), hunting, boating, swimming and the like.
- (6) Neither the establishment nor the management of an aquatic preserve shall infringe upon the lawful and traditional riparian rights of private property owners adjacent to a preserve. In furtherance of these

rights, reasonable improvement for ingress and egress, mosquito control, shore protection and similar purposes may be permitted by the State of Florida Board of Trustees of the Internal Improvement Trust Fund and other jurisdictional agencies, after review and formal concurrence by any specifically designated managing agency for the preserve in question.

(7) Other uses of an aquatic preserve, or human activity within a preserve, although not originally contemplated, may be permitted by the State of Florida Board of Trustees of the Internal Improvement Trust Fund and other jurisdictional agencies, but only after a formal finding of compatibility made by the said Trustees on the advice of any specifically designated managing agency for the preserve in question.

IN TESTIMONY WHEREOF, the Trustees for and on behalf of the State of Florida Board of Trustees of the Internal Improvement Trust Fund have hereunto subscribed their names and have caused the official seal of said State of Florida Board of Trustees of the Internal Improvement Trust Fund to be hereunto affixed, in the City of Tallahassee, Florida, on this the 24th day of November A. D. 1969.

CLAUDE R. KIRK, JR, Governor

TOM ADAMS, Secretary of State

EARL FAIRCLOTH, Attorney General

FRED O. DICKINSON, JR., Comptroller

BROWARD WILLIAMS, Treasurer

FLOYD T. CHRISTIAN, Commissioner of Education

DOYLE CONNER, Commissioner of Agriculture

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

A.2 / Florida Statutes

All the statutes can be found according to number at www.leg.state.fl.us/Statutes

Florida Statutes, Chapter 253: State Lands

Florida Statutes, Chapter 258: State Parks and Preserves
Part II (Aquatic Preserves)

Florida Statutes, Chapter 267 (Historical Resources)

Florida Statutes, Chapter 370: Saltwater Fisheries

Florida Statutes, Chapter 372: Wildlife

Florida Statutes, Chapter 403: Environmental Control
(Statute authorizing the Florida Department of Environmental Protection (DEP) to create Outstanding Florida Waters is at 403.061(27))

Florida Statutes, Chapter 597: Aquaculture

A.3 / Florida Administrative Codes

All rules can be found according to number at www.flrules.org/Default.asp

Florida Administrative Code, Chapter 18-20: Florida Aquatic Preserves
<https://www.flrules.org/gateway/ChapterHome.asp?Chapter=18-20>

Florida Administrative Code, Chapter 18-21: Sovereignty Submerged Lands Management
<https://www.flrules.org/gateway/ChapterHome.asp?Chapter=18-21>

Florida Administrative Code, Chapter 62-302: Surface Water Quality Standards
(Rule designating Outstanding Florida Waters is at 62-302.700)
<https://www.flrules.org/gateway/ChapterHome.asp?Chapter=62-302>

Resource Data

B.1 / Glossary of Terms

References to these definitions can be found at the end of this list and in Appendix B.2 (References).

amphidromous – applied to the migratory behavior of fish moving from freshwater to the sea, and vice versa. Such migration is not for breeding purposes and occurs regularly at some stage of the live cycle (feeding, overwintering, etc.). (Allaby, 2005)

aquaculture - the cultivation of aquatic organisms. (Lincoln et al., 2003)

codify - to arrange laws and rules systematically. (Neufeldt & Sparks, 1990)

diversity - a measure of the number of species and their relative abundance in a community. (Lincoln et al., 2003)

drainage basin (catchment) - the area from which a surface watercourse or a groundwater system derives its water; watershed. (Allaby, 2005)

easement - a right that one may have in another's land. (Neufeldt & Sparks, 1990)

ecosystem - a community of organisms and their physical environment interacting as an ecological unit. (Lincoln et al., 2003)

emergent - an aquatic plant having most of the vegetative parts above water; a tree which reaches above the level of the surrounding canopy. (Lincoln et al., 2003)

endangered species - an animal or plant species in danger of extinction throughout all or a significant portion of its range. (U.S. Fish and Wildlife Service [USFWS], 2015)

endemic - native to, and restricted to, a particular geographical region. (Lincoln et al., 2003)

extinction - the disappearance of a species from a given habitat. (Lincoln et al., 2003)

fauna - the animal life of a given region, habitat or geological stratum. (Lincoln et al., 2003)

flora - the plant life of a given region, habitat or geological stratum. (Lincoln et al., 2003)

geographic information system (GIS) - computer system supporting the collection, storage, manipulation and query of spatially referred data, typically including an interface for displaying geographical maps. (Lincoln et al., 2003)

infauna - the animal life within a sediment. (Lincoln et al., 2003)

intertidal zone - the shore zone between the highest and lowest tides; littoral. (Lincoln et al., 2003)

listed species - a species, subspecies, or distinct population segment that has been added to the Federal list of endangered and threatened wildlife and plants. (USFWS, 2015)

mandate - an order or command; the will of constituents expressed to their representative, legislature, etc. (Neufeldt & Sparks, 1990)

mesohaline - pertaining to brackish water having a salinity between three and 10 parts per thousand or sea water having a salinity between 30 and 34 parts per thousand. (Lincoln et al., 2003)

midden - a refuse heap; used especially in archaeology. (Lincoln et al., 2003)

polyhaline – pertaining to brackish water having a salinity between 10 and 17 parts per thousand; or to sea water having a salinity greater than 34 parts per thousand. (Lincoln et al., 2003)

population - all individuals of one or more species within a prescribed area. A group of organisms of one species, occupying a defined area and usually isolated to some degree from other similar groups. (Lincoln et al., 2003)

runoff - part of precipitation that is not held in the soil but drains freely away. (Lincoln et al., 2003)

salinity - a measure of the total concentration of dissolved salts in seawater. (Lincoln et al., 2003)

sessile - non-motile; permanently attached at the base. (Lincoln et al., 2003)

species - a group of organisms, minerals or other entities formally recognized as distinct from other groups; the basic unit of biological classification. (Lincoln et al., 2003)

species of concern - an informal term referring to a species that might be in need of conservation action. This may range from a need for periodic monitoring of populations and threats to the species and its habitat, to the necessity for listing as threatened or endangered. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing. "Imperiled species" is another general term for listed as well as unlisted species that are declining. (USFWS, 2015)

stakeholder - any person or organization who has an interest in the actions discussed or is affected by the resulting outcomes of a project or action. (USFWS, 2015)

subtidal - environment which lies below the mean low water level. (Allaby, 2005)

supratidal - the zone on the shore above mean high tide level. (Lincoln et al., 2003)

threatened species - an animal or plant species likely to become endangered within the foreseeable future throughout all or a significant portion of its range. (USFWS, 2015)

turbid - cloudy; opaque with suspended matter. (Lincoln et al., 2003)

upland - land elevated above other land. (Neufeldt & Sparks, 1990)

vegetation - plant life or cover in an area; also used as a general term for plant life. (Lincoln et al., 2003)

water column - the vertical column of water in a sea or lake extending from the surface to the bottom. (Lincoln et al., 2003)

watershed - an elevated boundary area separating tributaries draining in to different river systems; drainage basin. (Lincoln et al., 2003)

wetland - an area of low lying land, submerged or inundated periodically by fresh or saline water. (Lincoln et al., 2003)

wildlife - any undomesticated organisms; wild animals. (Allaby, 2005)

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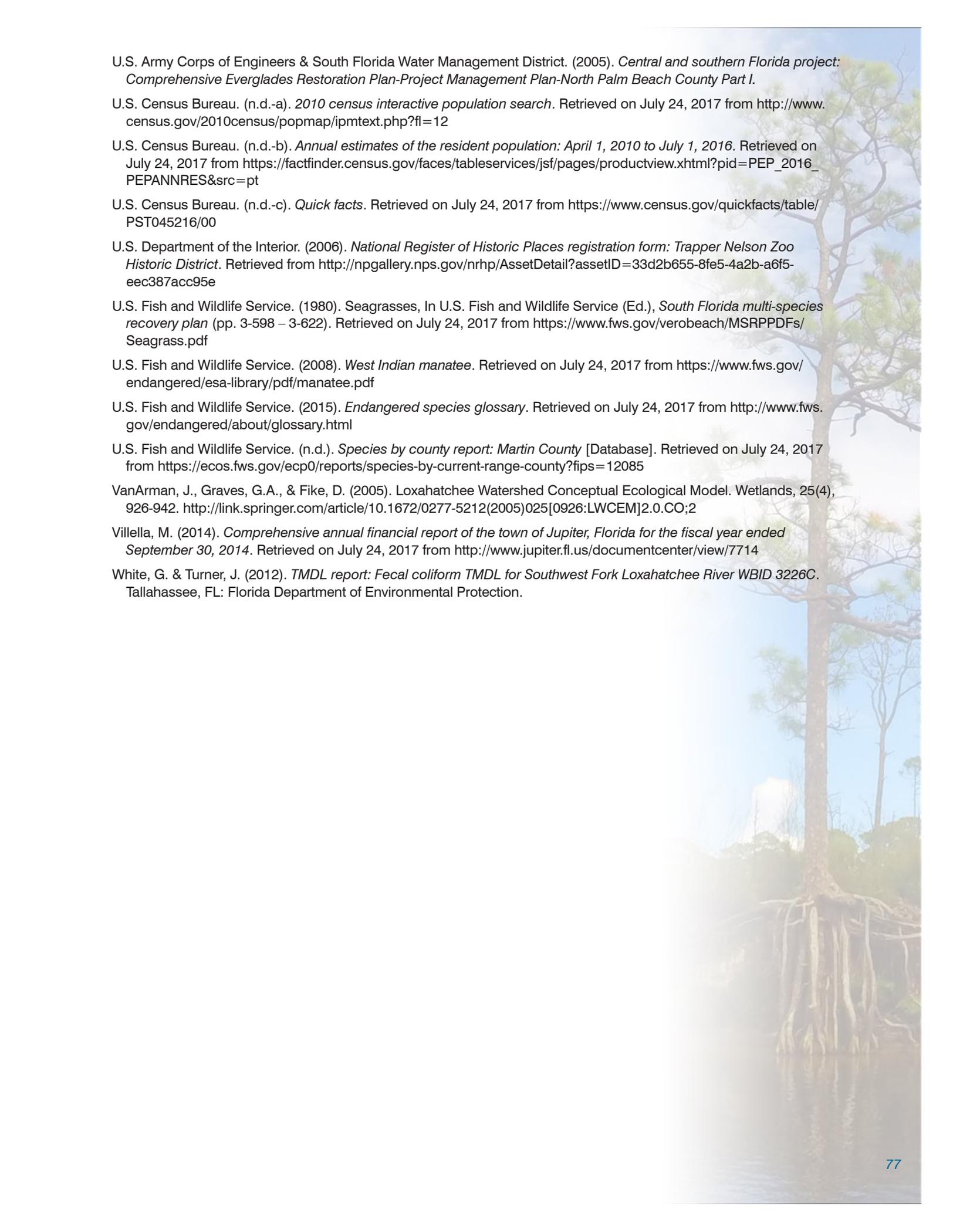
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B.3 / Species Lists

B.3.1 / Native Species List

Common Name	Species Name	Status
Legend: FT = Federally- and State-Designated Threatened • FE = Federally- and State-Designated Endangered ST = State-Designated Threatened • SE = State-Designated Endangered • SSC = State Species of Special Concern • (S/A) = listed due to similarity of appearance • BGEPA = Bald and Golden Eagle Protection Act CE = commercially exploited		
Kingdom Plantae (plants)		
Division Pterophyta (ferns)		
Mosquito fern	<i>Azolla caroliniana</i>	
Swamp fern	<i>Blechnum serrulatum</i>	
Long strap fern	<i>Campyloneurum phyllitidis</i>	
Hand fern	<i>Ophioglossum palmatum</i>	SE
Cinnamon fern	<i>Osmunda cinnamomea</i>	CE
Royal fern	<i>Osmunda regalis</i>	CE
Golden polypody	<i>Phlebodium aureum</i>	
Resurrection fern	<i>Pleopeltis polypodioides</i>	
Whisk fern	<i>Psilotum nudum</i>	
Wood fern	<i>Thelypteris interrupta</i>	
Marsh fern	<i>Thelypteris palustris</i>	
Meniscium fern	<i>Thelypteris serrata</i>	
Shoestring fern	<i>Vittaria lineata</i>	
Chain fern	<i>Woodwardia virginica</i>	
Bromeliaceae		
Air pine	<i>Tillandsia fasciculata</i>	SE
Ball moss	<i>Tillandsia recurvata</i>	
Needle-leaf airplant	<i>Tillandsia setacea</i>	
Spanish moss	<i>Tillandsia usneoides</i>	
Giant air pine	<i>Tillandsia utriculata</i>	SE
Division Pteridophyta (ferns)		
Giant leather fern	<i>Acrostichum danaeifolium</i>	
Division Pinophyta (cone-bearing plants)		
South Florida slash pine	<i>Pinus elliotti</i> var. <i>densa</i>	
Division Magnoliophyta (flowering plants)		
Class Liliopsida (grass-like flowering plants)		
Dayflower	<i>Commelina erecta</i>	
Swamp lily	<i>Crinum americanum</i>	
Hop sedge	<i>Cyperus lupulina</i>	
Flatsedge (Pinebarren flatsedge)	<i>Cyperus retrorsus</i>	
Variable witchgrass	<i>Dichanthelium commutatum</i>	
Butterfly orchid	<i>Encyclia tampensis</i>	CE
Shoal grass	<i>Halodule wrightii</i>	
Green arrow arum	<i>Peltandra virginica</i>	
Beak sedge	<i>Rhynchospora nariflora</i>	
Royal palm	<i>Roystonea regia</i>	
Cabbage palm (Sabal palm)	<i>Sabal palmetto</i>	
Saw palmetto	<i>Serenoa repens</i>	
Greenbrier	<i>Smilax auriculata</i> / <i>bona-nox</i>	
Catbrier	<i>Smilax laurifolia</i>	

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Gammagrass	<i>Tripsacum dactyloides</i>	
Cattail	<i>Typha latifolia</i>	
American tapegrass	<i>Vallisneria americana</i>	
Seagrasses (flowering aquatic plants)		
Shoal grass	<i>Halodule wrightii</i>	
Paddle grass	<i>Halophila decipiens</i>	
Star grass	<i>Halophila engelmannii</i>	
Johnson's seagrass	<i>Halophila johnsonii</i>	FT
Widgeon grass	<i>Ruppia maritima</i>	
Manatee grass	<i>Syringodium filiforme</i>	
Turtle grass	<i>Thalassia testudinum</i>	
Class Magnoliopsida (woody flowering plants)		
Red maple	<i>Acer rubrum</i>	
Alligator weed	<i>Alternanthera philoxeroides</i>	
Bastard indigo	<i>Amorpha fruticosa</i>	
Pond apple	<i>Annona glabra</i>	
Marlberry	<i>Ardisia escallonioides</i>	
Black mangrove	<i>Avicenna germinans</i>	
Saltbush (Sea myrtle)	<i>Baccharis halimifolia</i>	
Water hyssop (Herb-of-grace)	<i>Bacopa monnieri</i>	
False nettle	<i>Boehmeria cylindrica</i>	
Gumbo limbo	<i>Bursera simaruba</i>	
American beautyberry	<i>Callicarpa americana</i>	
Golden canna	<i>Canna flaccida</i>	
Water hickory	<i>Carya aquatica</i>	
Buttonbush	<i>Cephalanthus occidentalis</i>	
Coco plum	<i>Chrysobalanus icaco</i>	
Sawgrass	<i>Cladium jamaicensis</i>	
Sea grape	<i>Coccoloba uvifera</i>	
Stiff cornel dogwood	<i>Cornus foemina</i>	
Coral bean	<i>Erythrina herbacea</i>	
Strangler fig	<i>Ficus aurea</i>	
Pop ash	<i>Fraxinus caroliniana</i>	
Pennywort	<i>Hydrocotyle</i> sp.	
St. Johns wort	<i>Hypericum reductum</i>	
Dahoon holly	<i>Ilex cassine</i>	
Virginia willow	<i>Itea virginica</i>	
White mangrove	<i>Laguncularia racemosa</i>	
Primrose willow	<i>Ludwigia peruviana</i>	
Staggerbush	<i>Lyonia fruticosa</i>	
Climbing hemp vine	<i>Mikania scandens</i>	
Red mulberry	<i>Morus rubra</i>	
Wax myrtle (Southern bayberry)	<i>Myrica cerifera</i>	
Myrsine	<i>Myrsine guianensis</i>	

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Virginia creeper	<i>Parthenocissus quinquefolia</i>	
Red bay	<i>Persea borbonia</i>	
Swamp bay	<i>Persea palustris</i>	
Marsh fleabane	<i>Pluchea odorata</i>	
Wild coffee	<i>Psychotria nervosa</i>	
Wild coffee	<i>Psychotria sulzneri</i>	
Wild coffee	<i>Psychotria undata</i>	
Laurel oak	<i>Quercus laurifolia</i>	
Myrtle oak	<i>Quercus myrtifolia</i>	
Live oak	<i>Quercus virginiana</i>	
Rubber vine	<i>Rhabdadenia biflora</i>	
Red mangrove	<i>Rhizophora mangle</i>	
Blackberry	<i>Rubus trivialis</i>	
Coastal plain willow	<i>Salix caroliniana</i>	
White vine	<i>Sarcostemma clausa</i>	
Lizard's tail	<i>Saururus cernuus</i>	
Bald cypress	<i>Taxodium distichum</i>	
Poison ivy	<i>Toxicodendron radicans</i>	
Muscadine grape	<i>Vitis rotundifolia</i>	
Calusa grape	<i>Vitis shuttleworthii</i>	
Kingdom Animalia (animals)		
Phylum Arthropoda (insects, crustaceans)		
Class Cirripedia (barnacles)		
Barnacles	<i>Balanus</i> sp.	
Ivory barnacle	<i>Balanus eburneus</i>	
Class Pycnogonida (sea spiders)		
	<i>Pycnogonida</i> unid.	
Class Crustacea		
Order Amphipoda (small shrimp-like crustaceans)		
	<i>Acuminodeutopus nalgei</i>	
	<i>Ampelisca abdita</i>	
	<i>Ampelisca vadorum</i>	
	<i>Bathyporeia parkeri</i>	
	<i>Cerapus</i> cf. <i>benthophilus</i>	
	<i>Cerapus</i> cf. <i>tubularis</i>	
	<i>Cerapus</i> sp.	
	<i>Corophium acutum</i>	
	<i>Corophium</i> cf. <i>tuberculatum</i>	
	<i>Corophium lacustre</i>	
	<i>Corophium</i> sp.	
	<i>Cymadusa compta</i>	
	<i>Erichthorius brasiliensis</i>	
	<i>Erichthorius rubricornis</i>	
	<i>Eudevanopus hondoranus</i>	

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	<i>Gammarus fasciatus</i>	
	<i>Gammarus mucronatus</i>	
	<i>Grandidierella bonnieroides</i>	
Fresh water shrimp (scud)	<i>Hyallela azteca</i>	
	<i>Lembos smithi</i>	
	<i>Listriella barnardi</i>	
	<i>Lysianopsis alba</i>	
	<i>Melita nitida</i>	
	<i>Monoculodes nyei</i>	
Beach flea	<i>Orchestia uhleri</i>	
	<i>Parhyale hawaiiensis</i>	
	<i>Photis cf. reinhardi</i>	
	<i>Pontogeneia inermis</i>	
	<i>Rudilomboides naglei</i>	
	<i>Stegocephalidae sp.</i>	
	<i>Stenothoidae sp.</i>	
Order Cumacea (hooded shrimp)		
	<i>Almyracuma cf. Proximoculi</i>	
	<i>Almyracuma nr. Proximoculi</i>	
	<i>Almyracuma sp.</i>	
	<i>Cyclaspsis varians</i>	
	<i>Cumacea sp.</i>	
	<i>Oxyurostylus cf. smithi</i>	
Order Decapoda (crabs, shrimp, prawns)		
Green snapping shrimp	<i>Alpheus normanni</i>	
Burrowing shrimp	<i>Alpheus sp.</i>	
Mangrove tree crab	<i>Aratus pisonii</i>	
Nodose box crab	<i>Calappa angusta (Clyzodion angustum)</i>	
Estuarine mud shrimp	<i>Callinassa jamaicense</i>	
Blue crab	<i>Callinectes sapidus</i>	
Crab	<i>Callinectes sp.</i>	
Great land crab	<i>Cardisoma guanhumii</i>	
Hermit crab	<i>Clibanarius sp.</i>	
Thinstripe hermit crab	<i>Clibanarius vittatus</i>	
Prawn	<i>Dendrobranchiata sp.</i>	
Mole crab	<i>Emerita talpoida</i>	
Shrimp	<i>Hippolyte sp.</i>	
Zostera shrimp	<i>Hippolyte zostericola</i>	
Crayfish	<i>Macrobrachium ohione</i>	
Long-arm prawn	<i>Macrobrachium sp.</i>	
Estuarine long-eye shrimp	<i>Ogyrides alphaerostris</i>	
Hermit crab	<i>Paguristes sp.</i>	
Long-armed hermit crab	<i>Pagurus longicarpus</i>	
Hermit crab	<i>Pagurus sp.</i>	

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Grass shrimp	<i>Palaemonetes</i> sp.	
American freshwater shrimp	<i>Palaemonetes paludosus</i>	
	<i>Panopeus herbstii</i>	
Prawn	<i>Penaeus</i> sp.	
American grass shrimp	<i>Periclimenes americanus</i>	
	<i>Pinnixa</i> cf. <i>floridana</i>	
Tube pea crab	<i>Pinnixa chaetoptera</i>	
Pea crab	<i>Pinnixa</i> sp.	
Pea crab	<i>Pinnotheridae</i> sp.	
Crayfish	<i>Procambarus</i> sp.	
Eatuarine mud crab	<i>Rhithropanopeus harrisi</i>	
Harris mud crab	<i>Rhithropanopeus harrisi</i>	
Gray mud crab	<i>Sesarma cinereum</i>	
Mangrove crab	<i>Sesarma</i> sp.	
Destructor	<i>Sphaeroma destructor</i>	
Arrow shrimp	<i>Tozeuma carolinense</i>	
Arrow shrimp	<i>Tozeuma</i> sp.	
Fiddler crab	<i>Uca</i> sp.	
Order Isopoda (pillbugs,sowbugs)		
	<i>Anthuridae</i> unid.	
	<i>Cassidinidea ovalis</i>	
	<i>Cyathura polita</i>	
	<i>Edotea</i> cf. <i>montosa</i>	
	<i>Edotea trilobata</i>	
	<i>Erichsonella attenuata</i>	
	<i>Unounna reynoldsi</i>	
	<i>Paracerceis caudata</i>	
	<i>Xenanthura brevitelson</i>	
Order Tanaidacea		
	<i>Halmyrapseudes bahamensis</i>	
	<i>Hargeria repax</i>	
	<i>Hargeria robustus</i>	
	<i>Tanaidae</i> unid.	
	<i>Tanaidacea</i> unid.	
	<i>Tanais stanford</i>	
Class Insecta		
Order Diptera (true flies, mosquitoes, gnats)		
	<i>Ablabesmyia mallochi</i>	
	<i>Chironomus</i> sp	
	<i>Cladotanytarsus</i> sp.	
	<i>Cryptochironomus</i> sp.	
	<i>Cryptotendipes</i> sp.	
	<i>Polypedilum tritum</i>	
	<i>Polypedilum halterale</i>	

