



Rainbow Springs 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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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, National Oceanic and Atmospheric Administration, or any of its sub-agencies.

June 2016



Nesting great blue herons.



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Aerial view of exposed limestone and spring vent in the Rainbow River.

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

Rainbow Springs Aquatic Preserve Management Plan	
Lead Agency:	Florida Department of Environmental Protection's (DEP) Florida Coastal Office (FCO)
Common Name of Property:	Rainbow Springs Aquatic Preserve (RSAP)
Location:	Marion County, Florida
Acreage Total:	164 acres
Acreage Breakdown for FCO Management Units According to Florida Natural Areas Inventory (FNAI) Natural Community Types	
FNAI Natural Communities	Acreage according to GIS
Spring-Run Stream	106 acres
Blackwater Stream	13 acres
Bottomland Forest	14 acres
Floodplain Swamp	10 acres
Floodplain Marsh	9 acres
Hydric Hammock	1 acre
Mesic Flatwoods	< 1 acre
Ruderal	10 acres
Aquatic Cave	Unknown acreage
Total	164 acres (numbers do not add up to 164 acres due to rounding)
Management Agency:	Florida Coastal Office
Designation:	Aquatic Preserve
Unique Features:	RSAP is a unique system rich with historic and environmental significance. It is recognized as a National Natural Landmark as well as an Outstanding Florida Water. This exceptional system has more than 85 identified spring vents and was recently added to the Great Florida birding trail. Of the 11.4 miles of shoreline that represents the aquatic preserve boundary line, approximately five miles remain undeveloped and the majority is in public possession. RSAP is a freshwater source for a wide variety of native Florida flora and fauna, many of which are either state and/or federally listed species of concern such as the wood stork (<i>Mycteria americana</i>) and the cardinal flower (<i>Lobelia cardinalis</i>).
Archaeological/ Historical Sites:	The Department of State's Division of Historical Resources have identified five culturally important sites encompassed by the Rainbow Springs State Park boundary, which is in close proximity to RSAP. These sites consist of two prehistoric sites, one historic site, and two multicomponent sites.
Management Needs	
Ecosystem Science:	Maintaining the health of the natural resources is crucial to ensuring the survival of the aquatic preserve for future generations. The strategic long-term monitoring programs for submerged aquatic vegetation and water quality will play an important role in sustaining this resource.
Resource Management:	Resource management activities related to RSAP focus on the impacts of biological components like nutrient loads, non-native, invasive species infestations, and other surrounding land usage. Rainbow River has been verified as an impaired water body by the DEP's Total Maximum Daily Load program for nutrients and algae. A Basin Management Action Plan is being developed for the surrounding springshed in the effort to restore the Rainbow River water body. Partnerships with Southwest Florida Water Management District and Florida Fish & Wildlife Conservation Commission prove invaluable in the assessment of native vegetation and the treatment of non-native, and/or invasive species.
Education & Outreach:	Education and outreach within RSAP is a critical component to the successful management of this unique natural resource. A wide variety of education and outreach tactics are utilized by RSAP staff. These include participation in various community events, working groups, as well as partnerships. Education and outreach strategies are designed to appeal to all ages and examples of content include proper use of the resource, native and non-native and/or invasive species, and management techniques.

Public Use:	Public use is a large component to the popularity of RSAP. Recreational opportunities include boating, fishing, tubing, swimming, snorkeling, diving, kayaking and canoeing, as well as birding and wildlife observing. Its designation as part of the Great Florida Birding Trail further emphasizes interest. It is important to address and maintain the balance between resource management and recreational use to protect, conserve, and enhance the aquatic preserve and to ensure its use for future generations.
Public Involvement:	Public support is vital to the success of conservation programs. The goal is to foster understanding of the problems facing these fragile ecosystems and the steps needed to adequately manage this important habitat. RSAP staff will hold a public meeting and advisory committee meeting at a location near the aquatic preserve to receive input on the draft management plan. An additional public meeting will be held in Tallahassee when the Acquisition and Restoration Council reviews the management plan.

FCO/Trustees Approval

FCO approval date: March 29, 2016	ARC approval date: June 17, 2016	Trustees approval date: December 4, 2018
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Comments:

Acronym List

Abbreviation	Meaning	Abbreviation	Meaning
BMAP	Basin Management Action Plan	MCAVA	Marion County Aquifer Vulnerability Assessment
BMP	Best Management Practice	MFL	Minimum Flows and Levels
C	Centigrade	MGD	Million Gallons Per Day
CFS	Cubic Feet Per Second	NERR	National Estuarine Research Reserve
CSO	Citizen Support Organization	NOAA	National Oceanic and Atmospheric Administration
DEP	Florida Department of Environmental Protection	OFW	Outstanding Florida Water
DNR	Florida Department of Natural Resources	OPS	Other Personal Services
DO	Dissolved Oxygen	ORAP	Oklawaha River Aquatic Preserve
F	Fahrenheit	PLRG	Pollutant Loading Reduction Goal
F.A.C.	Florida Administrative Code	RSAP	Rainbow Springs Aquatic Preserve
F.A.R.	Florida Administrative Register	RSSP	Rainbow Springs State Park
FCO	Florida Coastal Office	S	State
FNAI	Florida Natural Areas Inventory	SAV	Submerged Aquatic Vegetation
FTE	Full Time Equivalent	SNAP	Statewide Nuisance Alligator Program
FWC	Florida Fish and Wildlife Conservation Commission	SWFWMD	Southwest Florida Water Management District
F.S.	Florida Statutes	SWIM	Surface Water Improvement and Management
G	Global	TMDL	Total Maximum Daily Load
IPMS	FWC Invasive Plant Management Section	USGS	United States Geological Survey
		WBID	Waterbody Identification (number)

Table of Contents

Part I / Basis for Management

Chapter 1 / Introduction	1
1.1 / Management Plan Purpose and Scope	2
1.2 / Public Involvement	3
Chapter 2 / The Florida Department of Environmental Protection’s Florida Coastal Office	5
2.1 / Introduction	5
2.2 / Management Authority	6
2.3 / Statutory Authority	7
2.4 / Administrative Rules	7
Chapter 3 / The Rainbow Springs Aquatic Preserve	9
3.1 / Historical Background	9
3.2 / General Description	10
3.3 / Resource Description	12
3.4 / Values	27
3.5 / Citizen Support Organizations	27
3.6 / Adjacent Public Lands and Designated Resources	28
3.7 / Surrounding Land Use	30

Part II / Management Programs and Issues

Chapter 4 / The Rainbow Springs Aquatic Preserve’s Management Programs & Issues	31
4.1 / The Ecosystem Science Management Program	32
4.1.1 / Background of Ecosystem Science at Rainbow Springs Aquatic Preserve	32
4.1.2 / Current Status of Ecosystem Science at Rainbow Springs Aquatic Preserve	34
4.1.3 / Ecosystem Science Issue	42
Issue 1 / Water Quality	42
4.2 / The Resource Management Program	43
4.2.1 / Background of Resource Management at Rainbow Springs Aquatic Preserve	43
4.2.2 / Current Status of Resource Management at Rainbow Springs Aquatic Preserve	44
4.2.3 / Resource Management Issue	49
Issue 2 / Wildlife Protection and Habitat Restoration	49
4.3 / The Education and Outreach Management Program	50
4.3.1 / Background of Education and Outreach at Rainbow Springs Aquatic Preserve	50
4.3.2 / Current Status of Education and Outreach Rainbow Springs Aquatic Preserve	50
4.4 / The Public Use Management Program	51
4.4.1 / Background of Public Use at Rainbow Springs Aquatic Preserve	51
4.4.2 / Current Status of Public Use at Rainbow Springs Aquatic Preserve	52
4.4.3 / Public Use Issue	53
Issue 3 / Sustainable Public Use	53

Part III / Additional Plans

Chapter 5 / Administrative Plan	55
Chapter 6 / Facilities Plan	57

List of Maps

Map 1 / Florida Coastal Office system	2
Map 2 / Rainbow Springs Aquatic Preserve	11
Map 3 / Florida Aquifer Vulnerability Assessment	13
Map 4 / Marion County Aquifer Vulnerability Assessment	14
Map 5 / Stratigraphic geology of Rainbow Springs Aquatic Preserve	15
Map 6 / Soils of Rainbow Springs Aquatic Preserve	15
Map 7 / Springs of Rainbow Springs Aquatic Preserve	16
Map 8 / Springshed and drainage basin boundaries for Rainbow Springs Aquatic Preserve	17
Map 9 / Rainbow Springs Aquatic Preserve Florida Natural Areas Inventory natural communities	18
Map 10 / Non-native invasive plant distribution in Rainbow Springs Aquatic Preserve	23

Map 11 / Adjacent conservation lands of Rainbow Springs Aquatic Preserve.	28
Map 12 / Florida Forever proposed acquisitions near Rainbow Springs Aquatic Preserve.	28
Map 13 / Land use surrounding Rainbow Springs Aquatic Preserve.	29
Map 14 / Land use within the springshed of Rainbow Springs Aquatic Preserve.	29
Map 15 / Surface water quality monitoring stations in Rainbow Springs Aquatic Preserve.	38
Map 16 / Wells sampled within the Rainbow Springs Aquatic Preserve springshed.	38
Map 17 / Flow monitoring stations near Rainbow Springs Aquatic Preserve.	41
Map 18 / Sailfin catfish removal sites in Rainbow River, 2006.	48
Map 19 / Public access points of Rainbow Springs Aquatic Preserve.	52

List of Tables

Table 1 / Population estimates and projections, 2012-2040.	12
Table 2 / Florida Natural Areas Inventory natural communities of Rainbow Springs Aquatic Preserve. .	20
Table 3 / Archaeological sites within 2,500 feet of Rainbow Springs Aquatic Preserve.	25
Table 4 / Headsprings nitrate concentrations (surface water).	36
Table 5 / Spring vent nitrate graph 1994-2014.	40
Table 6 / USGS annual evapotranspiration / rainfall total.	40
Table 7 / Eurasian water milfoil removal.	46

List of Figures

Figure 1 / State management structure.	8
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List of Appendices

Appendix A / Legal Documents	60
A.1 / Aquatic Preserve Resolution	60
A.2 / Florida Statutes	61
A.3 / Florida Administrative Code	61
A.4 / Management Agreements	62
Memorandums of Understanding and Memorandums of Agreement	62
Appendix B / Resource Data	65
B.1 / Glossary of Terms	65
B.2 / References	66
B.3 / Species Lists	69
Documented Native Species	69
Potential Species	78
Listed Species	79
Invasive Non-native and/or Problem Species	80
B.4 / Arthropod Control Plans	81
Appendix C / Public Involvement	82
C.1 / Advisory Committee	82
List of Members and their Affiliations	82
Florida Administrative Register Posting	83
Meeting Summary	84
C.2 / Formal Public Meeting	87
Florida Administrative Register Posting	87
Advertisement Flyer	88
Newspaper Advertisement	89
Summary of the Formal Public Meeting	90
Appendix D / Goals, Objectives and Strategies	95
D.1 / Current Goals, Objectives and Strategies Budget Table	95
D.2 / Budget Summary Table	99
D.3 / Major Accomplishments Since the Approval of the Previous Plan	99
Appendix E / Other Requirements	101
E.1 / Acquisition and Restoration Council Management Plan Compliance Checklist	101
E.2 / Management Procedures for Archaeological and Historical Sites and Properties on State-Owned or Controlled Lands	107
E.3 / Letters of Compliance with County Comprehensive Plans	108
E.4 / Division of State Lands Management Plan Approval Letter	109



With increasing development, recreation and economic pressures, our aquatic resources have the potential to be significantly impacted, either directly or indirectly.