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	<i>Stenichironomus</i> sp.	
	<i>Thienemanniella</i> sp.	
	<i>Tribelos fuscicome</i>	
Phylum Cnidaria		
Class Anthozoa (sea anemones, corals)		
Sea anemones	<i>Actiniaria</i> sp.	
	<i>Anthenaria</i> sp.	
	<i>Anthomedusa</i> sp.	
Sea anemones	<i>Thenaria</i> sp.	
Class Hydrozoa (hydra, obelia, air ferns)		
	<i>Hydrobiidae</i> sp.	
	<i>Hydrozoa</i> unid.	
Phylum Chaetognatha (arrow worms)		
	<i>Chaetognatha</i> unid.	
	<i>Syngnathus</i> sp.	
Phylum Chordata		
Lancelet (sea squirt)	<i>Branchiostoma lanceolatum (Amphioxus)</i>	
Phylum Echinodermata (starfish, sea urchins, sea cucumbers)		
Burrowing brittle star	<i>Amphiuridae</i> unid.	
Sea cucumber	<i>Holothuroidea</i> unid.	
Brittle starfish	<i>Ophiuroidea</i> sp.	
Phylum Hemicordata		
Acorn worm (tube worm)	<i>Enteropneusta</i> sp.	
Phylum Mollusca		
Class Gastropoda (snails)		
	<i>Cerithium cf. floridanum</i>	
	<i>Cerithium leutosum</i>	
Spotted slippersnail	<i>Crepidula maculosa</i>	
Eastern white slippersnail	<i>Crepidula plana</i>	
Slippersnail	<i>Crepidula</i> sp.	
Amber glassy-bubble	<i>Haminoea succenia</i>	
Bugle sprite	<i>Menetus dilatatus</i>	
Luner dovesnail	<i>Mitrella lunata</i>	
Common eastern nassa	<i>Nassarius vibex</i>	
Olive nerite	<i>Neritina reclivata</i>	
Nerites (sea snails)	<i>Neritina</i> sp.	
Virgin nerite	<i>Neritina virginica</i>	
Sea slugs	<i>Nudibranchia</i> sp.	
Olive shells	<i>Olivella</i> sp.	
Marine slugs/snails	<i>Opisthobranchia</i> unid.	
	<i>Polynices</i> sp.	
	<i>Turbonilla interrupta</i>	
Class Pelecypoda / Bivalvia (clams, oysters, mussels, scallops)		
Atlantic papermussel	<i>Amygdalum papyrium</i>	

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	<i>Anomalocardia auberiana</i>	
Adams ark (cancellate ark)	<i>Arcopsis adamsi</i>	
	<i>Astarte cf. nana</i>	
	<i>Asterothaeus hemphilli</i>	
Bivalves	<i>Bivalvia</i> sp.	
	<i>Bivalvia</i> unid.	
Elegant bushclam	<i>Bushia elegans</i>	
	Cf. <i>Gouldii cerina</i>	
Cross barred venus	<i>Chione cancellata</i> (<i>Neocompsa cylindricollis</i>)	
	<i>Corbula contracta</i>	
Eastern oyster	<i>Crassostrea virginica</i>	
Southern ribbed mussel	<i>Gaukensis dimissa</i> (<i>Geukensia granosissima</i>)	
	<i>Gouldi</i> cf. <i>cerina</i>	
Flat tree oyster	<i>Isognomon alatus</i>	
	<i>Lima pellicida</i>	
Thick lucine	<i>Lucina pectinata</i>	
Clam	<i>Lucina</i> sp.	
	<i>Lyonsia hyalina floridana</i>	
Clam	<i>Macoma</i> sp.	
	<i>Macominae</i> unid.	
Dwarf surfclam	<i>Mulinia lateralis</i>	
False dark mussel	<i>Mytilopsis leucophaeta</i>	
Many lined lucine	<i>Parvilucina multilineata</i>	
White pitar	<i>Pitar albidus</i>	
Carolina marshclam	<i>Polymesoda caroliniana</i>	
Rangia clam	<i>Rangia cuneata</i>	
West Indian awningclam	<i>Solemya occidentalis</i>	
Atlantic awning clam	<i>Solemya velum</i>	
Purplish tagelus	<i>Tagelus divisus</i>	
Stout tagelus	<i>Tagelus plebius</i>	
	<i>Tellina</i> nr. <i>Mera</i>	
	<i>Tellina</i> sp.	
	<i>Tellina versicolor</i>	
	<i>Tellinidae</i> unid.	
Phylum Annelida (segmented worms)		
Nesiotes		
Class Hirudinea (leeches)		
Freshwater leech	<i>Myzobdella uruguayensis</i>	
Leech	<i>Myzobdella</i> sp.	
Subclass Oligochaeta (earthworms, various worms)		
	<i>Dero trifida</i>	
Pot worms	<i>Enchytraeidae</i> unid.	

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	<i>Grania monospermatotheca</i>	
	<i>Grania</i> sp.	
	<i>Limnodriloides baculatus</i>	
	<i>Limnodriloides barnardi</i>	
	<i>Limnodriloides hastatus</i>	
	<i>Limnodriloides monotheucus</i>	
	<i>Limnodriloides rubicundis</i>	
	<i>Limnodriloides</i> sp.	
	<i>Limnodriloides</i> unid.	
	<i>Monopylephorus pervus</i>	
	<i>Monopylephorus rubroriveus</i>	
	<i>Oligochaete</i> unid.	
	<i>Paranis litoralis</i>	
	<i>Smithsonidrilus hummelincki</i>	
	<i>Tectidrilus gabriellae</i>	
	<i>Tectidrilus squalidus</i>	
	<i>Thalassodriloides gurwitschi</i>	
	<i>Thalassodrilodes</i> sp.	
	<i>Trieminentia corderoi</i>	
Ciliated oligochaete worms	<i>Tubificidae</i> unid.	
Ciliated oligochaete worms	<i>Tubificidae</i> sp. A	
	<i>Tubificidae</i> sp. w/out hair	
	<i>Tubificoides brownae</i>	
	<i>Tubificoides motei</i>	
	<i>Tubificoides</i> sp.	
Phylum Annelida		
Class Polychaeta (bristle worms)		
	<i>Ancistrosyllis carolinensis</i>	
	<i>Arabeila mutans</i>	
	<i>Arenicola cristata</i>	
	<i>Aricidea fragilis</i>	
	<i>Aricidea philbinae</i>	
	<i>Aricidea</i> sp A	
	<i>Aricidea</i> sp. C	
	<i>Aricidea</i> sp	
	<i>Aricidea</i> cf. <i>suecica</i>	
	<i>Aricidea taylori</i>	
	<i>Armandia agilis</i>	
	<i>Armandia maculata</i>	
	<i>Armandia</i> sp.	
	<i>Asychis elongatus</i>	
	<i>Axiiothella mucosa</i>	
	<i>Bhawania goodie</i>	
	<i>Bhawania heteroseta</i>	

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	<i>Boguea enigmatica</i>	
	<i>Brainia</i> sp.	
	<i>Brainia wellfeetensis</i>	
	<i>Brainia clavata</i>	
	<i>Branchiomma</i> sp.	
	<i>Capitella capitata</i>	
	Capitellidae unid	
	<i>Capitillides jonesi</i>	
	<i>Capitomastus jonesi</i>	
	<i>Capitomastis</i> sp. A	
	<i>Caraziella hobsonae</i>	
	<i>Caulleriella alata</i>	
	<i>Caulleriella kilariensis</i>	
	<i>Caulleriella</i> sp. A	
	<i>Caulleriella</i> sp.	
	<i>Ceratonereis mirabilis</i>	
	<i>Chone</i> cf. <i>americana</i>	
	<i>Chone</i> sp.	
	<i>Cirriformia</i> sp.	
	Cirratullidae unid.	
	<i>Cirriformia</i> sp. A	
	<i>Cirriformia</i> sp. B	
	<i>Cirrophorus</i> sp.	
	<i>Cossura delta</i>	
	<i>Diopatra cuprea</i>	
	<i>Dorvillea sociabilis</i>	
	Dorvilleidae sp.	
	<i>Drilonereis</i> sp. E	
	<i>Ehiersia cornuta</i>	
	Enchytraeidae unid.	
	<i>Enoplobranchus sanguineus</i>	
	<i>Eteone heteropoda</i>	
	<i>Etoene lactae</i>	
	<i>Etoene</i> sp.	
	<i>Eunice</i> sp.	
	<i>Eurythoe complanata</i>	
	<i>Eurythoe</i> sp. B	
	<i>Exogone dispar</i>	
	<i>Fabricia</i> sp.	
	<i>Fabriciola trilobata</i>	
	<i>Glycera abranchiata</i>	
	<i>Glycera dibranchiata</i>	
	<i>Glycera capitata</i>	
	<i>Glycera</i> sp.	

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	<i>Glyceride</i> unid.	
	<i>Glycinde solitaria</i>	
	<i>Glycinde socialis</i>	
	<i>Glycinde</i> sp.	
	<i>Grubeosyllis clavata</i>	
	<i>Gyptis brevipalpa</i>	
	<i>Haplosyllis spongicola</i>	
	<i>Haploscoloplos fragilis</i>	
	<i>Heteromastus filiformis</i>	
	<i>Hobsonia florida</i>	
	<i>Hypereteone heteropoda</i>	
	<i>Kinbergonuphis simoni</i>	
	<i>Laeonereis culveri</i>	
	<i>Laonome</i> sp.	
	<i>Leitoscoloplos foliosus</i>	
	<i>Leitoscoloplos fragilis</i>	
	<i>Leitoscoloplos robustus</i>	
	<i>Leitoscoloplos</i> sp.	
	<i>Lepidometria</i> sp.	
	<i>Loimia medusa</i>	
	<i>Lumbrineridae</i> unid.	
	<i>Lumbrineris</i> sp.	
	<i>Lumbrineris verrilli</i>	
	<i>Malacoceros vanderhorsti</i>	
	<i>Maidanidae</i> sp.	
	<i>Mediomastus ambiseta</i>	
	<i>Mediomastus californiensis</i>	
	<i>Mediomastus</i> sp.	
	<i>Megalomma pigmentum</i>	
	<i>Megalomma</i> sp. A	
	<i>Monticellina dorsobanchialis</i>	
	<i>Naineris laevigata</i>	
	<i>Naineris</i> sp.	
	<i>Naenthes succinea</i>	
	<i>Nematonereis hebes</i>	
	<i>Nereis falsa</i>	
	<i>Notomastus americanus</i>	
	<i>Notomastus daueri</i>	
	<i>Notomastus hemipodus</i>	
	<i>Notomastus</i> sp.	
	<i>Notomastus tenuis</i>	
	<i>Odontosyllis enopia</i>	
	<i>Ophryotrocha</i> sp.	
	<i>Orbinia riseri</i>	

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	<i>Orbinidae</i> unid.	
	<i>Owenia</i> sp.	
	<i>Paramphinome</i> sp. B	
	<i>Paraprionospio pinnata</i>	
	<i>Phyllodoce arenae</i>	
	<i>Phyllodocidae</i> unid.	
	<i>Pectinaria gouldi</i>	
	<i>Platynereis dumerili</i>	
	<i>Podarke obscura</i>	
	<i>Podarkiopsis lewifuscina</i>	
	<i>Poecilochaetus johnsoni</i>	
	<i>Polticirrus plumosus</i>	
	<i>Polydora ligni</i>	
	<i>Polydora socialis</i>	
	<i>Polydora</i> sp.	
	<i>Polydora websteri</i>	
	<i>Polynoidae</i> genus A	
	<i>Potamilia</i> sp.	
	<i>Prionospio</i> cf. <i>cirrobranchia</i>	
	<i>Prionospio cristata</i>	
	<i>Prionospio heterobranchia</i>	
	<i>Prionospio multibranchiata</i>	
	<i>Prionospio perkinsi</i>	
	<i>Prionospio</i> sp.	
	<i>Proceraea</i> cf. <i>cornuta</i>	
	<i>Psuedopolydora</i> sp. A	
	<i>Psuedopolydora</i> sp.	
	<i>Sabella</i> cf. <i>melanostigma</i>	
	<i>Sabellaria floridensis</i>	
	<i>Sabellidae</i> unid.	
	<i>Scoelepsis squamata</i>	
	<i>Scoelepsis texaria</i>	
	<i>Scoelepsis acmeiceps</i>	
	<i>Scoelepsis fragilis</i>	
	<i>Scoelepsis rubra</i>	
	<i>Scoloplos</i> sp	
	<i>Serpulidae</i> unid.	
	<i>Sphaeosyllis longicauda</i>	
	<i>Sphaeosyllis</i> sp.	
	<i>Spio pettibonae</i>	
	<i>Spiochaetopterus costarum</i>	
	<i>Spiochaetopterus c. oculatus</i>	
	<i>Spionidae</i> unid.	
	<i>Spirorbis</i> sp.	

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	<i>Sthenelais</i> sp.	
	<i>Streblosoma hartmanae</i>	
	<i>Streblosoma verrilli</i>	
	<i>Strebiospio benedicti</i>	
	<i>Strebiospio pettiboneae</i>	
	<i>Steninonereis martini</i>	
	<i>Streptosyllis pettiboneae</i>	
	<i>Syllis cornuta</i>	
	<i>Syllis ferrugina</i>	
	<i>Syllis</i> sp.	
	<i>Terebellides</i> sp. A	
	<i>Terebellides stroemii</i>	
	<i>Terebellides</i> unid.	
	<i>Tharyx</i> cf. <i>annulosus</i>	
	<i>Tharyx dorsobranchialis</i>	
	<i>Tharyx marioni</i>	
	<i>Tharyx</i> sp.	
Phylum Nematoda (roundworms)		
Horsehair worms	<i>Nematomorpha</i> unid.	
Phylum Nemertinea (ribbon worms)		
	<i>Nemertea</i> sp. A	
	<i>Nemertea</i> sp. E	
	<i>Nemertea</i> unid.	
	<i>Rhynchocoela</i> sp.	
	<i>Nemertea</i> sp. B	
	<i>Nemertea</i> sp. D	
Phylum Phoronida (horse shoe worms)		
	<i>Phoronis architecta</i>	
	<i>Phoronis</i> sp.	
Phylum Platyhelminthes (flatworms)		
	<i>Stylochus</i> sp.	
	<i>Turbellaria</i> unid.	
Phylum Porifera (sponges)		
	<i>Cliona</i> sp.	
Phylum Sipunculida (peanut worms)		
	<i>Sipunculida</i> unid.	
	<i>Sipuncula</i> sp.	
Subphylum Vertebrata (vertebrates)		
Class Chondrichthyes (cartilaginous fishes)		
Atlantic stingray	<i>Dasyatis americana</i>	
Spotted eagle ray	<i>Aetobatus narinari</i>	
Bull shark	<i>Carcharhinus leucas</i>	
Blacktip shark	<i>Carcharhinus limbatus</i>	
Sandbar shark	<i>Carcharhinus plumbeus</i>	

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Atlantic stingray	<i>Dasyatis americana</i>	
Southern stingray	<i>Dasyatis sabina</i>	
Bluntnose stingray	<i>Dasyatis sayi</i>	
Smooth butterfly ray	<i>Gymnura micrura</i>	
Lemon shark	<i>Negaprion brevirostris</i>	
Smalltooth sawfish	<i>Pristis pectinata</i>	FE
Cownose ray	<i>Rhinoptera bonasus</i>	
Scalloped hammerhead	<i>Sphyrna lewini</i>	
Southern stingray	<i>Dasyatis sabina</i>	
Superclass Osteichthyes (bony fishes)		
Sergeant major	<i>Abudefduf saxatilis</i>	
Lined sole	<i>Achirus lineatus</i>	
Mountain mullet	<i>Agonostomas monticola</i>	
Shad	<i>Alosa</i> sp.	
Brown bullhead	<i>Ameiurus nebulosus</i>	
Bowfin (Mudfish)	<i>Amia calva</i>	
Cuban anchovy	<i>Anchoa cubana</i>	
Striped anchovy	<i>Anchoa hepsetus</i>	
Dusky anchovy	<i>Anchoa lyolepis</i>	
Bay anchovy	<i>Anchoa mitchilli</i>	
American eel	<i>Anguilla rostrata</i>	
Sheepshead	<i>Archosargus probatocephalus</i>	
Hardhead catfish	<i>Arius felis</i>	
Gafftopsail catfish	<i>Bagre marinus</i>	
Silver perch	<i>Bairdiella chrysura</i>	
Whip eel	<i>Bascanichthys scuticaris</i>	
Frillfin goby (Molly miller)	<i>Bathygobius soporator</i>	
Yellow jack	<i>Caranx bartholomaei</i>	
Crevalle jack	<i>Caranx hippos</i>	
Horse-eye jack	<i>Caranx latus</i>	
Swordspine snook	<i>Centropomus ensiferus</i>	
Small-scale fat snook	<i>Centropomus mexicanus</i>	
Fat snook	<i>Centropomus parallelus</i>	
Tarpon snook	<i>Centropomus pectinatus</i>	
Common snook	<i>Centropomus undecimalis</i>	
Atlantic bumper	<i>Chloroscombrus chrysurus</i>	
Bay whiff	<i>Citharichthys spilopterus</i>	
Spotted whiff	<i>Citharichthys macrops</i>	
Spotted seatrout	<i>Cynoscion nebulosus</i>	
Sheepshead minnow	<i>Cyprinodon variegatus</i>	
Irish pompano	<i>Diapterus auratus</i>	
Spottail pinfish	<i>Diplodus caudimacula</i>	
Fat sleeper	<i>Dormitator maculatus</i>	
Gizzard shad	<i>Dorosoma cepedianum</i>	

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Everglades pygmy sunfish	<i>Elassoma evergladi</i>	
Largescale spinycheek sleeper	<i>Electris amblyopsis</i>	
Spinycheek sleeper	<i>Eleotris pisonis</i>	
Ladyfish	<i>Elops saurus</i>	
Bluespotted sunfish	<i>Enneacanthus gloriosus</i>	
Chubsucker	<i>Erimyzon oblongus</i>	
Lake chubsucker	<i>Erimyzon sucetta</i>	
Emerald sleeper	<i>Erotelis smaragdus</i>	
Swamp darter	<i>Etheostoma fusiforme</i>	
Slender mojarra	<i>Eucinostomas jonesi</i>	
Florida mojarra	<i>Eucinostomas lefroyi</i>	
Spotfin mojarra	<i>Eucinostomus argenteus</i>	
Silver jenny	<i>Eucinostomus gula</i>	
Mottled mojarra	<i>Eucinostomus lefroyi</i>	
Striped mojarra	<i>Eugerres plumieri</i>	
Lyre goby	<i>Evorthodus lyricus</i>	
Golden topminnow	<i>Fundulus chrysotus</i>	
Marsh killifish	<i>Fundulus confluentus</i>	
Lined topminnow	<i>Fundulus lineolatus</i>	
Southern starhead minnow	<i>Fundulus lineolatus</i>	
Banded topminnow	<i>Fundulus rubrifrons</i>	
Seminole killifish	<i>Fundulus seminolis</i>	
Redface topminnow	<i>Funduuls rubrifrons</i>	
Mosquitofish	<i>Gambusia affinis</i>	
Eastern mosquitofish (Eastern gambusia)	<i>Gambusia holbrooki</i>	
Yellowfin mojarra	<i>Gerres cinereus</i>	
Bigmouth sleeper	<i>Gobiomorus dormitor</i>	
Darter goby	<i>Gobionellus boleosoma</i>	
Sharptail goby	<i>Gobionellus hastatus</i>	
Highfin goby	<i>Gobionellus oceanicus</i>	
Naked goby	<i>Gobiosoma bosci</i>	
Green moray	<i>Gymnothorax fuebris</i>	
French grunt	<i>Haemulon flavolineatum</i>	
White grunt	<i>Haemulon plumieri</i>	
Bluestriped grunt	<i>Haemulon sciurus</i>	
Scaled sardine	<i>Harengula jagauna</i>	
Least killifish	<i>Heterandria formosa</i>	
Dwarf seahorse	<i>Hippocampus zosterae</i>	
Yellow bullhead	<i>Ictalurus natalis</i>	
Flagfish	<i>Jordanella floridae</i>	
Brook silverside	<i>Labidesthes sicculus</i>	
Hairy blenny	<i>Labrisomus nuchipinnis</i>	
Pinfish	<i>Lagodon rhomboides</i>	
Spot	<i>Leiostomus xanthurus</i>	

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Cuban majorra	<i>Lepidochir havana</i>	
Long-nosed gar	<i>Lepisosteus osseus</i>	
Spotted gar (Florida gar)	<i>Lepisosteus platyrhincus</i>	
Warmouth	<i>Lepomis gulosus</i>	
Bluegill	<i>Lepomis macrochirus</i>	
Dollar sunfish	<i>Lepomis marginatus</i>	
Redear sunfish	<i>Lepomis microlophus</i>	
Spotted sunfish	<i>Lepomis punctatus</i>	
Sunfish	<i>Lepomis</i> sp.	
Pygmy killifish	<i>Leptoliucania ommata</i>	
Crested goby	<i>Lophogobius cyprinoides</i>	
Bluefin killifish	<i>Lucania goodei</i>	
Dog snapper	<i>Lutjanus griseus</i>	
Highfin blenny	<i>Lupinoblennius nicholsi</i>	
Gray snapper	<i>Lutjanus griseus</i>	
Tarpon	<i>Megalops atlanticus</i>	
Tidewater silverside	<i>Menidia beryllena</i>	
Inland silverside	<i>Menidia beryllina</i>	
Gulf kingfish	<i>Menticirrhus littoralis</i>	
Clown goby	<i>Microgobius gulosus</i>	
Opposum pipefish	<i>Microphis brachyurus</i>	
Atlantic croaker	<i>Micropogonias undulatus</i>	
Largemouth bass	<i>Micropterus salmoides</i>	
Striped mullet	<i>Mugil cephalus</i>	
White mullet	<i>Mugil curema</i>	
Gag grouper	<i>Mycteroperca microlepis</i>	
Worm eel	<i>Myrophis punctatus</i>	
Speckled worm eel	<i>Myropis punctatus</i>	
Golden shiner	<i>Notemigonus crysoleucas</i>	
Ironcolor shiner	<i>Notropis chalybaeus</i>	
Taillight shiner	<i>Notropis maculatus</i>	
Coastal shiner	<i>Notropis petersoni</i>	
Tadpole madtom	<i>Noturus gyrinus</i>	
Leatherjacket	<i>Oligoplites saurus</i>	
Atlantic thread herring	<i>Opisthonema oglinum</i>	
Pigfish	<i>Orthopristis chrysopterus</i>	
Southern flounder	<i>Paralichthys lethostigma</i>	
Sailfin molly	<i>Poecilia latipinna</i>	
Burro grunt	<i>Pomadasydys crocro</i>	
Black crappie	<i>Pomoxis nigromaculatus</i>	
Bighead searobin	<i>Prionotus tribulus</i>	
Mangrove rivulus	<i>Rivulus marmoratus</i>	
Spanish sardine	<i>Sardinella anchovia</i>	
Zelinda's parrotfish	<i>Scarus croicensis (Zelindae)</i>	