Part I

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, 3 National Estuarine Research Reserves (NERRs), a National Marine Sanctuary, the Coral Reef Conservation Program, the Florida Coastal Management Program, the Outer Continental Shelf Program, and the Florida Oceans and Coastal Council. 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 expansive 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.

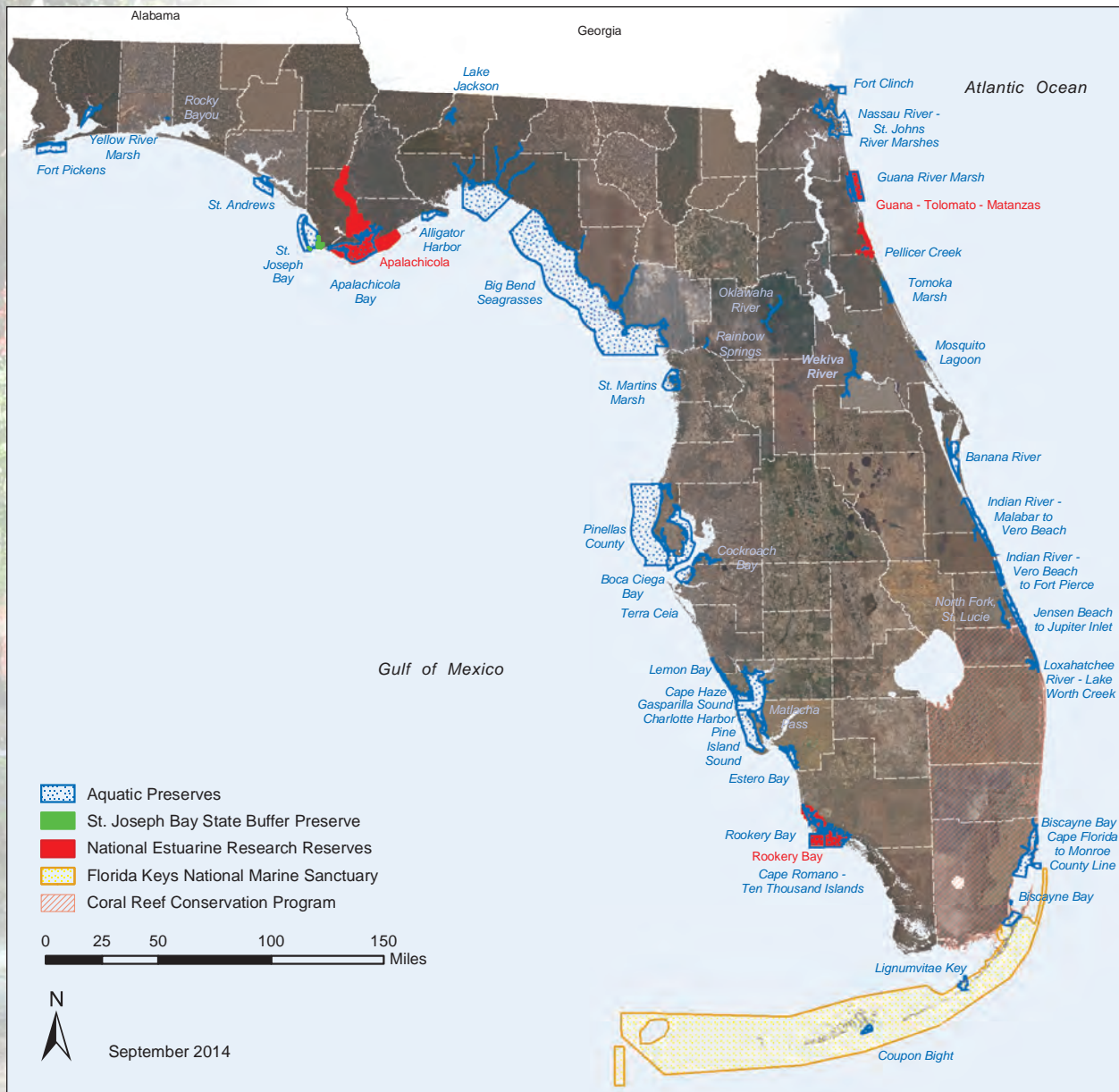
Title to submerged lands not conveyed to private landowners is held by the Board of Trustees of the Internal Improvement Trust Fund (the Trustees). The Governor and Cabinet, sitting as the Trustees, act as guardians for the people of the state of Florida (§253.03, Florida Statutes [F.S.]) and regulate the

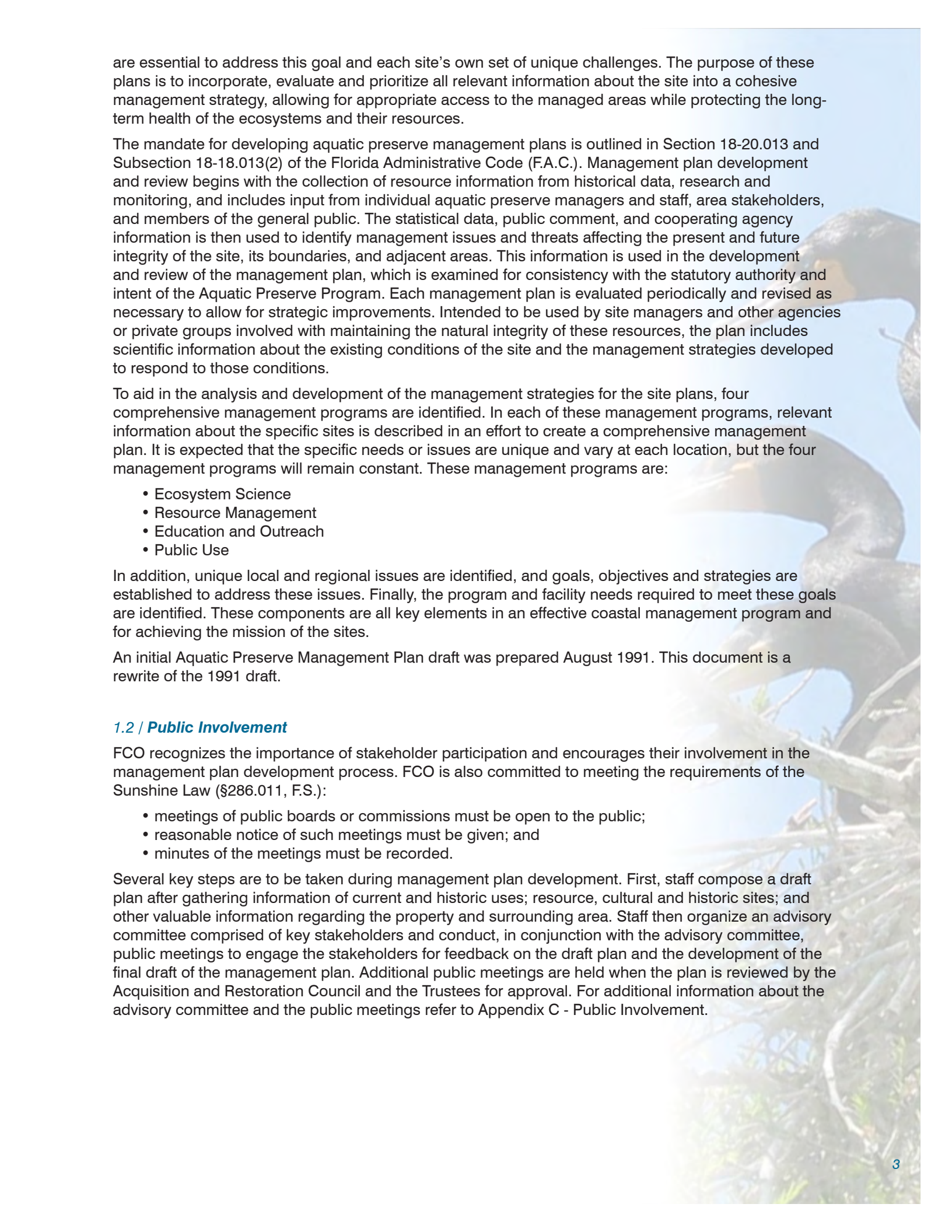
use of these public lands. Through statute, the Trustees have the authority to adopt rules related to the management of sovereignty submerged lands (Florida Aquatic Preserve Act of 1975, §258.36, F.S.). A higher layer of protection is afforded to aquatic preserves including areas of sovereignty lands 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.).

This 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

With increasing development, recreation and economic pressures, our aquatic resources have the potential to be significantly impacted, either directly or indirectly. These potential impacts to 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 aquatic preserve 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. This 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, four comprehensive management programs are identified. In each of these management programs, relevant information about the specific sites is described in an effort to create a comprehensive management plan. It is expected that the specific needs or issues are unique and vary at each location, but the four management programs will remain constant. These management programs are:

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

In addition, unique local and regional issues are identified, and goals, objectives and strategies are established to address these issues. Finally, the program and facility needs required to meet these goals are identified. These components are all key elements in an effective coastal management program and for achieving the mission of the sites.

An initial Aquatic Preserve Management Plan draft was prepared August 1991. This document is a rewrite of the 1991 draft.

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 the Sunshine Law (§286.011, F.S.):

- 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.



Largemouth bass is an important fish species for recreational fishing.