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Red drum	<i>Sciaenops ocellatus</i>	
Plumed scorpionfish	<i>Scorpaena grandicornis</i>	
Redfin parrotfish	<i>Sparisoma rubripinne</i>	
Southern puffer	<i>Sphoeroides nephelus</i>	
Checkered puffer	<i>Sphoeroides testudineus</i>	
Great barracuda	<i>Sphyaena barracuda</i>	
Atlantic needlefish	<i>Strongylura marina</i>	
Redfin needlefish	<i>Strongylura notata</i>	
Needlefishes	<i>Strongylura</i> sp.	
Dusky pipefish	<i>Syngnathus floridae</i>	
Northern pipefish	<i>Syngnathus fuscus</i>	
Gulf pipefish	<i>Syngnathus scovelli</i>	
Inshore lizardfish	<i>Synodus foetens</i>	
Common pompano	<i>Trachinotus carolinus</i>	
Permit	<i>Trachinotus falcatus</i>	
Hogchoker	<i>Trinectes maculatus</i>	
Class Amphibia (frogs, toads,salamanders)		
Florida cricket frog	<i>Acris gryllus</i>	
Two-toed amphiuma	<i>Amphiuma means</i>	
Oak toad	<i>Bufo quercicus</i>	
Southern toad	<i>Bufo terrestris</i>	
Narrow-mouth toad	<i>Gastrophryne carolinensis</i>	
Green treefrog	<i>Hyla cinerea</i>	
Pine woods treefrog	<i>Hyla femoralis</i>	
Barking treefrog	<i>Hyla gratiosa</i>	
Squirrel treefrog	<i>Hyla squirella</i>	
Little grass frog	<i>Limnaoedus ocularis</i>	
Gopher frog	<i>Lithobates capito</i>	
Peninsula newt	<i>Notophthalmus viridescens</i>	
Florida chorus frog	<i>Pseudacris ocularis</i>	
Pig frog	<i>Rana grylio</i>	
Southern leopard frog	<i>Rana utricularia</i>	
Eastern spadefoot toad	<i>Scaphiopus holbrookii</i>	
Eastern lesser siren	<i>Siren intermedia intermedia</i>	
Class Reptilia (reptiles)		
Florida cottonmouth	<i>Agkistrodon piscivorus</i>	
American alligator	<i>Alligator mississippiensis</i>	FT (S/A)
Green anole	<i>Anolis carolinensis</i>	
Loggerhead sea turtle	<i>Caretta caretta</i>	FT
Green sea turtle	<i>Chelonia mydas</i>	FT
Florida scarlet snake	<i>Cemphorus coccinea coccinea</i>	
Snapping turtle	<i>Chelydra serpentina</i>	
Florida red-bellied turtle	<i>Chrysemys nelsoni</i>	
Six-lined racerunner	<i>Cnemidophorus sexlineatus</i>	

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Southern black racer	<i>Coluber constrictor</i>	
Leatherback sea turtle	<i>Dermochelys coriacea</i>	FE
Eastern indigo snake	<i>Drymarchon corais couperi</i>	FT
Hawksbill sea turtle	<i>Eretmochelys imbricata</i>	FE
Corn snake	<i>Elaphe guttata guttata</i>	
Yellow rat snake	<i>Elaphe obsoleta quadrivittata</i>	
Rat snake	<i>Elaphe</i> sp.	
Peninsula mole skink	<i>Eumeces egregious onocrepis</i>	
Southeastern five-lined skink	<i>Eumeces inexpectatus</i>	
Eastern mud snake	<i>Farancia abacurra abacurra</i>	
Gopher tortoise	<i>Gopherus polyphemus</i>	ST
Striped mud turtle	<i>Kinosternon baurii</i>	
Florida mud turtle	<i>Kinosternon subrubrum steindachneri</i>	
Scarlet kingsnake	<i>Lampropriis triangulum elapsoides</i>	
King snake	<i>Lompropeltis</i> sp.	
Eastern coachwhip snake	<i>Masticophis flagellum flagellum</i>	
Eastern coral snake	<i>Micrurus fulvius</i>	
Florida water snake	<i>Nerodia fasciata</i>	
Florida green water snake	<i>Nerodia floridana</i>	
Rough green snake	<i>Opheodrys aestivus</i>	
Florida pine snake	<i>Pituophis melanoleucus mugitus</i>	ST
Peninsula cooter	<i>Psuedemys floridana peninsularis</i>	
Striped crayfish snake	<i>Regina allei</i>	
Ground skink	<i>Sciencella lateralis</i>	
South Florida swamp snake	<i>Semenatrix pygus cyclas</i>	
Florida brown snake	<i>Storeria dekayi victa</i>	
Florida box turtle	<i>Terrapene carolina bauri</i>	
Eastern ribbon snake	<i>Thamnophis sauritus</i>	
Eastern garter snake	<i>Thamnophis sirtalis</i>	
Florida softshell	<i>Trionyx ferox</i>	
Class Aves (birds)		
Cooper's hawk	<i>Accipiter cooperii</i>	
Sharp-shinned hawk	<i>Accipiter striatus</i>	
Spotted sandpiper	<i>Actitis macularia</i>	
Red-winged blackbird	<i>Agelaius phoeniceus</i>	
Backman's sparrow	<i>Aiorphila aestivalis</i>	
Wood duck	<i>Aix sponsa</i>	
American widgeon	<i>Anas americana</i>	
Green-winged teal	<i>Anas crecca</i>	
Blue-winged teal	<i>Anas discors</i>	
Mottled duck	<i>Anas fulvigula</i>	
Mallard	<i>Anas platyrhynchos</i>	
Anhinga	<i>Anhinga anhinga</i>	
Northern pintail	<i>Anus acuta</i>	

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Florida scrub jay	<i>Aphelocoma coerulescens</i>	FT
Limpkin	<i>Aramus guarana</i>	
Ruby-throated hummingbird	<i>Archilochus colubris</i>	
Great egret	<i>Ardea alba</i>	
Great blue heron	<i>Ardea herodias</i>	
Lesser scaup	<i>Aythya affinis</i>	
Cedar waxwing	<i>Bombycilla cedrorum</i>	
American bittern	<i>Botaurus lentiginosus</i>	
Least bittern	<i>Botaurus lentiginosus</i>	
Great horned owl	<i>Bubo virginianus</i>	
Red-tailed hawk	<i>Buteo jamaicensis</i>	
Red-shouldered hawk	<i>Buteo lineatus</i>	
Green heron	<i>Butorides virescens</i>	
Chuck-will's widow	<i>Caprimulgus carolinensis</i>	
Whip-poor-will	<i>Caprimulgus pelagica</i>	
Northern cardinal	<i>Cardinalis cardinalis</i>	
American goldfinch	<i>Carduelis tristis</i>	
Turkey vulture	<i>Cathartes aura</i>	
Swainson's thrush	<i>Catharus ustulatus</i>	
Belted kingfisher	<i>Ceryle alcyon</i>	
Chimney swift	<i>Chaetura pelagica</i>	
Killdeer	<i>Charadrius vociferus</i>	
Common nighthawk	<i>Chordeiles minor</i>	
Northern harrier (Marsh hawk)	<i>Circus cyaneus</i>	
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	
Northern flicker	<i>Colaptes auratus</i>	
Northern bobwhite	<i>Colinus virginianus</i>	
Ground dove	<i>Columbina passerina</i>	
Eastern wood peewee	<i>Contopus virens</i>	
Black vulture	<i>Coragyps atratus</i>	
Common crow	<i>Corvus brachyrhynchos</i>	
Fish crow	<i>Corvus ossifragus</i>	
Smooth-billed ani	<i>Crotophaga ani</i>	
Blue jay	<i>Cyanocitta cristata</i>	
Black-throated blue warbler	<i>Dendroica caerulescens</i>	
Yellow-rumped warbler	<i>Dendroica coronata</i>	
Yellow-throated warbler	<i>Dendroica dominca</i>	
Blackburnian warbler	<i>Dendroica fusca</i>	
Kirtland's warbler (Kirtland's wood warbler)	<i>Dendroica kirtlandii</i>	FE
Palm warbler	<i>Dendroica palmarum</i>	
Chestnut-sided warbler	<i>Dendroica pensylvanica</i>	
Pine warbler	<i>Dendroica pinus</i>	
Blackpoll warbler	<i>Dendroica striata</i>	
Cape May warbler	<i>Dendroica tigrina</i>	

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Bobolink	<i>Dolichonyx oryzivorus</i>	
Pileated woodpecker	<i>Dryocopus pileatus</i>	
Gray catbird	<i>Dumetella carolinensis</i>	
Little blue heron	<i>Egretta caerulea</i>	ST
Reddish egret	<i>Egretta rufescens</i>	ST
Snowy egret	<i>Egretta thula</i>	
Tricolored heron (Louisiana heron)	<i>Egretta tricolor</i>	ST
Swallow-tailed kite	<i>Elanoides forficatus</i>	
White ibis	<i>Eudocimus albus</i>	
Merlin	<i>Falco columbarius</i>	
Peregrine falcon	<i>Falco peregrinus</i>	
American kestrel	<i>Falco sparverius</i>	
Southeastern American kestrel	<i>Falco sparverius paulus</i>	ST
Magnificent frigatebird	<i>Fregata magnificens</i>	
American coot	<i>Fulica americana</i>	
Common snipe	<i>Gallinago gallinago</i>	
Common gallinule	<i>Gallinula chloropus</i>	
Common moorhen	<i>Gallinula chloropus</i>	
Common loon	<i>Gavia immer</i>	
Common yellowthroat	<i>Geothlypis trichas</i>	
Florida sandhill crane	<i>Grus canadensis pratensis</i>	ST
Bald eagle	<i>Haliaeetus leucocephalus</i>	BGEPA
Barn swallow	<i>Hirundo rustica</i>	
Spotted-breasted oriole	<i>Icterus pectoralis</i>	
Loggerhead shrike	<i>Lanius ludovicianus</i>	
Herring gull	<i>Larus argentatus</i>	
Laughing gull	<i>Larus atricilla</i>	
Ring-billed gull	<i>Larus delawarensis</i>	
Hooded merganser	<i>Lophodytes cucullatus</i>	
Red-bellied woodpecker	<i>Melanerpes carolinus</i>	
Red-headed woodpecker	<i>Melanerpes erthrocephalus</i>	
Wild turkey	<i>Meleagris gallopavo</i>	
Swamp sparrow	<i>Melospiza georgiana</i>	
Red-breasted merganser	<i>Mergus serrator</i>	
Northern mockingbird	<i>Mimus polyglottos</i>	
Black and white warbler	<i>Mniotilta varia</i>	
Brown-headed cowbird	<i>Molothrus ater</i>	
Wood stork	<i>Mycteria americana</i>	FT
Great crested flycatcher	<i>Myiarchus crinitus</i>	
Yellow-crowned night heron	<i>Nyctanassa violacea</i>	
Black-crowned night heron	<i>Nycticorax nycticorax</i>	
Screech owl	<i>Otus asio</i>	
Osprey	<i>Pandion haliaetus</i>	
Northern parula	<i>Parula americana</i>	

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Warbler	Parulidae (multiple spp.)	
Painted bunting	<i>Passerina ciris</i>	
Indigo bunting	<i>Passerina cyanea</i>	
Brown pelican	<i>Pelecanus occidentalis</i>	
Double-crested cormorant	<i>Phalacrocorax auritus</i>	
Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>	
Red-cockaded woodpecker	<i>Picoides borealis</i>	FE
Downy woodpecker	<i>Picoides pubescens</i>	
Hairy woodpecker	<i>Picoides villosus</i>	
Rufous-sided towhee	<i>Piilo erythrophthalmus</i>	
Summer tanager	<i>Piranga rubra</i>	
Roseate spoonbill	<i>Platalea ajaja</i>	ST
Pied-billed grebe	<i>Podilymbus podiceps</i>	
Blue-gray gnatcatcher	<i>Polioptila caerulea</i>	
Purple martin	<i>Progne subis</i>	
Boat-tailed grackle	<i>Quiscalus major</i>	
Common grackle	<i>Quiscalus quiscula</i>	
Ruby-crowned kinglet	<i>Regulus calendula</i>	
Bank swallow	<i>Riparia riparia</i>	
Everglades snail kite	<i>Rostrhamus sociabilis plumbeus</i>	FE
Black skimmer	<i>Rynchops niger</i>	ST
Eastern phoebe	<i>Sayornis phoebe</i>	
American woodcock	<i>Scolopax minor</i>	
Ovenbird	<i>Seiurus aurocapillus</i>	
Northern waterthrush	<i>Seiurus noveboracensis</i>	
American redstart	<i>Setophaga ruticilla</i>	
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	
Chipping sparrow	<i>Spizella passerina</i>	
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>	
Least tern	<i>Sterna antillarum</i>	ST
Royal tern	<i>Sterna maxima</i>	
Barred owl	<i>Strix varia</i>	
Eastern meadowlark	<i>Sturnella magna</i>	
Tree swallow	<i>Tachycineta bicolor</i>	
Carolina wren	<i>Thryothorus ludovicianus</i>	
Brown thrasher	<i>Toxostoma rufum</i>	
House wren	<i>Troglodytes aedon</i>	
American robin	<i>Turdus migratorius</i>	
Gray kingbird	<i>Tyrannus dominicensis</i>	
Barn owl	<i>Tyto alba</i>	
Orange-crowned warbler	<i>Vermivora celata</i>	
White-eyed vireo	<i>Vireo griseus</i>	
Solitary vireo	<i>Vireo solitarius</i>	
Mourning dove	<i>Zenaida macroura</i>	

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Class Mammalia (mammals)		
Short-tailed shrew	<i>Biarina brevicauda carolinensis</i>	
Nine-banded armadillo	<i>Dasypus novemcinctus</i>	
Common opossum	<i>Didelphis marsupialis</i>	
Southeastern flying squirrel	<i>Glaucomys volans querceti</i>	
River otter	<i>Lutra canadensis</i>	
Bobcat	<i>Lynx rufus</i>	
River otter	<i>Lontra canadensis</i>	
Evening bat	<i>Nycticeius humeralis</i>	
White-tailed deer	<i>Odocoileus virginianus</i>	
Rice rat	<i>Oryzomys palustris</i>	
Cotton mouse	<i>Peromyscus gossypinus palmarius</i>	
Florida mouse	<i>Podomys floridanus</i>	
Raccoon	<i>Procyon lotor</i>	
Eastern mole	<i>Scalopus aquaticus</i>	
Eastern gray squirrel	<i>Sciurus carolinensis</i>	
Sherman's fox squirrel	<i>Sciurus niger shermani</i>	SSC
Cotton rat	<i>Sigmadon hispidus littoralis</i>	
Eastern spotted skunk	<i>Spilogale putorius</i>	
Cottontail rabbit	<i>Sylvilagus floridanus</i>	
Marsh rabbit	<i>Sylvilagus palustris</i>	
Mexican free-tailed bat	<i>Tadarida brasiliensis</i>	
West Indian manatee	<i>Trichechus manatus</i>	FT
Atlantic bottlenose dolphin	<i>Tursiops truncatus</i>	
Common gray fox	<i>Urocyon cinereoargenteus</i>	

B.3.2 / Invasive Non-Native and/or Problem Species

Common Name	Species Name	Category
*Florida Exotic Pest Plant Council (FLEPPC) categorizes invasive exotic plants as Category I (plants that are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives) or Category II (plants that have increased in abundance or frequency but have not yet altered Florida plant communities to the extent shown by Category I species).		
Division Pteridophyta		
Old world climbing fern	<i>Lygodium microphyllum</i>	I
Sword fern	<i>Nephrolepis cordifolia</i>	I
Sword fern	<i>Nephrolepis multiflora</i>	I
Division Magnoliophyta (flowering plants)		
Class Liliopsida (grass-like flowering plants)		
Shell ginger	<i>Alpinia zerumbet</i>	
Queen palm	<i>Arecastrum romanzoffianum</i>	
Bamboo	<i>Bambusa sp</i>	
Bamboo palm	<i>Chamaedorea lutezens</i>	II
Madagascar periwinkle	<i>Chatharanthus roseus</i>	

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*Florida Exotic Pest Plant Council (FLEPPC) categorizes invasive exotic plants as Category I (plants that are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives) or Category II (plants that have increased in abundance or frequency but have not yet altered Florida plant communities to the extent shown by Category I species).		
Pangola grass	<i>Digitaria decumbens</i>	
Barnyard grass	<i>Echinochloa crus-galli</i>	
Water hyacinth	<i>Eithornia crassipes</i>	I
Pothos	<i>Epipremnum pinnatum</i> cv. <i>aureum</i>	II
Life plant	<i>Kalanchoe pinnata</i>	II
Mundo	<i>Mundo japonica</i>	
Banana	<i>Musa x paradisiaca</i>	
Screw pine	<i>Pandarus utilis</i>	
Guinea grass	<i>Panicum maximum</i>	II
Torpedo grass	<i>Panicum repens</i>	I
Bahia grass	<i>Paspalum notatum</i>	
Common reed grass	<i>Phragmites australis</i>	
Water lettuce	<i>Pistia stratiotes</i>	I
Natal grass	<i>Rhynchelytrum repens</i>	I
Sugarcane	<i>Saccharium officinarum</i>	
Climbing cassia	<i>Senna pendula</i>	I
Smut grass	<i>Sporobolus indicus</i>	
West Indian dropseed	<i>Sporobolus jacquemontii</i>	I
Arrowhead vine	<i>Syngonium podophyllum</i>	I
Cattail	<i>Typha</i> sp.	
Para grass	<i>Urochloa mutica</i>	I
Class Magnoliopsida (woody flowering plants)		
Rosary pea	<i>Abrus precatorius</i>	I
Earleaf acacia	<i>Acacia auriculiformis</i>	I
Women's tongue	<i>Albizia lebeck</i>	I
Allamanda (Yellow trumpet)	<i>Allamanda cathartica</i>	
Joyweed	<i>Alternanthera sessilis</i>	
Coral ardisia	<i>Ardisia crenata</i>	I
Shoebuttan ardisia	<i>Ardisia elliptica</i>	I
Ganges primrose	<i>Asystasia gangetica</i>	II
Bishopwood	<i>Bischofia javanica</i>	I
Australian pine	<i>Causarina equisetifolia</i>	I
Suckering Australian pine	<i>Causarina glauca</i>	I
Hairy partridge pea	<i>Chamaecrista pilosa</i>	
Citrus	<i>Citrus</i> sp.	
Sebesten plum	<i>Cordia dichotoma</i>	
Fuzzy rattlebox	<i>Crotalaria incana</i>	
Lanceleaf rattlebox	<i>Crotalaria lanceolata</i>	
Showy rattlebox	<i>Crotalaria spectabilis</i>	
Surinam cherry	<i>Eugenia uniflora</i>	I
False banyan	<i>Ficus altissima</i>	II
Weeping fig	<i>Ficus benjamina</i>	

Common Name	Species Name	Category
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*Florida Exotic Pest Plant Council (FLEPPC) categorizes invasive exotic plants as Category I (plants that are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives) or Category II (plants that have increased in abundance or frequency but have not yet altered Florida plant communities to the extent shown by Category I species).

Indian laurel fig	<i>Ficus microcarpa</i>	I
Green hygro	<i>Hygrophila polysperma</i>	I
Hairy indigo	<i>Indigofera hirsuta</i>	
Lantana	<i>Lantana camara</i>	I
Peruvian primrose willow	<i>Ludwigia peruviana</i>	I
Phasey bean	<i>Macroptilium lathyroides</i>	II
Mango	<i>Mangifera indica</i>	
Melaleuca	<i>Melaleuca quinquenervia</i>	I
Chinaberry	<i>Melia azedarach</i>	II
Cat-claw mimosa	<i>Mimosa pigra</i>	I
Strawberry guava	<i>Psidium cattleianum</i>	I
Guava	<i>Psidium guajava</i>	I
Downy rose myrtle	<i>Rhodomyrtus tomentosus</i>	I
Brazilian pepper	<i>Schinus terebinthifolius</i>	I
Mexican flame vine	<i>Senecio confusus</i>	
Java plum	<i>Syzygium cumini</i>	I
Rose apple	<i>Syzygium jambos</i>	I
Tropical almond	<i>Terminalia cattapa</i>	II
Caesar weed	<i>Urena lobata</i>	I
Wedelia (creeping oxeye)	<i>Wedelia trilobata</i>	II
Elephant ear	<i>Xanthosoma sagittifolium</i>	II

Kingdom Animalia (animals)

Subphylum Vertebrata (vertebrates)

Superclass Osteichthyes (bony fishes)

Black acara	<i>Cichlasoma bimaculatum</i>	
Mayan cichlid	<i>Cichlasoma urophthalmus</i>	
Walking catfish	<i>Clarias batrachus</i>	
Grass carp	<i>Ctenopharyngodon idella</i>	
Brown hopio	<i>Hoplosternum litorale</i>	
Blue tilapia	<i>Oreochromis aureus</i>	
Common lionfish	<i>Pterois miles</i>	
Red lionfish	<i>Pterois volitans</i>	
Sailfin catfish	<i>Pterygoplichthys disjunctivus</i>	
Spotted tilapia	<i>Tilapia mariae</i>	

Class Amphibia (frogs, toads, salamanders)

Cuban treefrog	<i>Osteophilus septentrionalis</i>	
Giant toad	<i>Bufo marinus</i>	
Greenhouse frog	<i>Eleutherodactylus planirostris planirostris</i>	

Class Reptilia (reptiles)

Indo-pacific gecko	<i>Hemidactylus garnotti</i>	
Island glass lizard	<i>Ophisaurus compressus</i>	

Common Name	Species Name	Category
*Florida Exotic Pest Plant Council (FLEPPC) categorizes invasive exotic plants as Category I (plants that are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives) or Category II (plants that have increased in abundance or frequency but have not yet altered Florida plant communities to the extent shown by Category I species).		
Class Aves (birds)		
Cattle egret	<i>Bubulcus ibis</i>	
European starling	<i>Sturnus vulgaris</i>	
House sparrow	<i>Passer domesticus</i>	
Class Mammalia (mammals)		
Feral hog	<i>Sus scrofa</i>	

B.4 / Arthropod Control Plan

Spatial data (e.g. shapefiles) for the boundaries of the aquatic preserve have been made accessible to the appropriate mosquito control district. The aquatic preserve is deemed highly productive and environmentally sensitive. By policy of DEP since 1987, aerial adulticiding is not allowed, but larviciding and ground adulticiding (truck spraying in public use areas) is typically allowed. Mosquito control plans temporarily may be set aside under declared threats to public or animal health, or during a Governor's Emergency Proclamation. Mosquito control plans are typically proposed by local mosquito control agencies when they desire to treat on public lands. Currently, there are no mosquito control plans for Loxahatchee River-Lake Worth Creek Aquatic Preserve.

B.5 / Archaeological and Historical Sites Associated with Loxahatchee River-Lake Worth Creek Aquatic Preserve

The list below was derived from shapefiles obtained from the Florida Department of State, Division of Historical Resources on October 11, 2017, and includes sites within .25 miles of Loxahatchee River-Lake Worth Creek Aquatic Preserve.

FL Master File #	FL Master File Name	Description	Location
MT00350	TRAPPER NELSON INTERPRETIVE SITE	Museum/art gallery/planetarium (c1936)	Within 0.25 miles of LRLWCAP
MT00389	RIVERSIDE MEMORIAL PARK CEMETERY	Cemetery (1907)	Within 0.25 miles of LRLWCAP
MT00852	RIVER EDGE CLUB	Lodge (club) building (c1925)	Within 0.25 miles of LRLWCAP
MT00995	Main Cabin	Other (1937+)	Within 0.25 miles of LRLWCAP
MT01282	KITCHEN CREEK #1	Campsite (prehistoric); Artifact scatter-low density (< 2 m ² meter); isolated find; prehistoric with pottery	Within 0.25 miles of LRLWCAP
MT01285	KITCHEN CREEK #4	Campsite (prehistoric); land-terrestrial	Within 0.25 miles of LRLWCAP
MT01320	HUNT SAWMILL	Lumber mill; 19th century American, 1821-1899	Within 0.25 miles of LRLWCAP
MT01323	TRAPPER NELSON SITE	Museum/art gallery/planetarium (c1938)	Within 0.25 miles of LRLWCAP
MT01344	Trapper Nelsons Pineapple Patch	Homestead; 20th century American, 1900-present	Within LRLWCAP
MT01348	Trapper Nelson Cabin and Zoo	Subsurface features present; homestead; historic refuse/dump; 20th century American, 1900-present	Within LRLWCAP
MT01449	Trapper Nelson Historic District	The camp-like complex of vernacular buildings and structures was made by Vince "Trapper" Nelson, typically using hewn pine logs, palm thatch and sheet metal.	Within LRLWCAP
MT01488	River Campground Bathroom	Outhouse (1964)	Within 0.25 miles of LRLWCAP
MT01489	Cypress Creek Pavilion	Outhouse (c1957)	Within 0.25 miles of LRLWCAP
MT01490	Pump House - Picnic Area	Other (1961-)	Within 0.25 miles of LRLWCAP
MT01577	Camp Murphy	Military camp from 1942-1944	Within 0.25 miles of LRLWCAP
PB00034	JUPITER INLET HIST & ARCHAEOLOGICAL SITE	Consists of an irregular aboriginal shell mound and the 1897 residence of the pioneer settler family of Harry DuBois.	Within 0.25 miles of LRLWCAP
PB00034A	JUPITER INLET ARCHAEOLOGICAL SITE	Historic burial(s) and prehistoric mounds and shell middens; Belle Glade, 700 B.C.-A.D. 1700; Glades, 1000 B.C.-A.D. 1700;	Within 0.25 miles of LRLWCAP
PB00035	JUPITER MIDDEN #2	Buildings remain; historical burials; campsite (prehistoric); habitation (prehistoric); homestead; 19th century American, 1821-1899; 20th century American, 1900-present; Archaic 8500 B.C.-1000 B.C.; British 1763-1783; American Civil War, 1861-1865	Within 0.25 miles of LRLWCAP
PB00065	Jupiter Inlet Lighthouse	Lighthouse (c1860)	Within 0.25 miles of LRLWCAP
PB00170	NN	Prehistoric middens	Within LRLWCAP
PB00233	CELESTIAL RAILROAD TERMINUS	The Celestial RR played an important role in the development of SE Florida. Locally historically significant.	Within 0.25 miles of LRLWCAP
PB01766	GLADWIN, D A HOUSE	Private residence (1926)	Within 0.25 miles of LRLWCAP

FL Master File #	FL Master File Name	Description	Location
PB06175	CAMP JUPITER	Campsite (prehistoric); historic fort; historic refuse/dump; variable density scatter of artifacts; American Acquisition/ Territorial Development 1821-1845; Seminole 2nd and 3rd Wars, 1835-1855	Within 0.25 miles of LRLWCAP
PB06181	PORFIDIO HOUSE	Private residence (1935)	Within 0.25 miles of LRLWCAP
PB06182	WILSON HOUSE 1	Private residence (1939)	Within 0.25 miles of LRLWCAP
PB06183	WILSON HOUSE 2	Private residence (1939)	Within 0.25 miles of LRLWCAP
PB06184	WILSON HOUSE 3	Private residence (1939)	Within 0.25 miles of LRLWCAP
PB06185	MINEAR HOUSE	Private residence (1940)	Within 0.25 miles of LRLWCAP
PB06186	TINDALL HOUSE	Private residence (1890)	Within 0.25 miles of LRLWCAP
PB06187	READ HOUSE	Private residence (1940)	Within 0.25 miles of LRLWCAP
PB06188	JOHNSTONS HOUSE	Private residence (1934)	Within 0.25 miles of LRLWCAP
PB06189	CAMP LOXIE	Private residence (1940)	Within 0.25 miles of LRLWCAP
PB06190	ESPINOSA HOUSE	Private residence (1930)	Within 0.25 miles of LRLWCAP
PB06191	WILLIS HOUSE	Private residence (1940)	Within 0.25 miles of LRLWCAP
PB06201	HYMAN, J LEONARD HOUSE	Private residence (1926)	Within 0.25 miles of LRLWCAP
PB07718	SUNI SANDS SHELL MIDDEN	Habitation historic; prehistoric shell midden; 19th century American, 1821-1899; 20th century American, 1900-present; Glades I, 1000 B.C.-A.D. 750; Glades II, A.D. 750-1200; Glades III, A.D. 1000-170	Within 0.25 miles of LRLWCAP
PB07719	SUNI SANDS STAIRWAY	Other (1904)	Within 0.25 miles of LRLWCAP
PB07720	SUNI SANDS BOATHOUSE	Apartment (1906)	Within 0.25 miles of LRLWCAP
PB09261	SCHEURICH MIDDEN	Prehistoric shell midden; variable density; 19th century American, 1821-1899; Late Archaic; Glades I, 1000 B.C.-A.D. 750	Within 0.25 miles of LRLWCAP
PB10940	Jonathan Landing	Campsite (prehistoric); prehistoric shell midden; Glades, 1000 B.C.-A.D. 1700; prehistoric	Within 0.25 miles of LRLWCAP
PB11372	Suni Sands Mobile Home Park	A late 1940s to early 1950s mobile home park in the area of northern Palm Beach County.	Within 0.25 miles of LRLWCAP
PB11396	Suni Sands Office	Office (c1940)	Within 0.25 miles of LRLWCAP
PB11401	Suni Sands Clubhouse	Lodge (club) building (1946)	Within 0.25 miles of LRLWCAP
PB11402	Suni Sands Tenant Facility	Warehouse (1946)	Within 0.25 miles of LRLWCAP
PB11428	SR A1A Roadway	Roadway from 1920s-1930s	Within 0.25 miles of LRLWCAP
PB11550	MEGHEN'S MOUND	Prehistoric middens	Within 0.25 miles of LRLWCAP
PB12102	Florida East Coast Railway		Within LRLWCAP
PB12192	Broadway (US 1), Riviera Beach		Within LRLWCAP
PB13330	Old Dixie Highway		Within LRLWCAP
PB13530	Steam Engine	Other	Within 0.25 miles of LRLWCAP
PB13607	FDOT Bridge #930075 on US 1		Within LRLWCAP
PB13608	FDOT Bridge #930116 on US 1		Within LRLWCAP
PB13609	FDOT Bridge #930117 on US 1		Within LRLWCAP

FL Master File #	FL Master File Name	Description	Location
PB13610	FDOT Bridge #930087 on US 1		Within LRLWCAP
PB13725	761 North A1A Concrete Slab	Building remains; homestead; 20th century American, 1900-present	Within 0.25 miles of LRLWCAP
PB14572	Old Loxahatchee Bridge		Within LRLWCAP
PB14577	Kindt-Hernandez House	Private residence (c1959)	Within 0.25 miles of LRLWCAP
PB14878	Jupiter US-1/Intracoastal Waterway Bridg		Within LRLWCAP
PB15298	Celt Cache Site	Campsite (prehistoric)	Within 0.25 miles of LRLWCAP
PB15991	500 Captain Armour's Way	Community center (e.g., recreation hall) (c1942)	Within 0.25 miles of LRLWCAP
PB16041	Bridge at Mile Post 282.58		Within LRLWCAP
PB16182	Lorsta Jupiter Family Housing, Unit A	Private residence (c1962)	Within 0.25 miles of LRLWCAP
PB16183	Lorsta Jupiter Family Housing, Unit B	Private residence (c1962)	Within 0.25 miles of LRLWCAP
PB16184	Lorsta Jupiter Family Housing, Unit C	Private residence (c1962)	Within 0.25 miles of LRLWCAP
PB16185	Lorsta Jupiter Family Housing, Unit D	Private residence (c1962)	Within 0.25 miles of LRLWCAP
PB16186	Lorsta Jupiter Family Housing, Unit E	Private residence (c1962)	Within 0.25 miles of LRLWCAP
PB16191	USCG Housing Lorsta Jupiter	FMSF Building Complex (9 single-family homes)	
PB16324	Pennock Point Midden	Habitation (prehistoric); prehistoric middens; 19th century American, 1821-1899; Glades, 1000 B.C.–A.D. 1700	Within 0.25 miles of LRLWCAP
PB16326	Jupiter Dragoon Camp	Campsite (prehistoric); historic fort; 19th century American, 1821-1899; Seminole, 2nd to the 3rd War, 1835-1855	Within 0.25 miles of LRLWCAP
PB16434	Jupiter Lighthouse Cemetery	Cemetery (c1905)	Within 0.25 miles of LRLWCAP
PB16435	Jupiter Inlet Light-house Oil House	Museum/art gallery/planetarium	Within 0.25 miles of LRLWCAP
PB16436	Jupiter Inlet Light Station Wharf	Pier	Within 0.25 miles of LRLWCAP
PB16437	USCG Family Quarters, Unit A	Private residence	Within 0.25 miles of LRLWCAP
PB16439	Jupiter Lighthouse Keeper's Workshop	Museum/art gallery/planetarium	Within 0.25 miles of LRLWCAP
PB16440	Jupiter Station Radio Transmitter House	Outbuilding	Within 0.25 miles of LRLWCAP
PB16441	Jupiter Inlet Light Station Garage	Garage	Within 0.25 miles of LRLWCAP
PB16443	Jupiter Lighthouse Res-ervation	Mixed District; Architecture, commerce, community planning & development, maritime history, and military elements from 1854-1962	Within 0.25 miles of LRLWCAP
PB16444	Auxiliary Pump House	Outbuilding	Within 0.25 miles of LRLWCAP
PB16445	Jupiter Lighthouse Staircase	Other	Within 0.25 miles of LRLWCAP
PB17118	Limestone Creek	Habitation/Midden	Within 0.25 miles of LRLWCAP

Public Involvement

C.1 / Advisory Committee

The following appendices contain information about the advisory committee meeting which was held in order to obtain input from the Loxahatchee River–Lake Worth Creek Aquatic Preserve Management Plan Advisory Committee regarding the draft management plan.

C.1.1 / List of members and their affiliations

Name	Affiliation
Bruce Bain	Friends of Jonathan Dickinson State Park Club Scrub
Bud Howard	Loxahatchee River District
Charles Grande	Rivers Coalition Defense Fund
Dan Haas	National Wild and Scenic Rivers
David Brown	Town of Jupiter
Deborah Drum	Martin County
Doug Smith	Treasure Coast Regional Planning Council
Eva Webb	Palm Beach Soil and Water Conservation District
Hal R. Valeche	Palm Beach County Commission, District 1
Harold Jenkins	Martin County Cpmmission, District 3
Janet Zimmerman	Florida Inland Navigation District
Jeff Beal	FWC
Jennifer Smith	DEP Southeast District
John Nelson	Audubon of Martin County
Juliana Catalfuno	Friends of Jonathan Dickinson State Park Club Scrub
Julie Espy	DEP Division of Environmental Assessment and Restoration
Kathy LaMartina	South Florida Water Managemnt District
Mark Nelson	Jonathan Dickinson State Park
Matt Mitchell	Palm Beach County Environmental Resources Management
Matthew J. Boykin	Northern Palm Beach County Improvement District
Michael Dillon	South Indian River Water Control District
Michael R. Couzzo, Jr.	Village of Tequesta
Michael Stahl	Palm Beach County Environmental Resources Management
Patricia Magrogan	Local property owner
Patricia Walker	Jupiter Inlet District
Pete Pimentel	Hobe-St. Lucie Conservancy District
Rob Robbins	Palm Beach County Environmental Resources Management
Shari Anker	Conservation Alliance of St. Lucie County
Todd Wodraska	Town of Jupiter
Traci Siani	Local property owner

DEPARTMENT OF ENVIRONMENTAL PROTECTION

The Florida Department of Environmental Protection, Florida Coastal Office announces a public meeting to which all persons are invited.

DATE AND TIME: Tuesday, November 14, 2017, 6:00 p.m.

PLACE: Jonathan Dickinson State Park, Elsa Kimbell Environmental Education and Research Center, 16450 S.E. Federal Highway, Hobe Sound, FL 33455

GENERAL SUBJECT MATTER TO BE CONSIDERED: A draft Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan has been prepared by the Florida Coastal Office. The draft plan is available for viewing or download at <http://publicfiles.dep.state.fl.us/CAMA/plans/aquatic/loxahatchee-River-Lake-Worth-Creek-AP-Management-Plan.pdf>. The Florida Coastal Office seeks public comment on the draft. Members of the Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan Advisory Committee have also been invited to attend, and listen to comments.

A copy of the agenda may be obtained by contacting: Aquatic Preserve Manager, Irene Arpayoglou at Irene.Arpayoglou@dep.state.fl.us or (772)429-2995.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting: Irene Arpayoglou at (772)429-2995. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

DEPARTMENT OF ENVIRONMENTAL PROTECTION

The Florida Department of Environmental Protection, Florida Coastal Office announces a public meeting to which all persons are invited.

DATE AND TIME: Wednesday, November 15, 2017, 9:00 a.m.

PLACE: Jonathan Dickinson State Park, Elsa Kimbell Environmental Education and Research Center, 16450 S.E. Federal Highway, Hobe Sound, FL 33455

GENERAL SUBJECT MATTER TO BE CONSIDERED: The Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan Advisory Committee will meet to discuss possible revisions to the draft Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan and comments received at the public meeting scheduled for November 14, 2017 and separately noticed. The draft plan is available for viewing or download at <http://publicfiles.dep.state.fl.us/CAMA/plans/aquatic/loxahatchee-River-Lake-Worth-Creek-AP-Management-Plan.pdf>.

A copy of the agenda may be obtained by contacting: Aquatic Preserve Manager, Irene Arpayoglou at Irene.Arpayoglou@dep.state.fl.us or (772)429-2995.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting: Irene Arpayoglou at (772)429-2995. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

DEPARTMENT OF ENVIRONMENTAL PROTECTION

Division of Recreation and Parks

The Florida Department of Environmental Protection, Division of Recreation and Parks announces a public meeting to which all persons are invited.

DATE AND TIME: Tuesday, October 24, 2017, 5:30 p.m. – 7:30 p.m., Presentation at 6:00 p.m.

MEETING HAS BEEN RESCHEDULED (Previously Scheduled for October 10, 2017)

PLACE: Stephen Foster Folk Culture Center State Park – Park Auditorium, 11016 Lillian Saunders Drive, White Springs, FL 32096

GENERAL SUBJECT MATTER TO BE CONSIDERED: An opportunity for the public to provide input on the ten-year management plan update for Stephen Foster Folk Culture Center State Park.

A copy of the agenda may be obtained by contacting: Manny Perez, Park Manager, Stephen Foster Folk Culture Center State Park, 11016 Lillian Saunders Drive, White Springs, FL 32096, PH#: (386)397-4331, FAX#: (386)397-4262 or email Manny.Perez@dep.state.fl.us.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting: Manny Perez, as listed above. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

DEPARTMENT OF ENVIRONMENTAL PROTECTION

Division of Recreation and Parks

The Florida Department of Environmental Protection, Division of Recreation and Parks announces a public meeting to which all persons are invited.

DATE AND TIME: Wednesday, October 25, 2017, 9:00 a.m.

MEETING HAS BEEN RESCHEDULED (Previously Scheduled for October 11, 2017)

PLACE: Stephen Foster Folk Culture Center State Park – Park Auditorium, 11016 Lillian Saunders Drive, White Springs, FL 32096

GENERAL SUBJECT MATTER TO BE CONSIDERED: Discussion of the proposed unit management plan update for

DEPARTMENT OF ENVIRONMENTAL PROTECTION

The Florida Department of Environmental Protection, Florida Coastal Office announces a public meeting to which all persons are invited.

DATE AND TIME: Tuesday, January 30, 2018, 9:00 a.m.

PLACE: Jupiter Community Center, 200 Military Trail, Jupiter, FL 33458

GENERAL SUBJECT MATTER TO BE CONSIDERED: The Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan Advisory Committee will meet to discuss possible revisions to the draft Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan and comments received at the public meeting scheduled for January 29, 2018 and separately noticed. The draft plan is available for viewing or download at <http://publicfiles.dep.state.fl.us/CAMA/plans/aquatic/loxahatchee-River-Lake-Worth-Creek-AP-Management-Plan.pdf>.

A copy of the agenda may be obtained by contacting: Aquatic Preserve Manager, Irene Arpayoglou at Irene.Arpayoglou@dep.state.fl.us or (772)429-2995.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting: Irene Arpayoglou at (772)429-2995. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

DEPARTMENT OF HEALTH

Division of Emergency Preparedness and Community Support
The Florida Department of Health/Legislative Committee Meeting announces a telephone conference call to which all persons are invited.

DATE AND TIME: Thursday, January 4, 2018, 10:00 a.m. – 11:00 a.m. EST; subsequent conference calls will be held the first Thursday of odd months

PLACE: Meeting link: <https://www.gotomeeting.com/join/386242229>; to dial in using phone: United States (toll-free), 1(877)309-2070; United States, +1(312)757-3119; access code, 386-242-229

GENERAL SUBJECT MATTER TO BE CONSIDERED: EMS State Plan, Goals and Objectives.

A copy of the agenda is available upon request.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 5 days before the workshop/meeting by contacting Bonnie.Anderson@flhealth.gov. If you are hearing or speech impaired, please contact the agency using the Florida

Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

If any person decides to appeal any decision made by the Board with respect to any matter considered at this meeting or hearing, he/she will need to ensure that a verbatim record of the proceeding is made, which record includes the testimony and evidence from which the appeal is to be issued.

For more information, you may contact Bonnie.Anderson@flhealth.gov.

DEPARTMENT OF ECONOMIC OPPORTUNITY

Division of Workforce Services

The Reemployment Assistance Appeals Commission announces a public meeting to which all persons are invited.

DATE AND TIME: December 20, 2017, 9:30 a.m.

PLACE: Reemployment Assistance Appeals Commission, 101 Rhyne Building, 2740 Centerview Drive, Tallahassee, Florida 32399-4151.

GENERAL SUBJECT MATTER TO BE CONSIDERED: Deliberation for cases pending before the Reemployment Assistance Appeals Commission that are ready for final review and the Chairman's report. No public testimony will be taken.

A copy of the agenda may be obtained by contacting: Reemployment Assistance Appeals Commission, 101 Rhyne Building, 2740 Centerview Drive, Tallahassee, Florida 32399-4151, (850)487-2685.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 24 hours before the workshop/meeting by contacting: Reemployment Assistance Appeals Commission, 101 Rhyne Building, 2740 Centerview Drive, Tallahassee, Florida 32399-4151, (850)487-2685. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

For more information, you may contact: Reemployment Assistance Appeals Commission, 101 Rhyne Building, 2740 Centerview Drive, Tallahassee, Florida 32399-4151, (850)487-2685.

LEE COUNTY DEPARTMENT OF TRANSPORTATION

The Lee County Department of Transportation announces a public meeting to which all persons are invited.

DATE AND TIME: Monday, December 18, 2017, 1:00 p.m.

PLACE: Estero Community Center, 9200 Corkscrew Palms Blvd, Estero, FL 33928

GENERAL SUBJECT MATTER TO BE CONSIDERED: Lee County will hold the first Steering Committee meeting for the Environmental Enhancement Preservation Communities



Florida Department of Environmental Protection

Indian River Lagoon Aquatic Preserves
3300 Lewis Street
Fort Pierce, FL 34981]

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Noah Valenstein
Secretary

Loxahatchee River-Lake Worth Creek Aquatic Preserve Draft Management Plan Advisory Committee Meeting

Wednesday, November 15, 2017, 9:00 a.m.

Jonathan Dickinson State Park
Elsa Kimbell Environmental Education and Research Center
16540 SE Federal Highway
Hobe Sound, FL 33455

Advisory Committee Attendees: Patricia Walker (Jupiter Inlet District), Pete Pimentel (Hobe-St. Lucie Conservancy District), Deborah Drum (Martin County), Michael Stahl (Palm Beach County), Traci Siani (local property owner), Pat Magrogan (local property owner), Kathy LaMartina (South Florida Water Management District), Jeff Beal (Florida Fish and Wildlife Conservation Commission), Mark Nelson (Jonathan Dickinson State Park), Irene Arpayoglou (Indian River Lagoon Aquatic Preserves [IRLAP])

Other Attendees: Drew Liddick, Jordan Skaggs, Drew Martin, Mike Grella

Staff: Matthew Anderson (IRLAP), Kevin Claridge (Florida Coastal Office [FCO]), Emily Dark (IRLAP), Elyssa Finkelstein (FCO), Kirk Fusco (IRLAP), Earl Pearson (FCO), Barchan Rodgers (IRLAP)

Earl welcomed everyone and introductions were done around the room. A brief recap of the previous night's public meeting was given with the comments from each station, as well as the comments to the floor.

The floor was open to discussion regarding the suggestion of an additional meeting, the identified issues, and any other parts of the plan. The discussion flowed across issues, but for summary purposes are grouped under general comments or four issue sections below. (Comments for issues 4 and 5 were grouped together.)