Chapter Two

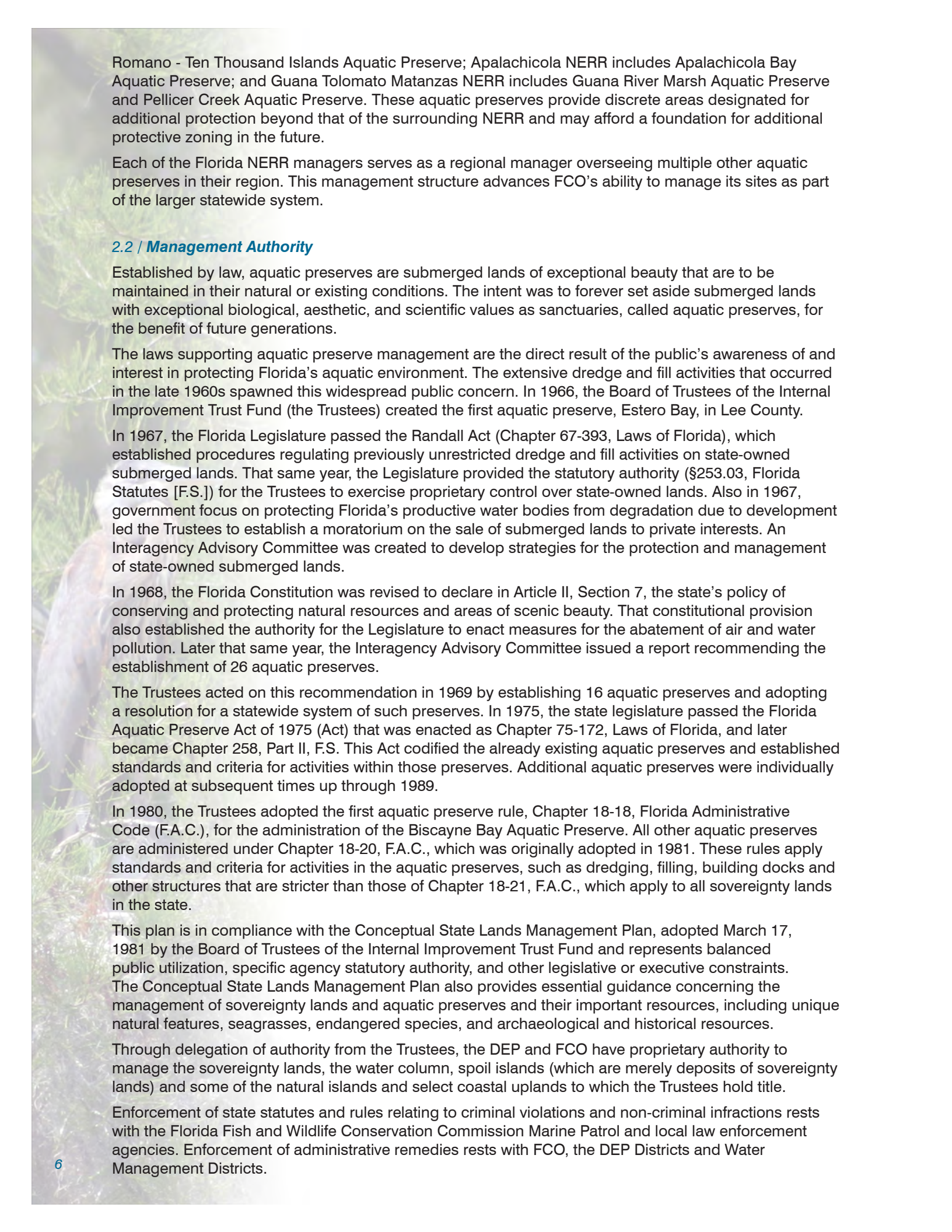
The Florida Department of Environmental Protection's Florida Coastal Office

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 Water Policy 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, 3 National Estuarine Research Reserves (NERRs), the Florida Keys National Marine Sanctuary 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.

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 submerged lands of exceptional beauty 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 (the Trustees) created the first aquatic preserve, 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 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 Marine Patrol 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 specifically 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. Aquatic preserve 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.

FCO staff comments, 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.

Many provisions of the Florida Statutes that empower non-FCO programs within DEP or other agencies may be important to the management of FCO sites. For example, Chapter 403, F.S., authorizes 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, F.A.C., should be read together with Chapter 18-18, F.A.C., or Chapter 18-20, F.A.C., to determine what activities are permissible within an aquatic preserve. If Chapter 18-18, F.A.C., or Chapter 18-20, F.A.C., are silent on an issue, Chapter 18-21, F.A.C., will control; if a conflict is perceived between the rules, the stricter standards of Chapter 18-18, F.A.C., or Chapter 18-20, F.A.C., supersede those of Chapter 18-21, F.A.C. Because Chapter 18-21, F.A.C. 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. “Activity,” in the context of the rule, 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.). To be authorized on sovereignty lands, activities must be not contrary to the public interest (Rule 18-21.004, F.A.C.).

Chapter 18-21, F.A.C., 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, it additionally 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, F.A.C. Chapter 18-18, F.A.C., is specific to the Biscayne Bay Aquatic Preserve and is more extensively described in that site’s management plan. Chapter 18-20, F.A.C., 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

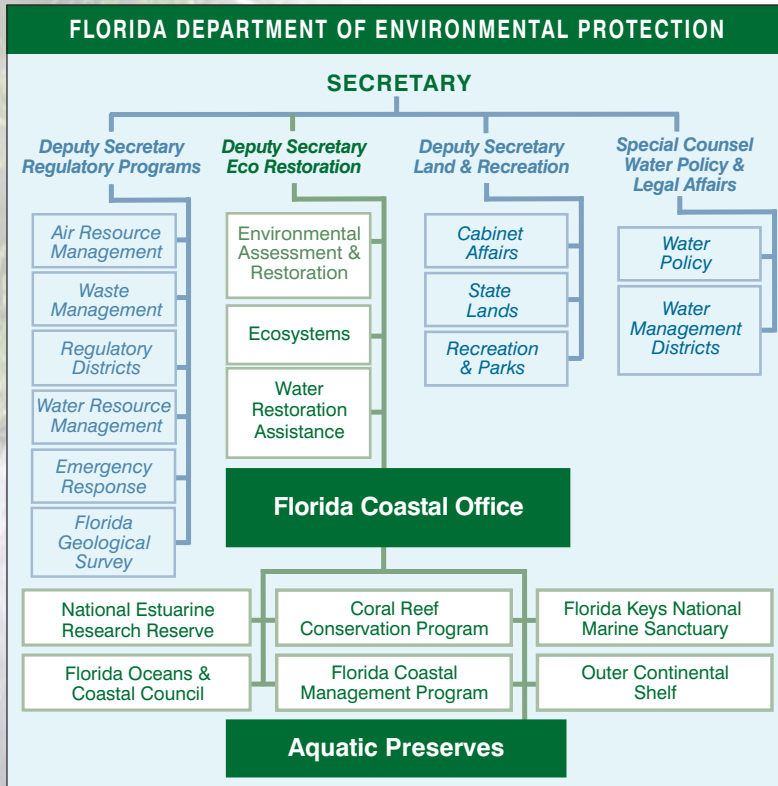


Figure 1 | State management structure.

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.

Chapter 18-20, F.A.C., 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.