1) General comments

- Suggested we hold meeting in Palm Beach County.
 - Better turn out if held in Jupiter.
- Provide more time for Adv Comm to review plan, provide more hard copies of plan.
- Second meeting will be held January 29, 2018 in conjunction with Loxahatchee River Management Coordinating Council at Jupiter Community Center.
 - Provide time for each group working in the Loxahatchee River to highlight their work on the river.
- Delay of 3 months for management plan to go ARC.
- Update advisory committee list: include Tom Howard, chair of Loxahatchee River Management Coordinating Council, add Loxahatchee Preservation initiative to committee.
- Remove total acreage line from natural communities table.
- Remove or expand information on commercial crabbing (remove, since very limited).
- Add Camp Murphy to archaeological sites.
- Appendix D: Budget table: increase amounts.

2) Issue 1: Water Quality

- How is WQ defined? TMDLs, fecal coliform.
- Partner with groups working on MFLs.
- Use mangrove/cypress ratios as Performance Measure for Loxahatchee River vegetation monitoring.
- P.51: No TMDLs set for Loxahatchee River-Lake Worth Creek Aquatic Preserve.
- Reference efforts from DEP Reasonable Assurance Plan (RAP acronym list) for river. Contact Julie Espy.
- Martin County likes the three objectives.
- Include information about work of Loxahatchee River Management Coordinating Council (LRMCC acronym list).
- Reference Restorative Flow Levels in first objective.
- Meeting MFLs is a given, not a goal for restoration. Discern between MFL and what is a restoration flow. Clarify which restoration plans are being referenced and that the goal is to support existing plans and not to redefine any plans or restoration goals.
- P. 59: restore hydrology... add 'and headwaters'.
- Objective 3: Include land use such as agriculture to water quality issues, not just septic and stormwater.

- Add information about dredging of oyster bars in 1970s and its impact to the aquatic preserve, pg. 14 and 29
- Pg 51: 1.1.1 change to “actively participate”.

3) Issue 2: Invasive Species

- Don't focus specifically on lionfish. Make them a specific objective under the umbrella of invasive species, but not the only one.
- What defines “significant reduction”?
- Mention other entities that conduct exotic management of other species.
- Add usage of USGS lionfish reporting site for other invasive species.
- Monitoring for “next lionfish”. Develop management strategy for future invasions.
- Early Detection Rapid Response (EDRR: add to acronym list) program Department of the Interior; add to plan.
- 1.1.4 Include communication efforts with other agencies through EDRR.
- Modify language to not be so lionfish specific, but use lionfish as an example of what an invasive species is capable of.
- Add information about native nuisance species (i.e. willow).
- Educate locals citizens/organizations on identifying new species and ranges (should it be here?).

4) Issue 3: Loss of Community Function and Species Diversity

- Include more information on living shorelines.
 - Add Jupiter Inlet District demonstration site project to plan.
- Add GIS information from Jupiter Inlet District, including their maps of hardened shorelines throughout Loxahatchee River-Lake Worth Creek Aquatic Preserve.
- Reference fertilizer ordinances for Martin and Palm Beach counties, Town of Jupiter ordinances, and any other local ordinances.
- Encourage adoption of ordinances.
- Educational information in restricted covenants? Can we add to plan? Ask the DEP Office of General Counsel before including in plan.
- Change language of 2.2; Actively participate in restoration efforts (add *Vallisneria*, emergent vegetation, oysters) with partners.
- Add Palm Beach County sea turtle monitoring data, and other species.
- Data gap: specifically Lake Worth Creek (Palm Beach County has some data on surrounding lands).

**5) Issue 4 and 5: Consider combining into one:
Education/Sustainable Use**

Goal: Increase public awareness through sustainable public use of the aquatic preserve.

- Add Leave No Trace program information (strategy).
- Add Geocaching information (strategy).
- Add use of social media (strategy).
- Diversify attendance to other events (strategy).
- Cannot install signs on channel markers (remove from plan), but confer with DOT about signs on bridge passthroughs into aquatic preserve.
- Multi language programs (strategy).
- Utilize existing programs to promote IRLAP (strategy).
- Focus public use to less sensitive areas of aquatic preserve (strategy).
- Update access points to include Palm Beach County conservation lands which have canoe/kayak launches.
- Add new boat ramp Waterway Park, update Fullerton Island info and add pictures.

After the comments were received, Earl explained the next steps of the management plan process: an additional public meeting will be held in Jupiter, followed by an additional advisory committee meeting. Then the plan will be revised to reflect public input, and it will be presented to an Acquisition and Restoration Council meeting (also a public meeting) in Tallahassee, and a Governor and Cabinet meeting. The public commenting period will be extended to reflect the additional meetings. The advisory committee was thanked for their time and effort.



Florida Department of Environmental Protection

Indian River Lagoon Aquatic Preserves
3300 Lewis Street
Fort Pierce, FL 34981]

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Noah Valenstein
Secretary

Loxahatchee River-Lake Worth Creek Aquatic Preserve Draft Management Plan Advisory Committee Meeting

Tuesday, January 30, 2018, 9:00 a.m.
Jupiter Community Center
200 Military Trail
Jupiter, FL 33458

Advisory Committee Attendees: Julie Espy (Florida Department of Environmental Protection, Division of Environmental Assessment and Restoration), Mark Nelson (Jonathan Dickinson State Park), Mike Dillon (South Indian River Water Control District), Pete Pimentel (Hobe-St. Lucie Conservancy District), Matt Mitchell (Palm Beach County), Janet Zimmerman (Florida Inland Navigation District), Pat Magrogan (local property owner), Kathy LaMartina (South Florida Water Management District), Patricia Walker (Jupiter Inlet District), David Brown (Town of Jupiter), Jeff Beal (Florida Fish and Wildlife Conservation Commission), Irene Arpayoglou (Indian River Lagoon Aquatic Preserves [IRLAP])

Staff: Matthew Anderson (IRLAP), Earl Pearson (Florida Coastal Office [FCO]), Barchan Rodgers (IRLAP)

Earl welcomed everyone and introductions were done around the room. A brief recap of the previous night's public meeting was given with the comments from each station, as well as the comments to the floor.

The floor was open to discussion regarding the suggestion of an additional meeting, the identified issues, and any other parts of the plan. The discussion flowed across issues, but for summary purposes are grouped under general comments or five issue sections below.

1) Issue 1: Water Quality

- Change Surface and Subsurface water from Class III to Class II
Discussion: Believed that the classification system may date back to 1995, and that now most of the river is already Class II. It was going to be looked into.

- If TMDLs or BMAPs are developed, update the management plan
Discussion: There's a reasonable assurance plan in the works, and can be included/referenced when available.
- Duration of freshwater being released is affecting the biology of the systems.
Discussion: No comments/discussion made for this point.
- Adjustment of the boundaries of the aquatic preserve (more coverage)
Discussion: The main area of focus appeared to be the gap between the Jensen Beach to Jupiter AP and LRLWC AP.
 - Question about if the area behind Guanabana's with poor water quality is within the aquatic preserve.
 - Answer was that the area is.
 - Question about who homeowners should contact about polluted water, stagnant water, siltation, etc.
 - Answer was, not the aquatic preserve or Jupiter Inlet District (JID), perhaps Department of Health or Palm Beach County Department of Environmental Resource Management (PBC-DERM). JID has a sand trap which gets dredged annually and supplies sand for beach renourishment with PBC, and this helps sedimentation. There's a huge sand buildup on the East side, which is under USACE jurisdiction, not JID.
 - Question about whether the Hobe Grove Canal exists.
 - Answer that the infrastructure or connectivity is in place, but it is not used. Recommendation to reference the Loxahatchee Preservation Initiative Document and support the preservation of headwaters.
 - Question of what the process is for adjusting the aquatic preserve boundaries.
 - Answer involved explanation of two methods/avenues – one is legislative and the second is through the Board of Trustees.
 - Question about benefits or drawbacks of expanding AP boundaries.
 - Answer that dredging was likely exempt as maintenance dredging, there would be additional conditions placed on homeowners or construction activities, JID's living shoreline project would be done well before any boundary change would affect them, but they might build their dock to aquatic preserve specifications regardless, as a demonstration point, and there might be new turbidity requirements when it comes to dredging.
 - Question about Cato's Bridge (noted when posed that this question didn't pertain to the LRLWC AP).
- Don't connect the Hobe Groves Canal or C-18 with C-76; too much pesticides and fertilizers
Discussion: No additional comment or discussion made when this point

was read, because it was already discussed under the previous point (see above).

2) Issue 2: Invasive Species

- Include upstream freshwater non-natives.
 - Don't forget Mayan cichlid
 - *Macrobrachium* spp.

Discussion: A couple of questions regarding what those particular species were (*Macrobrachium* are species of crayfish).

3) Issue 3: Loss of Community Function and Species Diversity

- Siltation is increasing west of Railroad Bridge and east of North Fork
 - From decreased LCD and decreased seagrass
 - Source is upriver or through the inlet from beach renourishment

Discussion: No comments/discussion made for this point.

- Resolve management agency questions of the canal
 - Dead end creeks
 - Tributaries
 - Ownership questions
 - Outside the aquatic preserve boundary

Discussion:

- Question about who's responsible or manages the connected or tributary waters outside the AP boundaries.
- Answer was Water Management Districts and homeowner associations.
- Question if AP takes questions about WQ during outreach & education events.
- Answer was that it depends, but those questions are usually routed to the entity handling the aspect in question. Background was provided on the dead-end canals in question. These particular dead-end canals are actually privately owned (homeowner property line goes to middle of canal), in 2001 legislative dollars helped support the dredging of muck and shoreline work on the canals in 2003 & 2004. The homeowners were urged and encouraged to maintain the canals. They didn't and canals deteriorated to current state. The town of Jupiter put together a program to tackle the issues, but the homeowners would need to take them up on it and cover the cost. Nobody has. JID has been asked to dredge those canals, but have the same issue as the town (public dollars on private land). There is an option that allows "piggybacking" on an already existing JID dredging project which saves the homeowners some money, but the cost is still on them. Other dead-end canal projects around the state are being watched. A homeowners

association could resolve the problem, it has been urged, but there's been no movement. Restrictive covenants for canals might be an option. Comment made that the canals are not in the AP, so might be a mute-point. Recommendation made to take some education based route to address the problem because it does impact the AP.

4) Issue 4: Lack of Public Awareness

- Local schools
Discussion: Grouped with point below.
- Jupiter Environmental Research and Field Studies Academy (JERFSA) (200 hours)
Discussion: The Loxahatchee River Center already has a volunteer program/relationship with JERFSA and Jupiter High, that could save IRLAP some leg work.
- Include pesticide and herbicide in homeowner's guide
Discussion: Town of Jupiter has a lot of good info on this in the water bill and newsletter. IRLAP could contribute info or a section to the water bill and newsletter as a hybrid homeowner's guide.
- This is the most important issue.
Discussion: No comments/discussion made for this point.
- Link management to what speaks to people (not just improve seagrasses but go all the way to fish)
Discussion: No comments/discussion made for this point.
- Kiosks or signs at Jupiter Lighthouse or Jupiter Outdoor Center
Discussion: Agreement that these would be good places for informational signage. Jonathan Dickinson State Park and other local parks or preserves along the aquatic preserve should also be considered. Palm Beach County specifically noted their good success with signage.
- Place QR codes on bridges or signs to reach paddleboarders.
Discussion: Some agreement at the notion that paddlers often put in at bridges or places other than boat ramps where IRLAP's current signage exists. QR codes on signs is a good way to expand the information and connection with aquatic preserve users.
- Incentivize QR's and awareness
Discussion: Aquatic Preserve Passport app currently in development similar to state parks passport could achieve this role.
- Curriculum for schools
Discussion: Several groups already do this with seemingly good reception and/or success. Jupiter Community High, and Neal Gallagher (sp?) with Jupiter Environmental Academy would be good schools to include. PBC specifically noted their good success with curriculum for the local schools.
- Photo contest in the aquatic preserves

Discussion: Could be run as either an informal contest hosted on IRLAP facebook or Instagram, to a more formal contest similar to IRL council's annual calendar. Can be paired with the signage and incentivized QR points above. PBC specifically noted their good success with photo contests.

- Aquatic preserve boundaries on Chart Plotter
Discussion: Method for reaching for expanding visibility and awareness. FWC charts used to display aquatic preserve boundaries. It's unknown if any digital or printed charts list the aquatic preserves. GoogleMaps labels them, but doesn't show boundaries.

5) Issue 5: Sustainable Public Use

- Add a kayak launch between Riverbend Park and Jonathan Dickinson State Park at Cypress Creek to eliminate shuttling cars to JDSP
Discussion: A kayak launch at that particular spot would be hard to do or unlikely to happen. When discussing public use you need to consider system carrying capacity and sometimes limit access instead of increasing.
- Question about combining issues 4 & 5.
Consensus was that they probably should be combined.
- Question about any upland property in the aquatic preserve and how much.
- Answer that there is upland property, but the exact amount is unknown at this time and is currently being evaluated under the FCO state-wide island inventory.
- Question if the determination of uplands owned and managed should be included as an objective and integrated strategy.
- Original answer was no because it's already being addressed, but secondary consideration is yes it should be included because it's being addressed.
- If there was more upland property in the LRLWC AP then it might be worth leaving issues 4 & 5 separate, but given the likely small amount of uplands, it's better to combine the two issues.

After the comments were received, Earl explained the next steps of the management plan process: the plan will be revised to reflect public input, and it will be presented to an Acquisition and Restoration Council meeting (also a public meeting) in Tallahassee, and a Governor and Cabinet meeting. The public commenting period will be extended to reflect the additional meetings. The advisory committee was thanked for their time and effort.

C.2 / Formal Public Meetings

The following appendices contain information about the Formal Public Meeting(s) which was held in order to obtain input from the public about the Loxahatchee River–Lake Worth Creek Aquatic Preserve Draft Management Plan.

C.2.1 / Florida Administrative Register Postings

DEPARTMENT OF ENVIRONMENTAL PROTECTION
The Florida Department of Environmental Protection, Florida Coastal Office announces a public meeting to which all persons are invited.

DATE AND TIME: Tuesday, November 14, 2017, 6:00 p.m.

PLACE: Jonathan Dickinson State Park, Elsa Kimbell Environmental Education and Research Center, 16450 S.E. Federal Highway, Hobe Sound, FL 33455

GENERAL SUBJECT MATTER TO BE CONSIDERED: A draft Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan has been prepared by the Florida Coastal Office. The draft plan is available for viewing or download at <http://publicfiles.dep.state.fl.us/CAMA/plans/aquatic/loxahatchee-River-Lake-Worth-Creek-AP-Management-Plan.pdf>. The Florida Coastal Office seeks public comment on the draft. Members of the Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan Advisory Committee have also been invited to attend, and listen to comments.

A copy of the agenda may be obtained by contacting: Aquatic Preserve Manager, Irene Arpayoglou at Irene.Arpayoglou@dep.state.fl.us or (772)429-2995.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting: Irene Arpayoglou at (772)429-2995. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

DEPARTMENT OF ENVIRONMENTAL PROTECTION
The Florida Department of Environmental Protection, Florida Coastal Office announces a public meeting to which all persons are invited.

DATE AND TIME: Wednesday, November 15, 2017, 9:00 a.m.

PLACE: Jonathan Dickinson State Park, Elsa Kimbell Environmental Education and Research Center, 16450 S.E. Federal Highway, Hobe Sound, FL 33455

GENERAL SUBJECT MATTER TO BE CONSIDERED: The Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan Advisory Committee will meet to discuss possible revisions to the draft Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan and comments received at the public meeting scheduled for November 14, 2017 and separately noticed. The draft plan is available for viewing or download at <http://publicfiles.dep.state.fl.us/CAMA/plans/aquatic/loxahatchee-River-Lake-Worth-Creek-AP-Management-Plan.pdf>.

A copy of the agenda may be obtained by contacting: Aquatic Preserve Manager, Irene Arpayoglou at Irene.Arpayoglou@dep.state.fl.us or (772)429-2995.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting: Irene Arpayoglou at (772)429-2995. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Division of Recreation and Parks

The Florida Department of Environmental Protection, Division of Recreation and Parks announces a public meeting to which all persons are invited.

DATE AND TIME: Tuesday, October 24, 2017, 5:30 p.m. – 7:30 p.m., Presentation at 6:00 p.m.

MEETING HAS BEEN RESCHEDULED (Previously Scheduled for October 10, 2017)

PLACE: Stephen Foster Folk Culture Center State Park – Park Auditorium, 11016 Lillian Saunders Drive, White Springs, FL 32096

GENERAL SUBJECT MATTER TO BE CONSIDERED: An opportunity for the public to provide input on the ten-year management plan update for Stephen Foster Folk Culture Center State Park.

A copy of the agenda may be obtained by contacting: Manny Perez, Park Manager, Stephen Foster Folk Culture Center State Park, 11016 Lillian Saunders Drive, White Springs, FL 32096, PH#: (386)397-4331, FAX#: (386)397-4262 or email Manny.Perez@dep.state.fl.us.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting: Manny Perez, as listed above. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Division of Recreation and Parks

The Florida Department of Environmental Protection, Division of Recreation and Parks announces a public meeting to which all persons are invited.

DATE AND TIME: Wednesday, October 25, 2017, 9:00 a.m.

MEETING HAS BEEN RESCHEDULED (Previously Scheduled for October 11, 2017)

PLACE: Stephen Foster Folk Culture Center State Park – Park Auditorium, 11016 Lillian Saunders Drive, White Springs, FL 32096

GENERAL SUBJECT MATTER TO BE CONSIDERED: Discussion of the proposed unit management plan update for

The meeting will also be webcast.
 Agendas are available 7 days prior to the meeting date at our website at: www.sfwmd.gov:
 Hold mouse over the "Topics" tab, scroll down to "Permits" and click
 Under "Upcoming Events" on the right hand column, click the "Monthly Regulatory Meetings" link
 Or, subscribe to ePermitting/eNoticing: www.sfwmd.gov/epermitting
 Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 5 days before the workshop/meeting by contacting: District Clerk's Office, (561)682-6805. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).
 For more information, you may call the information line at (561)682-6207 or Florida toll-free 1(800)432-2045, ext. 6207.

DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION
 Division of Pari-Mutuel Wagering
RULE NO.: RULE TITLE:
 61D-11.002: Cardroom Games
 Revised Notice of Workshop/Rule Development
 The Division of Pari-Mutuel Wagering hereby files this Revised Notice of Workshop/Rule Development to clarify that the recently published Notice of Workshop and Notice of Rule Development regarding Rule 61D-11.002, F.A.C., published on December 11, 2017, in Vol. 43, No. 237 issue of the Florida Administrative Register is not related to the proposed rule contained within the Notice of Proposed Rulemaking published on October 29, 2015.

DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION
 Board of Landscape Architecture
 The Board of Landscape Architecture announces a public meeting to which all persons are invited.
DATE AND TIME: Friday, January 19, 2018, 9:00 a.m.
PLACE: Embassy Suites, 8250 Jamaican Court, Orlando, Florida 32819
GENERAL SUBJECT MATTER TO BE CONSIDERED: General business.
 A copy of the agenda may be obtained by contacting: Board of Landscape Architecture, 2601 Blair Stone Road, Tallahassee, Florida 32399.
 Pursuant to the provisions of the Americans with Disabilities

Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 5 days before the workshop/meeting by contacting: Board of Landscape Architecture, 2601 Blair Stone Road, Tallahassee, Florida 32399. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).
 If any person decides to appeal any decision made by the Board with respect to any matter considered at this meeting or hearing, he/she will need to ensure that a verbatim record of the proceeding is made, which record includes the testimony and evidence from which the appeal is to be issued.
 For more information, you may contact: Board of Landscape Architecture, 2601 Blair Stone Road, Tallahassee, Florida 32399.

DEPARTMENT OF ENVIRONMENTAL PROTECTION
 The Florida Department of Environmental Protection, Florida Coastal Office announces a public meeting to which all persons are invited.
DATE AND TIME: Monday, January 29, 2018, 6:00 p.m.
PLACE: Jupiter Community Center, 200 Military Trail, Jupiter, FL 33458
GENERAL SUBJECT MATTER TO BE CONSIDERED: You are cordially invited to attend the Florida Coastal Office's public meeting to hear about the Loxahatchee River-Lake Worth Creek Aquatic Preserve, current and future management, and to provide comment on the draft management plan. The draft plan is available for viewing or download at <http://publicfiles.dep.state.fl.us/CAMA/plans/aquatic/loxahatchee-River-Lake-Worth-Creek-AP-Management-Plan.pdf>. The Florida Coastal Office seeks public comment on the draft. Members of the Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan Advisory Committee have also been invited to attend, and listen to comments.
 Written comments are welcome and can be submitted by mail to Irene Arpayoglou at 3000 Lewis Street, Fort Pierce, FL 34981, or by email to FloridaCoasts@dep.state.fl.us by Monday, February 12, 2018.
 A copy of the agenda may be obtained by contacting: Aquatic Preserve Manager Irene Arpayoglou, Irene.Arpayoglou@dep.state.fl.us, (772)429-2995.
 Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting: Irene Arpayoglou at (772)429-2995. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

Florida Department of Environmental Protection • Florida Coastal Office



Loxahatchee River-
Lake Worth Creek
Aquatic Preserve

Public Meeting

Tuesday, November 14, 2017
6:00 pm - 7:30 pm

Jonathan Dickinson State Park
Elsa Kimbell Environmental Education and
Research Center
16450 S.E. Federal Highway
Hobe Sound, FL 33455

To view the draft plan, please visit:
www.aquaticpreserves.org

The Florida Department of Environmental Protection's Florida Coastal Office (FCO) is responsible for the management of Florida's 41 aquatic preserves, three National Estuarine Research Reserves, a National Marine Sanctuary, Florida Coastal Management Program, Outer Continental Shelf Program, and Coral Reef Conservation Program. These protected areas comprise more than 4 million acres of the most valuable submerged lands and select coastal uplands in Florida. FCO is updating these management plans, and is currently seeking input on the draft Loxahatchee River-Lake Worth Creek Aquatic Preserve management plan.

Meeting objectives:

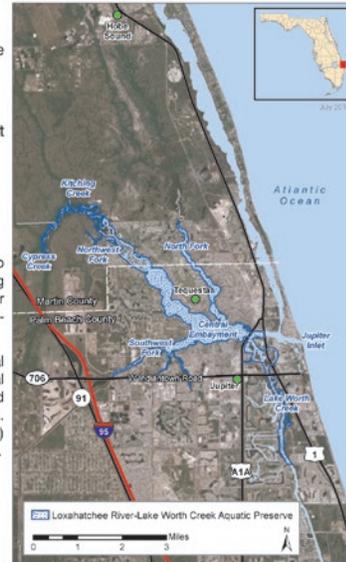
1. Review purpose and process for revising the Loxahatchee River-Lake Worth Creek Aquatic Preserve management plan.
2. Present current draft plan with a focus on issues, goals, objectives and strategies.
3. Receive input on the draft management plan.

The information from the meeting will be compiled and used by FCO in the revision of the draft management plan.

Please contact Irene Arpayoglou at (772)429-2995, or Irene.Arpayoglou@dep.state.fl.us, or visit our website at www.aquaticpreserves.org for more information or to request a written copy of the plan. Written comments are welcome and can be submitted by mail, or email FloridaCoasts@dep.state.fl.us on or before **November 28, 2017**.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting Irene Arpayoglou at (772)429-2995 or Irene.Arpayoglou@dep.state.fl.us. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, (800) 955-8771 (TDD) or (800) 955-8770 (Voice).

This publication funded in part through a grant agreement from the Florida Department of Environmental Protection, Florida Coastal Management Program by a grant provided by the Office of Ocean and Coastal Resource Management under the Coastal Zone Management Act of 1972, as amended, National Oceanic and Atmospheric Administration (NOAA) Award No. NA15NOS4190096-CM06M and NA16NOS4190120-CM07M. The views, statements, finding, conclusions, and recommendations expressed herein are those of the author(s) and do not necessarily reflect the views of the State of Florida, NOAA, or any of its subagencies. October 2017.





Loxahatchee River-
Lake Worth Creek
Aquatic Preserve

Public Meeting

Monday, January 29, 2018
6:00 pm - 7:30 pm

Jupiter Community Center
200 Military Trail
Jupiter, FL 33458

To view the draft plan, please visit:
www.aquaticpreserves.org

The Florida Department of Environmental Protection's Florida Coastal Office (FCO) is responsible for the management of Florida's 41 aquatic preserves, three National Estuarine Research Reserves, a National Marine Sanctuary, Florida Coastal Management Program, Outer Continental Shelf Program, and Coral Reef Conservation Program. These protected areas comprise more than 4 million acres of the most valuable submerged lands and select coastal uplands in Florida. FCO is updating these management plans, and is currently seeking input on the draft Loxahatchee River-Lake Worth Creek Aquatic Preserve management plan.

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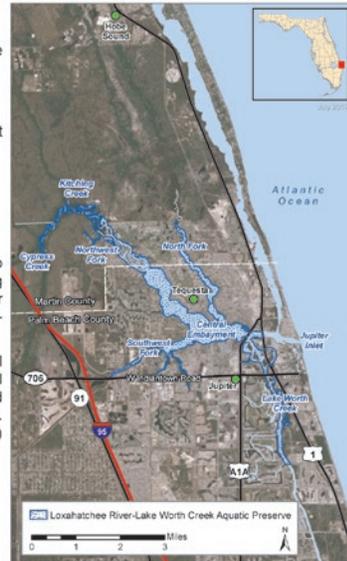
1. Review purpose and process for revising the Loxahatchee River-Lake Worth Creek Aquatic Preserve management plan.
2. Present current draft plan with a focus on issues, goals, objectives and strategies.
3. Receive input on the draft management plan.

The information from the meeting will be compiled and used by FCO in the revision of the draft management plan.

Please contact Irene Arpayoglou at (772)429-2995, or Irene.Arpayoglou@dep.state.fl.us, or visit our website at www.aquaticpreserves.org for more information or to request a written copy of the plan. Written comments are welcome and can be submitted by mail, or email FloridaCoasts@dep.state.fl.us on or before **February 12, 2018**.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting Irene Arpayoglou at (772)429-2995 or Irene.Arpayoglou@dep.state.fl.us. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, (800) 955-8771 (TDD) or (800) 955-8770 (Voice).

This publication funded in part through a grant agreement from the Florida Department of Environmental Protection, Florida Coastal Management Program by a grant provided by the Office of Ocean and Coastal Resource Management under the Coastal Zone Management Act of 1972, as amended, National Oceanic and Atmospheric Administration (NOAA) Award No. NA15NOS4190096-CM06M and NA16NOS4190120-CM07M. The views, statements, finding, conclusions, and recommendations expressed herein are those of the author(s) and do not necessarily reflect the views of the State of Florida, NOAA, or any of its subagencies. Dec 2018.



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Notice of Meeting/Workshop Hearing DEPARTMENT OF ENVIRONMENTAL PROTECTION...



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Notice of Meeting/Workshop Hearing DEPARTMENT OF ENVIRONMENTAL PROTECTION The Florida Department of Environmental Protection, Florida Coastal Office announces a public meeting to which all persons are invited. DATE AND TIME: Tuesday, November 14, 2017, 6:00 p.m. PLACE: Jonathan Dickinson State Park, Elsa Kimbell Environmental Education and Research Center, 16450 S.E. Federal Highway, Hobe Sound, FL 33455 GENERAL SUBJECT MATTER TO BE CONSIDERED: A draft Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan has been prepared by the Florida Coastal Office. The draft plan is available for viewing or download at publicfiles.dep.state.fl.us/CAMA/plans/aquatic/loxahatchee-River-Lake-Worth-Creek-AP-Management-Plan.pdf. The Florida Coastal Office seeks public comment on the draft. Members of the Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan Advisory Committee have also been invited to attend, and listen to comments. A copy of the agenda may be obtained by contacting: Aquatic Preserve Manager, Irene Arpayoglou at Irene.Arpayoglou@dep.state.fl.us or (772)429-2995. Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting: Irene Arpayoglou at (772)429-2995. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice). 11-3/2017

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STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION NOTICE OF INTENT ...



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Web ID 0000315243-01

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION NOTICE OF INTENT The Department of Environmental Protection hereby provides Notice of Intent to Issue a permit for the proposed project, subject to the conditions specified in the draft permit and summarized below. The applicant, City of West Palm Beach, Poonam K. Kalkat, Ph.D., Director of Public Utilities, P.O. Box 3366, West Palm Beach, Florida 33402 applied on June 2, 2017 for a permit to continue operational testing a Class V ASR injection well. The project is located at the West Palm Beach Water Treatment Plant, 1009 Banyan Boulevard, West Palm Beach, Florida 33401 in the county of Palm Beach. (File No. 079933-010-UC/5SR, WACS ID No. 65836) The facility will continue operational testing: A Class V, Group 7, Aquifer Storage and Recovery (ASR) well system to store and recover surface water from Clear Lake for the West Palm Beach Water Treatment Plant. ASR-1 consists of 24-inch steel casing to 985 feet below land surface (bls) and an open borehole completed below the casing to 1,200 feet bls. Recharge pumping rates are up to approximately 8 million gallons per day. There are three existing monitoring wells; one single zone surficial aquifer monitor well SAMW-1, and two on-site single zone Floridan Aquifer storage zone monitor wells, FAMW-1 and FAMW-2. The Department has permitting jurisdiction under Chapter 403 of the Florida Statutes and the rules adopted thereunder. The project is not exempt from permitting procedures. The Department has determined that a construction and testing permit is required for the proposed work. The Department will issue the permit unless a petition for an administrative hearing is timely filed under Sections 120.569 and 120.57, F.S., before the deadline for filing a petition. On the filing of a timely and sufficient petition, this action will not be final and effective until further order of the Department. Because the administrative hearing process is designed to formulate final agency action, the hearing process may result in a modification of the agency action or even denial of the application. A person whose substantial interests are affected by the Department's action may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57, F.S. Pursuant to Rules 28-106.201 and 28-106.301, F.A.C., a petition for an administrative hearing must contain the following information: a) The name and address of each agency affected and each agency's file or identification number, if known; b) The name, address, and telephone number of the petitioner; the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for

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Florida Department of Environmental Protection

Indian River Lagoon Aquatic Preserves
3300 Lewis Street
Fort Pierce, FL 34981]

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Noah Valenstein
Secretary

Loxahatchee River-Lake Worth Creek Aquatic Preserve Draft Management Plan Public Meeting

Tuesday, November 14, 2017, 6:00 p.m. - 7:30 p.m.
Jonathan Dickinson State Park
Elsa Kimbell Environmental Education and Research Center
16540 SE Federal Highway
Hobe Sound, FL 33455

Attendees: Kathy LaMartina, Pete Pimentel, Deborah Drum, Traci Siani, Agustin Martins, Charley Grande, Gerald M. Ward, Joy Stone, Ken Stone, Jeff Beal, Joe Atterbury, Matt Butler, Anne Cox, Michael Stahl, Janet Zimmerman, Mark Nelson, Pat Magrogan, Drew Liddick, Mike Grella, Pam Hopkins, Bud Howard, Eva Webb

Staff: Matthew Anderson, Irene Arpayoglou, Kevin Claridge, Emily Dark, Elyssa Finkelstein, Kirk Fusco, Earl Pearson, Barchan Rodgers

Earl welcomed everyone, gave a brief introduction about the purpose of the meeting, and introduced staff from the aquatic preserve and Tallahassee. Irene gave a PowerPoint presentation about the Indian River Lagoon Aquatic Preserves office, work being conducted, the Loxahatchee River-Lake Worth Creek Aquatic Preserve, and issues identified in the plan.

After the presentation, Earl explained the commenting process. The room was set up so that there were five stations – one for each of the five issues identified in the management plan. Staff were stationed at each of the stations to provide background on the issue, and they recorded comments the public had pertinent to each issue (listed below). Prior to separating to stations, attendees provided comments about the management plan process, also listed below.

General comments:

- A meeting should also be held in Palm Beach County, and would be better attended there, specifically Jupiter.
- The means of notifying the public seemed inadequate. Additional methods of notifying the public should be taken.

Issue 1 – Water Quantity and Quality

- NOAA Plankton Monitoring System Citizen Scientist Participation

Issue 2 – Invasive Species

- Functionally significant – what is a “significant reduction”?
- Mention of exotic species on upland islands
 - Which do we manage?
- Mention of other invasive/exotic fish species
- Present in local schools a part of education objective.
- Coordinate with other agencies that are doing lionfish activities (FOS, Martin County, etc.)
 - Keeping track of all lionfish activities (we don’t have to do all the work).
- Emphasis on what is already being done with lionfish in Loxahatchee.
- Education/sightings regarding other exotic fish species.
- Only a PR trick and a waste of aquatic preserve staff and time.

Issue 3 – Lack of Species Diversity

- Definition of water quality.
 - What is ideal – nutrient level (or on a spectrum) quantity (amount)
- Permitting requirements for seawall, riprap seaward
- Define nutrients (IFAS) for the homeowner – application impacts.

Issue 4 – Lack of Knowledge of the Aquatic Preserve

- Cannot add additional information to channel markers for USCG usage.
- Can do upland signage along waterway.
- Produce a list of sign locations / access points.
- Identify PSA’s.
- Identify funding sources.
- Homeowner association communication / school communication outreach.
- Local lecture series – need to engage locals.
- Leave-no-trace outreach in community.
- Interactive education/ outreach.
 - Demonstration/video.
- Social media/ online presence.

Issue 5 – Sustainable Public Use

- Boating
 - Need highlighted boater destinations. This reduces haphazard running through delicate areas (seagrass beds, etc.)
 - More designated areas within the aquatic preserve. Reduce pressure on other sensitive areas.
- Attend larger/broader audience events such as state fairs.
- Increase public appreciation for conservation of managed areas.

- Increase interaction with local organizations on information on aquatic preserve, and provide a finite "script" to inform larger audience.
- Add information on reasons for protected areas (i.e. sensitive seagrass bed).

Written Comments Provided at the Meeting

- Pg 62 and 64 Missing new boat ramp constructed by Palm Beach County in 2017: Waterway Park, 3630 E. Indiantown Rd, Jupiter, FL
- Private marinas: (Name change) Suntex Marina at Jupiter bought out Loggerhead Marina. Missing: Harbourside Place Marina, Jupiter Inlet Marina, and Jupiter Yacht Club Marina
- Pg 62 1.1.1 Channel Markers are strictly reserved for US Coast Guard navigational signage. Additional information can not be posted to channel markers. The AP may wish to seek permits for placement of their own piling on which to mount informational/educational signage. However, additional pilings in the water would cause a potential navigation hazard and are not recommended. Suggestion: look for upland site along the waterway to post signage.
- Pg 50 Mitigation: in first sentence, change "and" to "or". Should read "must be avoided or minimized"
- Pg 43 Fullerton Island has been developed by PBC into a passive recreational boater/kayaker destination
<http://discover.pbcgov.org/parks/Locations/Fullerton-Island.aspx>
- Pg 31 1st paragraph line 10. Is "muck" a technical term? Better to replace "muck" with "sediment"
- Pg 30 Seagrass Beds: line 6 "Thousands" should be changed to "Hundreds" of differing species
- Missing citation for 2nd paragraph Line 10 and 11 "The Loxahatchee River estuarine zone within the aquatic preserve contains the most abundant population of Johnson's seagrass on the east coast"
- Pg 15 3.2 1st paragraph: Hobe Sound is not a town. It is an unincorporated area in Martin County and is not adjacent to the AP boundary. Tequesta is a Village not a town (pg 16 too). Martin County is the northern boarder's local government.
- Pg 55 and other areas that discuss lionfish: The AP may wish to partner with Martin County which has a successful lionfish round-up program
<http://www.mclionfish.com>

After the comments were received, the group reconvened, and Earl explained the next steps in the management plan process: an advisory committee meeting, Acquisition and Restoration Council meeting (also a public meeting) in Tallahassee, and a Governor and Cabinet meeting. The public was reminded the comments could still be submitted on or before November 28, 2017. They were

thanked for taking time out of their schedules to attend, and to provide feedback.

The meeting was adjourned.



Florida Department of Environmental Protection

Indian River Lagoon Aquatic Preserves
3300 Lewis Street
Fort Pierce, FL 34981]

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Noah Valenstein
Secretary

Loxahatchee River-Lake Worth Creek Aquatic Preserve Draft Management Plan Public Meeting

Monday, January 29, 2018, 6:00 p.m. - 7:30 p.m.
Jupiter Community Center
200 Military Trail
Jupiter, FL 33458

Attendees: M.B. Hague, Justin Grubich, Traci Siani, Michael Stahl, Joseph Atterbury, Michele Newell, Wayne Newell, Barrett Cruce, Gerald M. Ward, Pete Pimentel, Patricia Walker, Tom Howard, Cheryl Schneider, Elaine Hines, Randy Hines, Bill Wood, Judie Wood, Butch Powell, Pat Magrogon, Stephen Dodson, Michael Cassatly, Chip Block, Josh Liller, William Daly, Jeff Beal, Joshua Arena, Julie Espy, Robert Shaw, Danica Montgomery, Matt Rostock, Bud Howard, Matt Mitchell, George Seidenberg, Jim Snyder, Martitza Waterman, Greg Waterman, Anne Cox, Mark Nelson, Cameron Taggart, Mike Grella, Jamie Stuve

Staff: Matthew Anderson, Irene Arpayoglou, Emily Dark, Drew Liddick, Earl Pearson, Barchan Rodgers

Earl welcomed everyone, gave a brief introduction about the purpose of the meeting, and introduced staff from the aquatic preserve and Tallahassee. Irene gave a PowerPoint presentation about the Indian River Lagoon Aquatic Preserves office, work being conducted, the Loxahatchee River-Lake Worth Creek Aquatic Preserve, and issues identified in the plan.

After the presentation, Earl explained the commenting process. The room was set up so that there were five stations – one for each of the five issues identified in the management plan. Staff were stationed at each of the stations to provide background on the issue, and they recorded comments the public had pertinent to each issue (listed below).

Issue 1 – Water Quantity and Quality

- Change Surface and Subsurface water from Class III to Class II.
- If TMDLs or BMAPs are developed, update the management plan.

- Duration of freshwater being released is affecting the biology of the systems.
- Adjustment of the boundaries of the aquatic preserve (more coverage; include the gap between Jensen Beach to Jupiter Inlet Aquatic Preserve and Loxahatchee River-Lake Worth Creek Aquatic Preserve).
- Don't connect the Hobe Groves Canal or C-18 with C-76; too much pesticides and fertilizers.

Issue 2 – Invasive Species

- Include upstream freshwater non-natives.
 - Don't forget Mayan cichlid.
 - *Macrobrachium* spp. (crayfish).

Issue 3 – Lack of Species Diversity

- Siltation is increasing west of Railroad Bridge and east of North Fork.
 - From decreased LCD and decreased seagrass.
 - Source is upriver or through the inlet from beach renourishment
- Resolve management agency questions of the canal.
 - Dead end creeks.
 - Tributaries.
 - Ownership questions.
 - Outside the aquatic preserve boundary.

Issue 4 – Lack of Knowledge of the Aquatic Preserve

- Local schools
- Jupiter Environmental Research and Field Studies Academy requires 200 hours.
- Include pesticide and herbicide in homeowner's guide
- This is the most important issue.
- Link management to what speaks to people (not just improve seagrasses but go all the way to fish)
- Jupiter Lighthouse and Jupiter Outdoor Center would be good places for kiosks/signs.
- Place QR codes on bridges or signs to reach paddleboarders.
- Incentivize QR's and awareness
- Curriculum for schools
- Photo contest in the aquatic preserves
- Aquatic preserve boundaries on chart plotter

Issue 5 – Sustainable Public Use

- Add a kayak launch between Riverbend Park and Jonathan Dickinson State Park at Cypress Creek to eliminate shuttling cars to JDSP
- Add information on reasons for protected areas (i.e. sensitive seagrass bed).

While the comments were received, Earl explained the next steps in the management plan process: an advisory committee meeting, Acquisition and Restoration Council meeting (also a public meeting) in Tallahassee, and a Governor and Cabinet meeting. The public was reminded the comments could still be submitted on or before February 12, 2018. They were thanked for taking time out of their schedules to attend, and to provide feedback.

From: [Alex Cotleur](#)
To: [Arpayoglou, Irene](#)
Subject: Loxahatchee River-lake worth creek aquatic preserve meeting
Date: Monday, January 29, 2018 3:30:09 PM

Hi Irene,

I'm feeling under the weather and am unable to attend this evening's meeting. I want to make sure however that I get my concerns on record. My perspective is unique in that I am a paddler, local waterfront homeowner on the c-18 canal and my husband is co-owner of a business that benefits from development. I am a living catch 22. I give tours and paddle lessons at Blueline and see many of our paddle spots along the waterway being taken over by development. Pretty soon, there won't be any shoreline that is undeveloped for paddlers to take a break!

I benefit financially from the development, but I benefit way more than can be quantified spiritually and health-wise from nature and I hope we can preserve what little we have left.

Along with tougher controls for developers, there needs to be an outpouring of education to the residents in the area. The influx of people moving into this area that are completely unaware of how sensitive and precious our natural areas are locally is astounding. I'm afraid these people don't even know that what they moved here for is at risk.

One of the major immediate concerns I have is the rate at which the S 46 spillway located at the C-18 canal is being kept open. It's expected for it to be open often during the rainy season and storm weather events. However, it has been open more than necessary; there hasn't been enough rain to merit a steady outflow outside times of heavy rain.

At low tide it smells like waste. Low tide has a certain smell I'm familiar with because I've lived on this property for 12 years and what I'm smelling at low tide is getting worse every year and can not be good for the river or the residents that use it recreationally.

I hear stories from old locals that the water behind my house was clear blue at one time. I'm concerned that by the time my kids grow up we won't have that clear blue water any further west than the railroad bridge because of the outflow from S-46.

A second concern is the lowering of the boat speed zone from Cato's bridge north, to a no wake zone. This area is replete with sand grass beds that fish and turtles thrive on. Making this a no wake zone hopefully can eliminate the erosion of those grass beds. It's the southern end of the Indian River Lagoon and it deserves respectful and responsible recreational use. Unfortunately the public doesn't know enough or care enough to do it themselves so an agency or the local Towns who have issued resolutions to change the area to a no wake zone need to step in. Even on the weekdays, without the crazy weekend traffic, there are countless jet skis and boaters running outside the channel. Designating this area a no wake zone would end the confusion, prevent an accident waiting to happen and hopefully preserve the sea grass bottom that supports the marine life.

I look forward to hearing what changes are made to accommodate the influx of development hurting our River. Thank you for your time! And anytime you would like to paddle in our area, just let me know!

Alexandra Cotleur
18021 Loxahatchee River Road
Jupiter, FL 33458
(561)373-5125

From: Mike Grella
To: [Arpayoglou, Irene](#); [Pearson, Earl](#)
Date: Monday, January 8, 2018 6:08:02 PM
Attachments: [Edits to Loxahatchee River – Lake Worth Creek Aquatic Preserve Management Plan.docx](#)

Attached are our comments. Let me know if you have any questions or concerns. Many thanks.

Mike Grella, AICP, CDM
Director, Jupiter Inlet District

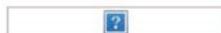
From: Arpayoglou, Irene [mailto:Irene.Arpayoglou@dep.state.fl.us]
Sent: Thursday, January 04, 2018 3:56 PM
To: Mike Grella <mgrella@jupiterinletdistrict.org>
Subject: Earl's email

Earl.Pearson@dep.state.fl.us

Irene Arpayoglou, M.S.
Florida Department of Environmental Protection
Indian River Lagoon Aquatic Preserves Manager
3300 Lewis Street
Ft. Pierce, Florida 34981
(772) 429-2995
Irene.Arpayoglou@dep.state.fl.us



 [Indian River Lagoon Aquatic Preserves](#)



Loxahatchee River – Lake Worth Creek Aquatic Preserve Plan

Section 3.2: Page 12, paragraph 2

During the early 1900s, Jupiter Inlet experienced periodic openings and closings due in part to water diversion as a result of the construction of the East Coast Canal (McPherson, Sabanskas, & Long, 1982). The Jupiter Inlet District (JID) was developed through a ~~unique special~~ act of Florida State Legislation in 1921 and tasked with the management of the Jupiter Inlet and Loxahatchee River. In 1922, the ~~Jupiter Inlet District JID~~ implemented a plan to dredge and construct two jetties, 300 feet long by 300 feet-wide (Palm Beach County, 2016). ~~Despite e~~ Extensions of the jetties, along with additional rocky material for reinforcement and the continued dredging efforts ~~all failed to correct the~~ periodic shoaling and closing events of the inlet ~~recurred~~ (Palm Beach County, 2016). This ~~behavior~~ continued until ~~1941~~ 1942 when the channel experienced another closure and remained that way until the conclusion of World War II.

Section 3.2: Page 14, paragraph 1

~~During the 1960s, the Jupiter Inlet continued to have issues with maintaining an adequate channel depth due to sands entering from the Atlantic as well as siltation from the Loxahatchee River. The US Army Corps of Engineers conducted a survey in 1966 which stated “The absence of a dependable, safe channel to the ocean through the Jupiter Inlet restricts vessels’ abilities to seek refuge from strong seas, forcing ships to choose between the Intracoastal Waterway, the Lake Worth Inlet for the St. Lucie Inlet” (LoxahatcheeRiver.net, n.d.). Since JID reopened the inlet in 1947, biennial maintenance dredging kept the inlet open for small – craft navigation. With the adoption of the Jupiter Inlet Management Plan (JIMP) in 1997, a series of management options were implemented, including the bypassing of 60,000 CY on an average annual basis. response to this issue, A sand trap was dredged 1,000 feet west from –of the entrance of Jupiter Inlet, within the southern embayment of the Loxahatchee River. while in the late 1960s both jetties were extended landward to prevent flanking (Grella, 2016).~~

Section 3.2: Page 14, paragraph 4

During the 1990s and 2000s, an extensive effort was undertaken at the federal and state level to restore and protect the Loxahatchee River area. In 1989, the JID commissioned the drafting of a management plan for the Loxahatchee (Loxahatchee River Management Plan), with the intent to enhance public recreational uses, where appropriate, while preserving the natural resources of the river, including the restoration of four oxbows in the river’s Northwest Fork (Grella, 2016).