As with statutes, 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 sites is so long as to be impractical to create within the context of this management plan.



Human activity in the Rainbow Springs dates back nearly 10,000 years, with Native Americans finding the environment highly attractive due to its abundance of fish, vegetation, and wildlife.

Chapter Three

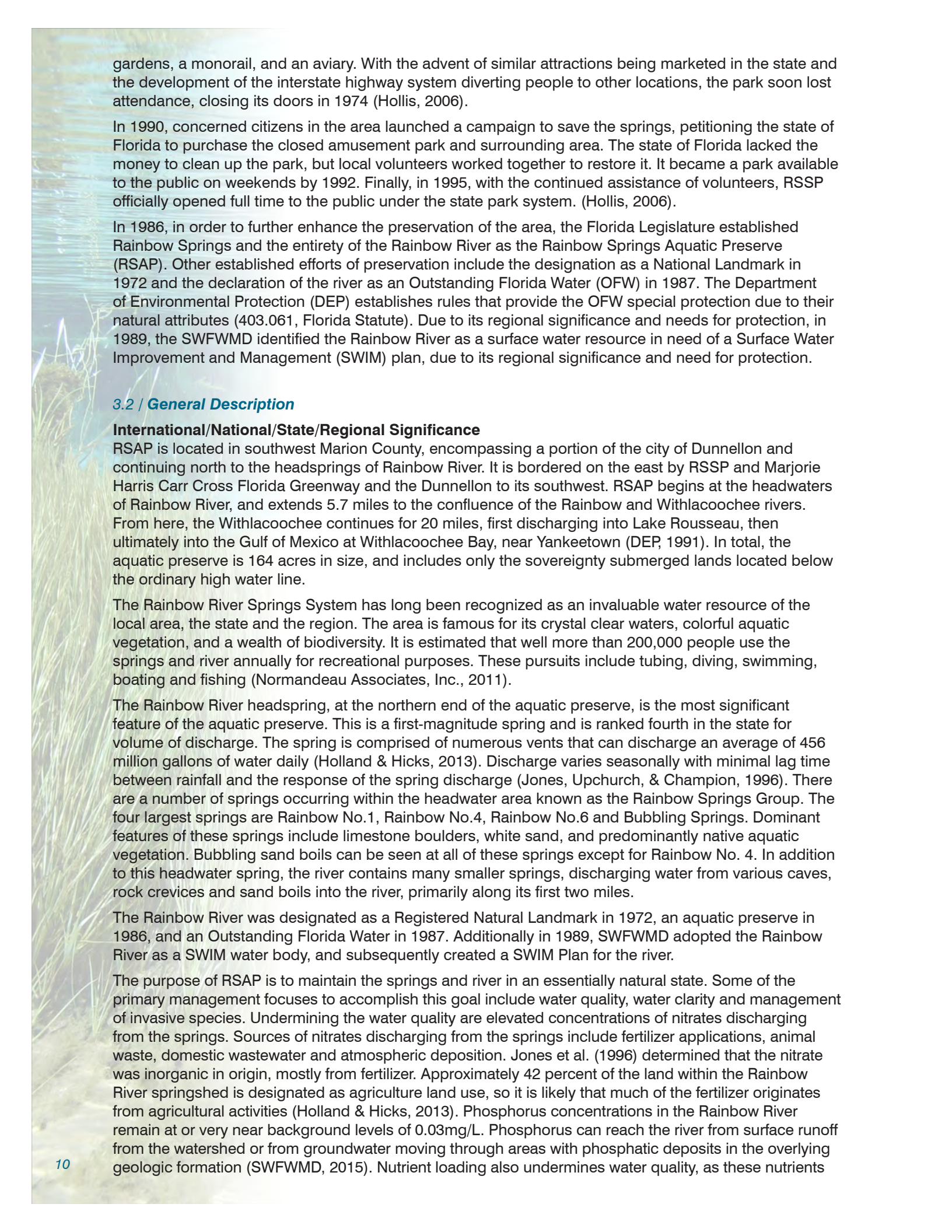
Rainbow Springs Aquatic Preserve

3.1 / Historical Background

Archeological discoveries of mastodon and mammoth fossils illustrate the long and rich history of the ecosystem of Rainbow Springs. Human activity in the Rainbow Springs area dates back nearly 10,000 years, with Native Americans finding the river and the surrounding environment highly attractive due to its abundance of fish, vegetation, and wildlife. Seminole Indians originally named the spring and river Wekiwa Creek (Florida Department of Environmental Protection [DEP], 2002).

Americans of European descent first settled in the region around 1854. Around this time the springs would be known as Blue Springs and the river Blue Run. By the 1880s, much of the area surrounding the river had been logged and converted to citrus farms (Southwest Florida Water Management District [SWFWMD], 2004). The popularity of the area rose substantially around 1890 due to the discovery of hard rock phosphate, nicknamed “white gold.” This led to the construction of mines, many dug by hand, along the banks of the river. The boom gave rise to the foundation of two towns: Dunnellon and Juliette. Although the town of Juliette would later fade away, with its land now part of the Rainbow Springs State Park (RSSP), Dunnellon continues on as an iconic historical town of Florida. Once being declared the richest phosphate deposits in the world, the phosphate industry would decline by World War I when pebble rock phosphate was discovered in Hillsborough and Polk counties. The last of the phosphate mines along the banks of the Rainbow River ceased operation in 1966 (SWFWMD, 2004). In addition to the old mine pits, other artifacts can still be seen, such as the pilings that supported cable-driven mine cars.