From: Josh Liller
To: [FloridaCoasts](#)
Subject: Corrections To Loxahatchee River & Lake Worth Creek Aquatic Preserve Management Plan Draft
Date: Monday, January 15, 2018 10:49:29 AM

I am reading the draft of the LR-LWC Aquatic Preserve Management Plan and have some corrections:

(Page numbers correspond with the printed number on the page)

pg 9

- San Miguel de Archangel, not San Miguel Archangel
- aviso, not a galleon
- wrecked 1659, not 1660

pg 10

- Jupiter Lighthouse Reservation designated 1854, Fort Jupiter Military Reservation designated in 1855 (although it did surround the lighthouse reservation).
- Keeper's name is James Arango Armour (or James A. Armour)

pg 11

- When the Dade County court seat and courthouse moved from Juno to Miami in 1899 the name "Miami" was already in use so the term "present-day Miami" is redundant.
- Tindall House is the oldest surviving pioneer house in the Jupiter area, not Palm Beach County.
- Tindall House was acquired by the Loxahatchee River Historical Society (not Loxahatchee River History Museum) in 1997 (not recently). It was restored in 2009 and can be visited at Jupiter Inlet Lighthouse & Museum, which is operated by LRHS.

pg 13

- Jupiter Inlet closed in early 1942, not 1941
- Camp Murphy trained soldiers in radar maintenance and operation
- Station J is written once as Station "J" and three times as station "J" – Station should be capitalized, and it is more commonly written without the quotation marks around J.
- While the naval intelligence and radio direction finding aspect of the station was established in 1940, it represented only an expansion and repurposing of the station. Naval Radio Station Jupiter was originally established in 1905 fronting the Loxahatchee River and had been in operation on the same site until its conversion in 1939-1940.
- Camp Murphy closed in 1944, but the Navy operated Station J until 1945 when the station was transferred to the Coast Guard who operated it until 1947 and only then was it discontinued.

pg 14

I am confused by this statement: "The U.S. Census reported that the population of Jupiter experienced a significant increase between 1980 and 1982." The census is only conducted every 10 years (1970, 1980, 1990, etc) so the Census could not report a significant increase between 1980 and 1982. Either the years are incorrect, or the increase was an estimation by the Census *Bureau*.

pg 16-17

There are three references to "US Highway A1A" but no such road exists. There is US Highway 1, and A1A which is separate State Road and there is also an Alternate A1A (more formally, State Road A1A Alternate or Alternate State Road A1A).

- "1.5 miles west of U.S. Highway A1A" – I'm not certain if this is a reference to the western Alt A1A bridge or the eastern US 1 bridge

- Damon Bridge (#3) carries Alternate A1A
- Tequesta Drive bridge (#7) is about 1 mile west of US Highway 1.

pg 20 map key

- Kitching Creek, not Kitchings
- 10-12 are mislabeled. The names match their colors on the map, but not their numbers.

Thank you.

Josh Liller

Historian and Collections Manager

Loxahatchee River Historical Society (LRHS) - a 501(c)3 non-profit

Jupiter Inlet Lighthouse and Museum

500 Captain Armour's Way, Jupiter, FL 33469

561-747-8380 x108

jliller@jupiterlighthouse.org

www.jupiterlighthouse.org

From: Matt Mitchell
To: [FloridaCoasts](#)
Cc: [Michael Stahl R.](#); [Julie Bishop](#)
Subject: Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan comments
Date: Thursday, February 8, 2018 10:44:08 AM
Attachments: [image001.jpg](#)
[PBC ERM Comments on the LR-LWCAP Managt Plan.pdf](#)
[LWL Spring 2017 letter report - FINAL.PDF](#)
[FullertonIslandRestorationPublicUse.pdf](#)

Good Morning,

On behalf of the County, please find the attached comments to the draft management plan. These comments have been summarized from staff in our Natural Areas and Environmental Enhancement and Restoration Divisions. Some were addressed partially during the public meetings. Most comments are general qa/qc of the document, but we have added some info and comments pertinent to some of our natural areas and other efforts. Supplemental information attached also includes some County monitoring data on sea turtle populations. Per discussions at the advisory council meeting, I believe this topic had been raised by other parties prior in the process, possibly with comments submitted.

Please feel to reach out with any questions - a lot of the discussions and suggestions regarding public access outreach are familiar to us through our own ERM outreach and involvement with the Lake Worth Lagoon Initiative.

Good job all on the process – we appreciate the opportunity to be involved and look forward to the final document and efforts implemented thereafter.

Regards,

Matt

Matt Mitchell

Environmental Manager
Palm Beach County Environmental Resources Management
2300 N. Jog Road, 4th Floor
West Palm Beach, FL 33411-2743
(561) 681-3833
MMitchell@pbcgov.org



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**Palm Beach County ERM Comments on the
Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan**

1. The plan is well written and follows the State guidelines for management plans for lands greater than 160 acres in size.
2. While the inclusion of several photos of the aquatic preserve tend to lengthen the plan, they do enhance the readability and understanding of the plan.
3. Suggest making the maps (included as photos in the plan) larger, perhaps covering an entire page to make them easier to read.
4. **Page 42**--When referencing surrounding properties of the aquatic preserve, several Palm Beach County Natural Areas are mentioned and that they are a part of NENA. Suggest ERM advise IRLAP staff updating the plan that we are in process of changing the name to Jaega Wildways—that way when they adopt their plan, it won't contain out of date information.
5. **Page 44**—In the summary of facilities at Limestone Creek Natural Areas, they forgot to mention the canoe/kayak launch that allows public access into the aquatic preserve and is located on the south side of the South Fork of the Loxahatchee River.
6. **Page 43**—Fullerton Island description should be updated to include a description of the public use facilities located there. **Fact Sheet Attached**
7. **Page 43**—Jackson Riverfront Pines should include info that there is a canoe/kayak landing on the natural shoreline of the natural area and located on the North Fork of the Loxahatchee River.
8. **Page 44**—Jupiter Ridge Natural Area should include info on the natural sand beach on the east side of the Lake Worth Creek (or ICW) that permits canoes/kayaks and small motorized vessels to beach on what is locally known as “ski beach” and visit the natural area. We have an informational kiosk there to inform the public about the natural area, but could include info on the aquatic preserve. Such information would help them achieve one of their public outreach objectives (Objective 1.2.—strategy 1.2.1).
9. **Page 47**—Suggest that it be made clearer that the staff doing on the ground work in the preserve and ensuring the implementation of the management plan is the limited staff from IRLAP (5 staff members, that oversee 7 aquatic preserves). This information appears buried in the Background of Ecosystem Science (Section 4.1.1) or the Appendices, but should be put upfront in the opening paragraphs of Chapter 4 similar to the initial paragraphs of Chapter 5 (pg. 67).
10. **Page 53**- Identify habitat restoration projects: Sawfish Island, Riverwalk restoration/exotic removal, Living Shoreline sites

11. **Page 54**—Typographical error on Integrated Strategy #1.2.2, the word “Asses” should change to “Assess”.
12. **Page 54**—Suggest to update information on the remaining number of septic systems within the vicinity of the aquatic preserve. Data referenced is from 2010, and there has likely been a significant amount of work done to convert septic systems to sewers in the past seven years (e.g., projects funded through LRPI).
13. **Page 58-** 1.1.3 The plan stated that they would write letters of support for restoration projects in the aquatic preserve but did not include any projects. Suggest adding a project section and add the restoration of Sawfish Island project into the plan. When applying for grant opportunities for that project, the management plan could then be cited.
14. **Page 60-** Implement strategies for protection of the endangered Green Sea Turtle. “Results of the preliminary sampling at Jupiter Inlet suggest that this area represents another significant assemblage of juvenile green turtles in Palm Beach County inshore waters.” The area they surveyed falls just east of the geographic area indicated in the Lox River-Lake Worth Creek Aquatic Management Preserve but turtles definitely utilize this waterway. Based on the large abundance of turtles at their survey site and the fact that turtles are often observed up into the river, this is likely an important area for them. **See attached letter report.**
15. **Page 60-** Implement strategies for manatee protection. This is a high use area.
16. **Page 64-** Public Use Issues: Add Fullerton and Burt Reynolds Park upgrades to boating and kayaking/paddleboarding.
17. **Page 68**—Suggest in the last paragraph of this Chapter 5 there should be some directive to investigate potential increases in funding for FCO/IRLAP, such as an appropriation from the Land Acquisition Trust Fund to help manage the aquatic preserves.
18. **Page 72**—Typographical error in the last line of text. “o” should be the word “of”
19. **Page 74**—in the Glossary of Terms for Amphidromous, the words “live cycle” should be “life cycle”.
20. **Page 74**—Glossary of Terms for Extinction. The definition given sounds more like the one used for the word Extirpation. Extinction means disappearance of a species from the earth’s biota.
21. **Page 75**—Glossary of Terms for Upland. Suggest expanding this definition to include the term is generally used to define lands that are not wetlands.
22. **Page 82**—Suggest separating the Animals Species List to begin on a new page or at least provide several lines of separation from the plant list.
23. **Page 102**—Suggest again that non-native pest animals be separated from the plant list by starting on a new page or at least several lines of separation.
24. **Page 103**—The FLEPPC “header” appears at the top of the page within the list of exotic animal species and should be removed.

25. **Page 108**—Appendix D. It appears the cost projections for the goals and objectives of the plan are very low, and the future cost projections appear not to account for any inflationary cost increases. If a 1.5-2.0% inflation factor was projected, I believe the costs would be more realistic, although overall, still pretty low.
26. **Page 113**—Budget Summary Table D.2 It appears the totals shown in the table don't match the numbers projected in Table D.1.(e.g., the Resource Management total for years 2018-2019).
27. **Page 113**—Section D.3. The last sentence seems to contradict on of the objectives in the public outreach section—Public Outreach Objective 1.2, Strategy 1.2.1. To the best of our knowledge information on the aquatic preserve or even signs identifying the Loxahatchee River-Lake Worth Creek Aquatic Preserve are not posted at any of our sites with access to the aquatic preserve (LIC,DES,JUR, and JRP), and potentially not Fullerton Island.

Goals, Objectives, and Strategies

D.1 / Current Goals, Objectives and Strategies Table

The following table provides a cost estimate for conducting the management activities identified in this plan. The data is organized by year and Management Program with subtotals for each program and year. The following represents the actual budgetary needs for managing the resources of the aquatic preserve. This budget was developed using data from the Florida Coastal Office (FCO) and other cooperating entities, and is based on actual costs for management activities, equipment purchases and maintenance, and for development of fixed capital facilities. This budget assumes optimal staffing levels to accomplish these strategies, and includes the costs associated with staffing such as salary or benefits. Budget categories identified correlate with the FCO Management Program Areas. The Funding Source column depicts the source of funds with “S” designated for state, “F” for federal, and “O” for other funding sources (e.g. non-profit groups, etc.). Dollar figures in orange font indicate funding not available at this time.

Goals, Objectives & Integrated Strategies	Mgmt. Program	Implement. Date (Planned)	Length of Initiative	Est. Avg. Yearly Cost	Funding	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26	26-27	27-28
Issue One: Water Quantity and Quality															
Goal 1: Improve water quality where necessary within the aquatic preserve to meet the needs of the natural resources and the surrounding populations.															
Objective 1: Improve freshwater quality/quantity in the Northwest Fork and Loxahatchee River Watershed.															
Strategy 1: Support restoration efforts that will benefit the aquatic preserve.	Resource Mgmt.	2018-2019	Recurring	\$2,500		\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500
Strategy 2: Support efforts to evaluate and update flood control measures with the potential to impact the aquatic preserve.	Resource Mgmt.	2019-2020	Recurring	\$2,500			\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500
Strategy 3: Review permit applications for projects within the aquatic preserve that could alter hydrology or water quality.	Resource Mgmt.	2018-2019	Recurring	\$1,500	S	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500
Strategy 4: Increase public awareness about water quality issues within the aquatic preserve and how activities in the watershed impact the aquatic preserve.	Education/ Outreach	2018-2019	Recurring	\$1,500		\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500
Objective 2: Collaborate with groups conducting water quality data collection within the aquatic preserve to stay informed about water quality status and disseminate information to the public.															
Strategy 1: Coordinate with the entities collecting water quality data to help disseminate information in a way that promotes local knowledge.	Resource Mgmt.	2018-2019	Recurring	\$1,000		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Strategy 2: Assess compiled data to identify status, trends and information gaps, and build on existing monitoring efforts to address information gaps.	Resource Mgmt.	2018-2019	Recurring	\$1,000			\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000

Goals, Objectives & Integrated Strategies	Mgmt. Program	Implement. Date (Planned)	Length of Initiative	Est. Avg. Yearly Cost	Funding	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26	26-27	27-28
Objective 3: Reduce water quality impacts caused by stormwater and septic system sources within the watershed.															
Strategy 1: Support local government efforts to convert high-priority areas to sewer.	Resource Mgmt.	2018-2019	Recurring	\$1,000	S	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Strategy 2: Support projects to enhance stormwater and sewage treatment in the aquatic preserve basin.	Resource Mgmt.	2018-2019	Recurring	\$1,000	S	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Issue Two: Invasive Species															
Goal 1: Identify non-native plant and animal species and document their location within the aquatic preserve to develop strategies to reduce their abundance.															
Objective 1: Conduct monitoring to establish baseline data on the non-native plant and animal species within the aquatic preserve															
Strategy 1: Develop monitoring protocols throughout the aquatic preserve to quantify non-native species.	Resource Mgmt.	2018-2019	Recurring	\$1,000		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Strategy 2: Coordinate with other agencies for funding opportunities in controlling non-native species.	Resource Mgmt.	2019-2020	Recurring	\$2,500			\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500
Objective 2: Identify and promote activities throughout the aquatic preserve to increase public awareness of the impact of non-native species and prevent further propagation of new species.															
Strategy 1: Develop educational programs for dive shops, local groups and schools to create awareness of the problems caused by non-native species.	Education/ Outreach	2018-2019	Recurring	\$1,500		\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500
Strategy 2: Support projects and events that promote local awareness of the problems of introducing non-native species to an ecosystem.	Education/ Outreach	2018-2019	Recurring	\$1,500		\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500
Issue Three: Loss of Natural Community Function and Species Diversity															
Goal 1: Protect the aquatic preserve from impacts related to land use changes that disrupt ecological functions of the natural resources.															
Objective 1: Coordinate with regulatory programs, local government, and adjacent land owners to reduce the impacts to the aquatic preserve from adjacent development activities.															
Strategy 1: Review and provide recommendations for local comprehensive plans that address development and water quality adjacent to the aquatic preserve.	Resource Mgmt.	2019-2020	Recurring	\$1,000	S		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000

Goals, Objectives & Integrated Strategies	Mgmt. Program	Implement. Date (Planned)	Length of Initiative	Est. Avg. Yearly Cost	Funding	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26	26-27	27-28
Strategy 2: Comment on proposed large scale coastal developments adjacent to the aquatic preserve and its watershed.	Resource Mgmt.	2018-2019	Recurring	\$1,000	S	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Strategy 3: Comment on permit applications for construction activities and leases on sovereign submerged lands within the aquatic preserve.	Resource Mgmt.	2018-2019	Recurring	\$1,500	S	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500
Strategy 4: Promote the use of soft, living shorelines to decrease erosion and protect the water quality and resources within the aquatic preserve.	Resource Mgmt.	2018-2019	Recurring	\$1,000		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Objective 2: Inform local residents about their contribution to global issues that impact the aquatic preserve.															
Strategy 1: Provide hands-on volunteer opportunities within the aquatic preserve to promote knowledge through personal interactions.	Education/ Outreach	2019-2020	Recurring	\$2,000			\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000
Strategy 2: Inform residents about climate change and sea-level rise and what actions can be taken to reduce their effects on the aquatic preserve.	Education/ Outreach	2019-2020	Recurring	\$1,500			\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500
Goal 2: Implement management practices that maintain or improve viable habitats and populations within the aquatic preserve.															
Objective 1: Establish and implement routine biological monitoring programs for essential habitats and rare and listed species.															
Strategy 1: Assist partners with natural resource monitoring efforts	Ecosystem Science	2018-2019	Recurring	\$1,000		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Strategy 2: Maintain a comprehensive species inventory.	Ecosystem Science	2019-2020	Recurring	\$1,000			\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Issue Four: Public Involvement															
Goal 1: Increase public involvement and awareness of the aquatic preserve, the work conducted in it, and its significance.															
Objective 1: Promote awareness of the aquatic preserve and its significance to local residents.															
Strategy 1: Install signage at access points informing a about the aquatic preserve and its significance.	Education/ Outreach	2018-2019	1 year	\$3,000		\$3,000									

Goals, Objectives & Integrated Strategies	Mgmt. Program	Implement. Date (Planned)	Length of Initiative	Est. Avg. Yearly Cost	Funding	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26	26-27	27-28
Strategy 2: Develop outreach materials and use social media to promote awareness of the aquatic preserve.	Education/ Outreach	2018-2019	1-2 years	\$5,000		\$5,000	\$5,000								
Strategy 3: Provide educational boat tours to inform the public about the effect of watershed practices on the aquatic preserve's natural resources.	Education/ Outreach	2019-2020	Recurring	\$2,500			\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500
Strategy 4: Create and promote a <i>Homeowner's Guide to Living on the Loxahatchee River-Lake Worth Creek Aquatic Preserve</i> .	Education/ Outreach	2019-2020	1 year	\$3,000			\$3,000								
Goal 2: Encourage user experiences and public recreation opportunities consistent with natural resources conservation.															
Objective 1: Increase public access and low impact recreational opportunities in the aquatic preserve.															
Strategy 1: Create partnerships with private businesses, concessionaires and launch site managers who operate in the aquatic preserve to encourage activities that protect the natural resources of the site, while promoting low impact recreational opportunities	Public Use	2018-2019	Recurring	\$2,500		\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500
Strategy 2: Support low impact recreational opportunities.	Public Use	2018-2019	Recurring	\$2,000		\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000
Objective 2: Inform local residents and visitors about actions they can take to conserve and restore resources in the aquatic preserve.															
Strategy 1: Promote Leave No Trace principles for recreational users within the aquatic preserve	Public Use	2018-2019	Recurring	\$2,000		\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000
Strategy 2: Coordinate community-based cleanup events in conjunction with local groups and CSOs.	Public Use	2019-2020	Recurring	\$2,000			\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000

D.2 / Budget Summary Table

The following table provides a summary of cost estimates for conducting the management activities identified in this plan.

Fiscal Year	Ecosystem Science	Resource Management	Education & Outreach	Public Use	Annual Total
2018-2019	\$1,000	\$11,500	\$12,500	\$6,500	\$31,500
2019-2020	\$2,000	\$18,500	\$18,500	\$8,500	\$47,500
2020-2021	\$2,000	\$18,500	\$10,500	\$8,500	\$39,500
2021-2022	\$2,000	\$18,500	\$10,500	\$8,500	\$39,500
2022-2023	\$2,000	\$18,500	\$10,500	\$8,500	\$39,500
2023-2024	\$2,000	\$18,500	\$10,500	\$8,500	\$39,500
2024-2025	\$2,000	\$18,500	\$10,500	\$8,500	\$39,500
2025-2026	\$2,000	\$18,500	\$10,500	\$8,500	\$39,500
2026-2027	\$2,000	\$18,500	\$10,500	\$8,500	\$39,500
2027-2028	\$2,000	\$18,500	\$10,500	\$8,500	\$39,500
Ten Year Totals	\$19,000	\$178,000	\$115,000	\$83,000	\$395,000

D.3 / Major Accomplishments Since the Approval of the Previous Plan

The Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan was adopted by the Board of Trustees of the Internal Improvement Trust Fund on June 12, 1984. Until the establishment of a local field office in 1986, all aquatic preserve matters were handled in Tallahassee.

Although the protection and management of the natural resources within Loxahatchee River-Lake Worth Creek Aquatic Preserve have always been a priority, most of the management efforts in the aquatic preserve have been natural resource protection through the regulatory permit review process, and education and outreach. Staff routinely coordinate with the regulatory division when permit applications are submitted for projects within Loxahatchee River-Lake Worth Creek Aquatic Preserve and educational signage has been posted at all public access to the aquatic preserve.

Other Requirements

E.1 / Acquisition and Restoration Council Management Plan Compliance Checklist

Land Management Plan Compliance Checklist Required for State-owned conservation lands over 160 acres			
Item #	Requirement	Statute/Rule	Pg#/App
Section A: Acquisition Information Items			
1	The common name of the property.	18-2.018 & 18-2.021	Ex. Sum.
2	The land acquisition program, if any, under which the property was acquired.	18-2.018 & 18-2.021	p. 1
3	Degree of title interest held by the Board, including reservations and encumbrances such as leases.	18-2.021	p. 1, 6-8
4	The legal description and acreage of the property.	18-2.018 & 18-2.021	Ex. Sum & p. 15
5	A map showing the approximate location and boundaries of the property, and the location of any structures or improvements to the property.	18-2.018 & 18-2.021	p. 15
6	An assessment as to whether the property, or any portion, should be declared surplus. Provide Information regarding assessment and analysis in the plan, and provide corresponding map.	18-2.021	N/A
7	Identification of other parcels of land within or immediately adjacent to the property that should be purchased because they are essential to management of the property. Please clearly indicate parcels on a map.	18-2.021	N/A
8	Identification of adjacent land uses that conflict with the planned use of the property, if any.	18-2.021	p. 46
9	A statement of the purpose for which the lands were acquired, the projected use or uses as defined in 253.034 and the statutory authority for such use or uses.	259.032(10)	p. 6
10	Proximity of property to other significant State, local or federal land or water resources.	18-2.021	p. 41-46
Section B: Use Items			
11	The designated single use or multiple use management for the property, including use by other managing entities.	18-2.018 & 18-2.021	p. 7
12	A description of past and existing uses, including any unauthorized uses of the property.	18-2.018 & 18-2.021	p. 9-15, 37-38, 41-46, 61-63
13	A description of alternative or multiple uses of the property considered by the lessee and a statement detailing why such uses were not adopted.	18-2.018	N/A
14	A description of the management responsibilities of each entity involved in the property's management and how such responsibilities will be coordinated.	18-2.018	p. 6-8, 48-63
15	Include a provision that requires that the managing agency consult with the Division of Historical Resources, Department of State before taking actions that may adversely affect archeological or historical resources.	18-2.021	App. E.2
16	Analysis/description of other managing agencies and private land managers, if any, which could facilitate the restoration or management of the land.	18-2.021	p. 40-41, 48-51
17	A determination of the public uses and public access that would be consistent with the purposes for which the lands were acquired.	259.032(10)	p. 61-63
18	A finding regarding whether each planned use complies with the 1981 State Lands Management Plan, particularly whether such uses represent "balanced public utilization," specific agency statutory authority and any other legislative or executive directives that constrain the use of such property.	18-2.021	p. 6-8
19	Letter of compliance from the local government stating that the LMP is in compliance with the Local Government Comprehensive Plan.	BOT requirement	App. E.3

**Land Management Plan Compliance Checklist
Required for State-owned conservation lands over 160 acres**

Item #	Requirement	Statute/Rule	Pg#/App
20	An assessment of the impact of planned uses on the renewable and non-renewable resources of the property, including soil and water resources, and a detailed description of the specific actions that will be taken to protect, enhance and conserve these resources and to compensate/mitigate damage caused by such uses, including a description of how the manager plans to control and prevent soil erosion and soil or water contamination.	18-2.018 & 18-2.021	p. 19-26, 47-63
21	*For managed areas larger than 1,000 acres, an analysis of the multiple-use potential of the property which shall include the potential of the property to generate revenues to enhance the management of the property provided that no lease, easement, or license for such revenue-generating use shall be entered into if the granting of such lease, easement or license would adversely affect the tax exemption of the interest on any revenue bonds issued to fund the acquisition of the affected lands from gross income for federal income tax purposes, pursuant to Internal Revenue Service regulations.	18-2.021 & 253.036	N/A
22	If the lead managing agency determines that timber resource management is not in conflict with the primary management objectives of the managed area, a component or section, prepared by a qualified professional forester, that assesses the feasibility of managing timber resources pursuant to section 253.036, F.S.	18-021	N/A
23	A statement regarding incompatible use in reference to Ch. 253.034(10).	253.034(10)	N/A

*The following taken from 253.034(10) is not a land management plan requirement; however, it should be considered when developing a land management plan: The following additional uses of conservation lands acquired pursuant to the Florida Forever program and other state-funded conservation land purchase programs shall be authorized, upon a finding by the Board of Trustees, if they meet the criteria specified in paragraphs (a)-(e): water resource development projects, water supply development projects, storm-water management projects, linear facilities and sustainable agriculture and forestry. Such additional uses are authorized where: (a) Not inconsistent with the management plan for such lands; (b) Compatible with the natural ecosystem and resource values of such lands; (c) The proposed use is appropriately located on such lands and where due consideration is given to the use of other available lands; (d) The using entity reasonably compensates the titleholder for such use based upon an appropriate measure of value; and (e) The use is consistent with the public interest.

Section C: Public Involvement Items

24	A statement concerning the extent of public involvement and local government participation in the development of the plan, if any.	18-2.021	App. C
25	The management prospectus required pursuant to paragraph (9)(d) shall be available to the public for a period of 30 days prior to the public hearing.	259.032(10)	N/A
26	LMPs and LMP updates for parcels over 160 acres shall be developed with input from an advisory group who must conduct at least one public hearing within the county in which the parcel or project is located. Include the advisory group members and their affiliations, as well as the date and location of the advisory group meeting.	259.032(10)	App. C
27	Summary of comments and concerns expressed by the advisory group for parcels over 160 acres	18-2.021	App. C
28	During plan development, at least one public hearing shall be held in each affected county. Notice of such public hearing shall be posted on the parcel or project designated for management, advertised in a paper of general circulation, and announced at a scheduled meeting of the local governing body before the actual public hearing. Include a copy of each County's advertisements and announcements (meeting minutes will suffice to indicate an announcement) in the management plan.	253.034(5) & 259.032(10)	App. C
29	The manager shall consider the findings and recommendations of the land management review team in finalizing the required 10-year update of its management plan. Include manager's replies to the team's findings and recommendations.	259.036	N/A
30	Summary of comments and concerns expressed by the management review team, if required by Section 259.036, F.S.	18-2.021	N/A
31	If manager is not in agreement with the management review team's findings and recommendations in finalizing the required 10-year update of its management plan, the managing agency should explain why they disagree with the findings or recommendations.	259.036	N/A

**Land Management Plan Compliance Checklist
Required for State-owned conservation lands over 160 acres**

Item #	Requirement	Statute/Rule	Pg#/App
Section D: Natural Resources			
32	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding soil types. Use brief descriptions and include USDA maps when available.	18-2.021	p. 19
33	Insert FNAI based natural community maps when available.	ARC consensus	p. 27
34	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding outstanding native landscapes containing relatively unaltered flora, fauna and geological conditions.	18-2.021	Ex Sum, p. 15
35	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding unique natural features and/or resources including but not limited to virgin timber stands, scenic vistas, natural rivers and streams, coral reefs, natural springs, caverns and large sinkholes.	18-2.018 & 18-2.021	p. 27-33
36	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding beaches and dunes.	18-2.021	N/A
37	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding mineral resources, such as oil, gas and phosphate, etc.	18-2.018 & 18-2.021	p. 19-20, App. A.1
38	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding fish and wildlife, both game and non-game, and their habitat.	18-2.018 & 18-2.021	p. 27-35, App. B.3.1
39	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding State and Federally listed endangered or threatened species and their habitat.	18-2.021	p. 27-35, App. B.3.1
40	The identification or resources on the property that are listed in the Natural Areas Inventory. Include letter from FNAI or consultant where appropriate.	18-2.021	p. 27-33
41	Specific description of how the managing agency plans to identify, locate, protect and preserve or otherwise use fragile, nonrenewable natural and cultural resources.	259.032(10)	p. 37-38, p. 47-63, App. E.2
42	Habitat Restoration and Improvement	259.032(10) & 253.034(5)	
42-A.	Describe management needs, problems and a desired outcome and the key management activities necessary to achieve the enhancement, protection and preservation of restored habitats and enhance the natural, historical and archeological resources and their values for which the lands were acquired.	259.032(10) & 253.034(5)	p. 47-65, App. D.1
42-B.	Provide a detailed description of both short (2-year planning period) and long-term (10-year planning period) management goals, and a priority schedule based on the purposes for which the lands were acquired and include a timeline for completion.	259.032(10) & 253.034(5)	App. D.1
42-C.	The associated measurable objectives to achieve the goals.	259.032(10) & 253.034(5)	App. D.1
42-D.	The related activities that are to be performed to meet the land management objectives and their associated measures. Include fire management plans - they can be in plan body or an appendix.	259.032(10) & 253.034(5)	App. D.1
42-E.	A detailed expense and manpower budget in order to provide a management tool that facilitates development of performance measures, including recommendations for cost-effective methods of accomplishing those activities.	259.032(10) & 253.034(5)	App. D.1
43	***Quantitative data description of the land regarding an inventory of forest and other natural resources and associated acreage. See footnote.	253.034(5)	Ex Sum
44	Sustainable Forest Management, including implementation of prescribed fire management	18-2.021, 253.034(5) & 259.032(10)	
44-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	18-2.021, 253.034(5) & 259.032(10)	N/A

**Land Management Plan Compliance Checklist
Required for State-owned conservation lands over 160 acres**

Item #	Requirement	Statute/Rule	Pg#/App
44-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	18-2.021, 253.034(5) & 259.032(10)	N/A
44-C.	Measurable objectives (see requirement for #42-C).	18-2.021, 253.034(5) & 259.032(10)	N/A
44-D.	Related activities (see requirement for #42-D).	18-2.021, 253.034(5) & 259.032(10)	N/A
44-E.	Budgets (see requirement for #42-E).	18-2.021, 253.034(5) & 259.032(10)	N/A
45	Imperiled species, habitat maintenance, enhancement, restoration or population restoration	259.032(10) & 253.034(5)	
45-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	p. 47-63, App. D.1
45-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	App. D.1
45-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	App. D.1
45-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	App. D.1
45-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1
46	***Quantitative data description of the land regarding an inventory of exotic and invasive plants and associated acreage. See footnote.	253.034(5)	App. B.3.2
47	Place the Arthropod Control Plan in an appendix. If one does not exist, provide a statement as to what arrangement exists between the local mosquito control district and the management unit.	BOT requirement via lease language	App. B.4
48	Exotic and invasive species maintenance and control	259.032(10) & 253.034(5)	
48-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	p. 35-37, 54-55, App. D.1
48-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	App. D.1
48-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	App. D.1
48-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	App. D.1
48-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1

Section E: Water Resources

49	A statement as to whether the property is within and/or adjacent to an aquatic preserve or a designated area of critical state concern or an area under study for such designation. If yes, provide a list of the appropriate managing agencies that have been notified of the proposed plan.	18-2.018 & 18-2.021	p. 1-4
50	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding water resources, including water classification for each water body and the identification of any such water body that is designated as an Outstanding Florida Water under Rule 62-302.700, F.A.C.	18-2.021	p. 1-4, 20-26
51	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding swamps, marshes and other wetlands.	18-2.021	p. 27-33

**Land Management Plan Compliance Checklist
Required for State-owned conservation lands over 160 acres**

Item #	Requirement	Statute/Rule	Pg#/App
52	***Quantitative description of the land regarding an inventory of hydrological features and associated acreage. See footnote.	253.034(5)	Ex. Sum
53	Hydrological Preservation and Restoration	259.032(10) & 253.034(5)	
53-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	App. D.1
53-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	App. D.1
53-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	App. D.1
53-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	App. D.1
53-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1

Section F: Historical, Archaeological and Cultural Resources

54	**Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding archeological and historical resources. Include maps of all cultural resources except Native American sites, unless such sites are major points of interest that are open to public visitation.	18-2.018, 18-2.021 & per DHR's request	Ex. Sum, p 37-38, App. B.5, E.2
55	***Quantitative data description of the land regarding an inventory of significant land, cultural or historical features and associated acreage.	253.034(5)	Ex. Sum, p 37-38, App. B.5, E.2
56	A description of actions the agency plans to take to locate and identify unknown resources such as surveys of unknown archeological and historical resources.	18-2.021	App. D.1
57	Cultural and Historical Resources	259.032(10) & 253.034(5)	
57-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	App. D.1
57-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	App. D.1
57-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	App. D.1
57-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	App. D.1
57-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1

**While maps of Native American sites should not be included in the body of the management plan, the DSL urges each managing agency to provide such information to the Division of Historical Resources for inclusion in their proprietary database. This information should be available for access to new managers to assist them in developing, implementing and coordinating their management activities.

Section G: Facilities (Infrastructure, Access, Recreation)

58	***Quantitative data description of the land regarding an inventory of infrastructure and associated acreage. See footnote.	253.034(5)	p. 67-68
59	Capital Facilities and Infrastructure	259.032(10) & 253.034(5)	
59-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	p. 67-68, App. D.1
59-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	App. D.1
59-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	App. D.1

**Land Management Plan Compliance Checklist
Required for State-owned conservation lands over 160 acres**

Item #	Requirement	Statute/Rule	Pg#/App
59-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	App. D.1
59-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1
60	*** Quantitative data description of the land regarding an inventory of recreational facilities and associated acreage.	253.034(5)	p. 60-63
61	Public Access and Recreational Opportunities	259.032(10) & 253.034(5)	
61-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	App. D.1
61-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	App. D.1
61-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	App. D.1
61-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	App. D.1
61-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1

Section H: Other/ Managing Agency Tools

62	Place this LMP Compliance Checklist at the front of the plan.	ARC and managing agency consensus	Front & App. E.1
63	Place the Executive Summary at the front of the LMP. Include a physical description of the land.	ARC and 253.034(5)	Ex. Sum
64	If this LMP is a 10-year update, note the accomplishments since the drafting of the last LMP set forth in an organized (categories or bullets) format.	ARC consensus	App. D.3
65	Key management activities necessary to achieve the desired outcomes regarding other appropriate resource management.	259.032(10)	p. 47-63
66	Summary budget for the scheduled land management activities of the LMP including any potential fees anticipated from public or private entities for projects to offset adverse impacts to imperiled species or such habitat, which fees shall be used to restore, manage, enhance, repopulate, or acquire imperiled species habitat for lands that have or are anticipated to have imperiled species or such habitat onsite. The summary budget shall be prepared in such a manner that it facilitates computing an aggregate of land management costs for all state-managed lands using the categories described in s. 259.037(3) which are resource management, administration, support, capital improvements, recreation visitor services, law enforcement activities.	253.034(5)	App. D.1
67	Cost estimate for conducting other management activities which would enhance the natural resource value or public recreation value for which the lands were acquired, include recommendations for cost-effective methods in accomplishing those activities.	259.032(10)	App. D.1
68	A statement of gross income generated, net income and expenses.	18-2.018	N/A

*** = The referenced inventories shall be of such detail that objective measures and benchmarks can be established for each tract of land and monitored during the lifetime of the plan. All quantitative data collected shall be aggregated, standardized, collected, and presented in an electronic format to allow for uniform management reporting and analysis. The information collected by the DEP pursuant to s. 253.0325(2) shall be available to the land manager and his or her assignee.

These procedures apply to state agencies, local governments, and non-profits that manage state-owned properties.

A. General Discussion

Historic resources are both archaeological sites and historic structures. Per Chapter 267, Florida Statutes, '*Historic property*' or '*historic resource*' means any prehistoric district, site, building, object, or other real or personal property of historical, architectural, or archaeological value, and folklife resources. These properties or resources may include, but are not limited to, monuments, memorials, Indian habitations, ceremonial sites, abandoned settlements, sunken or abandoned ships, engineering works, treasure trove, artifacts, or other objects with intrinsic historical or archaeological value, or any part thereof, relating to the history, government, and culture of the state."

B. Agency Responsibilities

Per State Policy relative to historic properties, state agencies of the executive branch must allow the Division of Historical Resources (Division) the opportunity to comment on any undertakings, whether these undertakings directly involve the state agency, i.e., land management responsibilities, or the state agency has indirect jurisdiction, i.e. permitting authority, grants, etc. No state funds should be expended on the undertaking until the Division has the opportunity to review and comment on the project, permit, grant, etc.

State agencies shall preserve the historic resources which are owned or controlled by the agency.

Regarding proposed demolition or substantial alterations of historic properties, consultation with the Division must occur, and alternatives to demolition must be considered.

State agencies must consult with Division to establish a program to location, inventory and evaluate all historic properties under ownership or controlled by the agency.

C. Statutory Authority

Statutory Authority and more in depth information can be found at: www.flheritage.com/preservation/compliance/guidelines.cfm

D. Management Implementation

Even though the Division sits on the Acquisition and Restoration Council and approves land management plans, these plans are conceptual. Specific information regarding individual projects must be submitted to the Division for review and recommendations.

Managers of state lands must coordinate any land clearing or ground disturbing activities with the Division to allow for review and comment on the proposed project. Recommendations may include, but are not limited to: approval of the project as submitted, cultural resource assessment survey by a qualified professional archaeologist, modifications to the proposed project to avoid or mitigate potential adverse effects.

Projects such as additions, exterior alteration, or related new construction regarding historic structures must also be submitted to the Division of Historical Resources for review and comment by the Division's architects. Projects involving structures fifty years of age or older, must be submitted to this agency for a significance determination. In rare cases, structures under fifty years of age may be deemed historically significant. These must be evaluated on a case by case basis.

Adverse impacts to significant sites, either archaeological sites or historic buildings, must be avoided. Furthermore, managers of state property should make preparations for locating and evaluating historic resources, both archaeological sites and historic structures.

E. Minimum Review Documentation Requirements

In order to have a proposed project reviewed by the Division, certain information must be submitted for comments and recommendations. The minimum review documentation requirements can be found at: www.flheritage.com/preservation/compliance/docs/minimum_review_documentation_requirements.pdf .

Questions relating to the treatment of archaeological and historic resources on state lands should be directed to:

Deena S. Woodward

Division of Historical Resources, Bureau of Historic Preservation, Compliance and Review Section

R. A. Gray Building, 500 South Bronough Street

Tallahassee, FL 32399-0250

Phone: (850) 245-6425, Toll Free: (800) 847-7278, Fax: (850) 245-6435



Florida Department of Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard, MS 235
Tallahassee, Florida 32399-3000

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Noah Valenstein
Secretary

March 2018

Nikki van Vonno
Martin County Growth Management Director
Martin County Department of Growth Management
2401 SE Monterey Road
Stuart, FL

Dear Ms. van Vonno:

Attached is a copy of the draft Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan. (The plan can also be found at <https://floridadep.gov/fco/fco/content/florida-coastal-office-site-management-plans>.) The plan was developed with input from the public and the Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan Advisory Group. We anticipate the plan being reviewed by the Acquisition and Restoration Council at their June 2018 meeting in Tallahassee (<https://floridadep.gov/lands/environmental-services/content/acquisition-and-restoration-council-arc>). We respectfully request, within 30 days of receipt of this letter, your review of the Aquatic Preserve plan for its compliance with the Martin County Comprehensive Plan. Please reply to the physical address at the top of the letter (or e-mail address) regarding whether the Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan is in compliance with the county's comprehensive plan. Thank you in advance for your time and effort in this matter.

If you have any questions, please don't hesitate to contact me at (850)245-2104 or Earl.Pearson@floridadep.gov.

Sincerely,

A handwritten signature in blue ink, appearing to read "Earl Pearson".

Earl Pearson
Planning Manager
Florida Coastal Office



MARTIN COUNTY
BOARD OF COUNTY COMMISSIONERS
2401 S.E. MONTEREY ROAD • STUART, FL 34996

May 1, 2018

Telephone: (772) 288-5495
Fax: (772) 288-5764
Email: nikkiv@martin.fl.us

DOUG SMITH
Commissioner, District 1

ED FIELDING
Commissioner, District 2

HAROLD E. JENKINS II
Commissioner, District 3

SARAH HEARD
Commissioner, District 4

EDWARD V. CIAMPI
Commissioner, District 5

TARYN KRZYDA, CPM
County Administrator

SARAH W. WOODS
County Attorney

Earl Pearson, Planning Manager
Florida Department of Environmental Protection
Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard, MS 235
Tallahassee, Florida 32399-3000

RE: Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan

Mr. Pearson:

We are in receipt of your letter requesting our review of the Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan for consistency with the Martin County Comprehensive Growth Management Plan (CGMP).

As prescribed in Section 1.1, Comprehensive Growth Management Plan, Martin County Code, the purposes of the CGMP are:

- (1) To implement and strengthen the comprehensive planning process, and
- (2) To protect and restore natural and manmade resources and maintain the character, stability and quality of life for present and future County residents, and
- (3) To allow only orderly growth and development that achieves the purposes listed in this subsection, and
- (4) To achieve and maintain conservative prudent fiscal management, and
- (5) To set out goals, objectives, policies, and procedures Martin County has adopted and to require that they be strictly followed when conducting the county's business.

The Florida Department of Environmental Protection's Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan is consistent with the Goals, Objectives and Policies as found Chapter 8, Coastal Management Element, and Chapter 9, Conservation and Open Space Element, of the County's Comprehensive Growth Management Plan.

Thank you for providing us the opportunity to review the state's management plan for this outstanding natural resource in our County.

Sincerely,

Nicki van Vonno
Growth Management Department Director

NvV:DD:pj

TELEPHONE
772-288-5400

WEB ADDRESS
<http://www.martin.fl.us>

gmd2018L355.docx



Florida Department of Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard, MS 235
Tallahassee, Florida 32399-3000

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Noah Valenstein
Secretary

March 2018

Lorenzo Aghemo, Director of Planning
Palm Beach County Planning, Zoning, & Building Department
2300 N. Jog Road
West Palm Beach, FL 33411

Dear Mr. Aghemo:

Attached is a copy of the draft Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan. (The plan can also be found at <https://floridadep.gov/fco/fco/content/florida-coastal-office-site-management-plans>.) The plan was developed with input from the public and the Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan Advisory Group. We anticipate the plan being reviewed by the Acquisition and Restoration Council at their June 2018 meeting in Tallahassee (<https://floridadep.gov/lands/environmental-services/content/acquisition-and-restoration-council-arc>). We respectfully request, within 30 days of receipt of this letter, your review of the Aquatic Preserve plan for its compliance with the Palm Beach County Comprehensive Plan. Please reply to the physical address at the top of the letter (or e-mail address) regarding whether the Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan is in compliance with the county's comprehensive plan. Thank you in advance for your time and effort in this matter.

If you have any questions, please don't hesitate to contact me at (850)245-2104 or Earl.Pearson@floridadep.gov.

Sincerely,

A handwritten signature in blue ink that reads "Earl Pearson".

Earl Pearson
Planning Manager
Florida Coastal Office



**Department of Planning,
Zoning & Building**

2300 North Jog Road
West Palm Beach, FL 33411-2741
(561) 233-5000

Planning Division 233-5300
Zoning Division 233-5200
Building Division 233-5100
Code Enforcement 233-5500
Contractors Certification 233-5525
Administration Office 233-5005
Executive Office 233-5228
www.pbcgov.com/pzb



**Palm Beach County
Board of County
Commissioners**

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County Administrator

Verdenia C. Baker

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May 9, 2018

Earl Pearson, Planning Manager
Florida Department of Environmental Protection
3900 Commonwealth Boulevard, MS 235
Tallahassee, FL 32399-3000

Re: Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan

Dear Mr. Pearson:

Thank you for the opportunity to review the draft Loxahatchee River-Lake Worth Creek Aquatic Preserve Management Plan. This letter is in response to your letter dated March 2018 requesting the County to determine whether the Aquatic Preserve Management Plan is consistent with the County's Comprehensive Plan.

After review by staff, the County has determined that the aquatic preserve plan is in compliance with Palm Beach County's Comprehensive Plan.

If you have any questions or comments, please contact me at 561-233-5467.

Sincerely,

Lorenzo Aghemo
Planning Director

c: Patricia Behn, PBC Deputy Planning Director
Stephanie Gregory, PBC Senior Planner

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**Florida Department of
Environmental Protection**

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Noah Valenstein
Secretary

June 15, 2018

Mr. Earl Pearson
Florida Coastal Office
Florida Department of Environmental Protection
3900 Commonwealth Boulevard, MS 235
Tallahassee, Florida 32399-3000

RE: Loxahatchee River – Lake Worth Creek Aquatic Preserve Management Plan

Dear Mr. Pearson:

On **June 15, 2018**, the Acquisition and Restoration Council recommended approval of the **Loxahatchee River – Lake Worth Creek Aquatic Preserve** management plan. Please advise Mr. James Parker of this office when the plan has been approved by the Board of Trustees.

Sincerely,

A handwritten signature in blue ink, appearing to read "Ray Spaulding".

Raymond V. Spaulding
Office of Environmental Services
Division of State Lands
Department of Environmental Protection



Loxahatchee River–Lake Worth Creek Aquatic Preserve
Management Plan

Florida Department of Environmental Protection
Florida Coastal Office

3900 Commonwealth Blvd., MS #235
Tallahassee, FL 32399 • www.aquaticpreserves.org