The second boom came in the 1930s, when the area followed a path similar to the rest of Florida with the rise of tourism. Along with a name change from Blue Springs and Blue Run to “Rainbow Springs” for marketing purposes, an amusement park brought in thousands of visitors to the area to enjoy the spring’s breathtaking environment, with pristine, clear waters and plentiful biodiversity. The private, family-owned amusement park offered a variety of attractions, including “submarine tours”, waterfalls,



gardens, a monorail, and an aviary. With the advent of similar attractions being marketed in the state and the development of the interstate highway system diverting people to other locations, the park soon lost attendance, closing its doors in 1974 (Hollis, 2006).

In 1990, concerned citizens in the area launched a campaign to save the springs, petitioning the state of Florida to purchase the closed amusement park and surrounding area. The state of Florida lacked the money to clean up the park, but local volunteers worked together to restore it. It became a park available to the public on weekends by 1992. Finally, in 1995, with the continued assistance of volunteers, RSSP officially opened full time to the public under the state park system. (Hollis, 2006).

In 1986, in order to further enhance the preservation of the area, the Florida Legislature established Rainbow Springs and the entirety of the Rainbow River as the Rainbow Springs Aquatic Preserve (RSAP). Other established efforts of preservation include the designation as a National Landmark in 1972 and the declaration of the river as an Outstanding Florida Water (OFW) in 1987. The Department of Environmental Protection (DEP) establishes rules that provide the OFW special protection due to their natural attributes (403.061, Florida Statute). Due to its regional significance and needs for protection, in 1989, the SWFWMD identified the Rainbow River as a surface water resource in need of a Surface Water Improvement and Management (SWIM) plan, due to its regional significance and need for protection.

3.2 / General Description

International/National/State/Regional Significance

RSAP is located in southwest Marion County, encompassing a portion of the city of Dunnellon and continuing north to the headsprings of Rainbow River. It is bordered on the east by RSSP and Marjorie Harris Carr Cross Florida Greenway and the Dunnellon to its southwest. RSAP begins at the headwaters of Rainbow River, and extends 5.7 miles to the confluence of the Rainbow and Withlacoochee rivers. From here, the Withlacoochee continues for 20 miles, first discharging into Lake Rousseau, then ultimately into the Gulf of Mexico at Withlacoochee Bay, near Yankeetown (DEP, 1991). In total, the aquatic preserve is 164 acres in size, and includes only the sovereignty submerged lands located below the ordinary high water line.

The Rainbow River Springs System has long been recognized as an invaluable water resource of the local area, the state and the region. The area is famous for its crystal clear waters, colorful aquatic vegetation, and a wealth of biodiversity. It is estimated that well more than 200,000 people use the springs and river annually for recreational purposes. These pursuits include tubing, diving, swimming, boating and fishing (Normandeau Associates, Inc., 2011).

The Rainbow River headspring, at the northern end of the aquatic preserve, is the most significant feature of the aquatic preserve. This is a first-magnitude spring and is ranked fourth in the state for volume of discharge. The spring is comprised of numerous vents that can discharge an average of 456 million gallons of water daily (Holland & Hicks, 2013). Discharge varies seasonally with minimal lag time between rainfall and the response of the spring discharge (Jones, Upchurch, & Champion, 1996). There are a number of springs occurring within the headwater area known as the Rainbow Springs Group. The four largest springs are Rainbow No.1, Rainbow No.4, Rainbow No.6 and Bubbling Springs. Dominant features of these springs include limestone boulders, white sand, and predominantly native aquatic vegetation. Bubbling sand boils can be seen at all of these springs except for Rainbow No. 4. In addition to this headwater spring, the river contains many smaller springs, discharging water from various caves, rock crevices and sand boils into the river, primarily along its first two miles.

The Rainbow River was designated as a Registered Natural Landmark in 1972, an aquatic preserve in 1986, and an Outstanding Florida Water in 1987. Additionally in 1989, SWFWMD adopted the Rainbow River as a SWIM water body, and subsequently created a SWIM Plan for the river.

The purpose of RSAP is to maintain the springs and river in an essentially natural state. Some of the primary management focuses to accomplish this goal include water quality, water clarity and management of invasive species. Undermining the water quality are elevated concentrations of nitrates discharging from the springs. Sources of nitrates discharging from the springs include fertilizer applications, animal waste, domestic wastewater and atmospheric deposition. Jones et al. (1996) determined that the nitrate was inorganic in origin, mostly from fertilizer. Approximately 42 percent of the land within the Rainbow River springshed is designated as agriculture land use, so it is likely that much of the fertilizer originates from agricultural activities (Holland & Hicks, 2013). Phosphorus concentrations in the Rainbow River remain at or very near background levels of 0.03mg/L. Phosphorus can reach the river from surface runoff from the watershed or from groundwater moving through areas with phosphatic deposits in the overlying geologic formation (SWFWMD, 2015). Nutrient loading also undermines water quality, as these nutrients

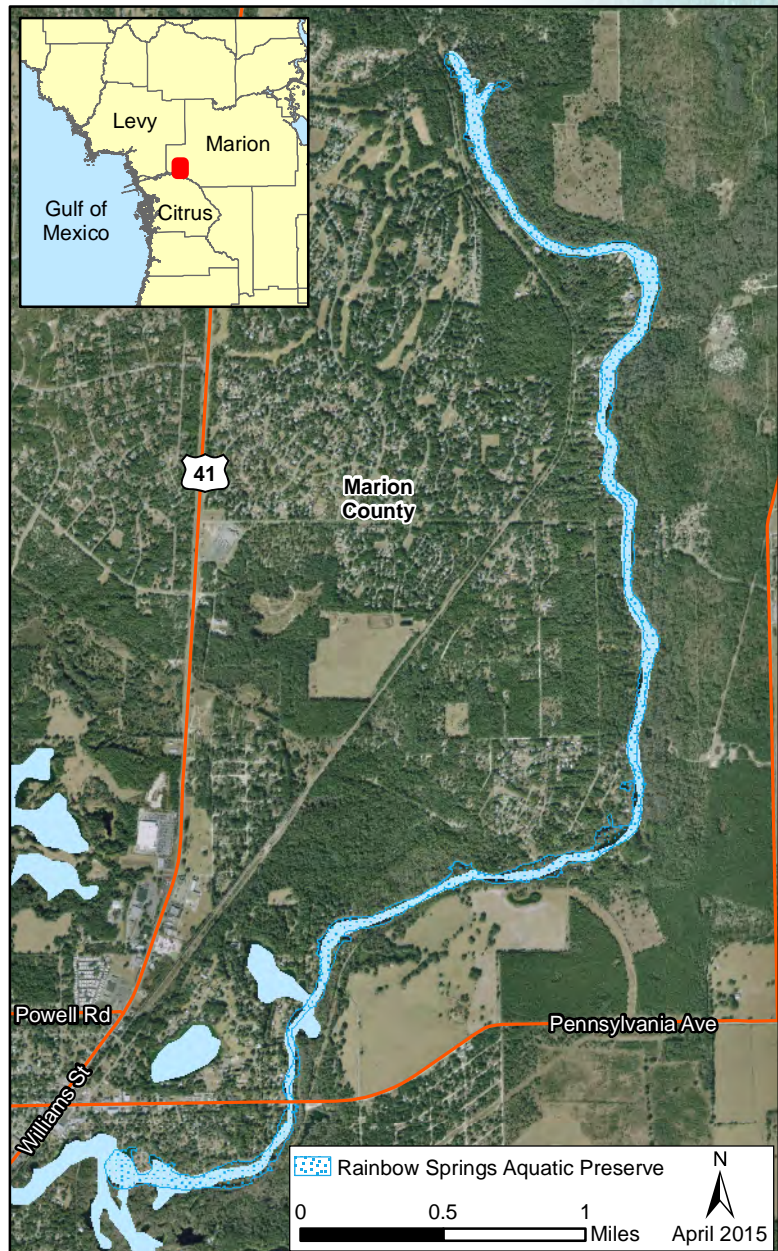
fuel the growth of chlorophyll-producing organisms. An increase in phytoplankton has contributed to a decrease in transparency, which has had an impact on rooted aquatic vegetation.

Finally, the Rainbow River and surrounding watershed includes several species of non-native invasive plants. These species include camphor tree (*Cinnamomum camphora*), cogon grass (*Imperata cylindrica*), air potato (*Dioscorea bulbifera*), coral ardisia (*Ardisia crenata*), skunk vine (*Paederia foetida*), Japanese honeysuckle (*Lonicera japonica*), chinaberry (*Melia azedarach*), lantana (*Lantana camara*), Japanese climbing fern (*Lygodium japonicum*), Chinese tallow, (*Sapium sebiferum*), torpedo grass (*Panicum repens*), water trumpet (*Cryptocoryne* spp.), water-lettuce (*Pistia stratiotes*), hydrilla (*Hydrilla verticillata*), and wild taro (*Colocasia esculenta*). Invasive plant removal is vital to prevent the loss of natural communities in the aquatic preserve and to permit the reestablishment of native species, on which the wildlife of the Rainbow River Corridor depends. Several areas may benefit from native vegetation restoration. Aquatic plant management on Rainbow River is conducted during the winter months by SWFWMD when recreational use is low. There are no swimming restrictions associated with the herbicides used, but concerns regarding herbicides always exist. Florida Fish and Wildlife Conservation Commission (FWC) Aquatic Plant Management permits are available to property owners for removal of invasive exotic plants, like hydrilla and water-lettuce. The removal of the noxious filamentous algae, *Lyngbya*, is also permitted. Year-round removal of these plants by homeowners allows unrestricted access for water activities.

Location/Boundaries

RSAP is located in central Florida, within the southwest corner of Marion County and is bordered to the south by Citrus County. The southernmost portion of the aquatic preserve lies within the city limits of Dunnellon, while the remainder lies outside of the city limits. Residential housing borders the majority of river just beyond its left bank. The aquatic preserve is about 20 miles southwest of Ocala, 100 miles northwest of Orlando and 100 miles north of the Tampa-St Petersburg area.

RSAP is surrounded and accessible by several highways and local roads. The aquatic preserve is bisected in the southern portion and accessible from the east by Southwest County Highway 484. This highway becomes East Pennsylvania Avenue once it enters the city limits of Dunnellon. This highway then becomes County Road 40/Cedar Street/West Highway 40, and the aquatic preserve is thus accessible from the west by this road. The aquatic preserve can be accessed from the southwest and northwest by U.S. Highway 41. The aquatic preserve is also accessible from the northwest by Southwest 190th Avenue Road, which along with U.S. Highway 41, parallels much of the length of the Rainbow River. The river itself is accessible to citizens at several points along the river. These include boat ramps located within RSSP



Map 2 | Rainbow Springs Aquatic Preserve.

and K.P. Hole County Park. Access to swimmers can also be found in Dunnellon City Park and Blue Run Park. There is also a tubing exit point and kayaking launch in Blue Run Park.

The main landmark in the area is RSSP, at the northern edge of the aquatic preserve. There is also K.P. Hole County Park, a small park in the northern section of the aquatic preserve, well south of the headsprings. The entry to this park is framed by stately live oaks draped with Spanish moss. The main water bodies in the area are the Withlacoochee River to the south, and Lake Rousseau located on the Withlacoochee to the southwest. These waterbodies empty into Withlacoochee Bay in the Gulf of Mexico, approximately 20 miles west of Rainbow River.

3.3 / Resource Description

Surrounding Population Data and Future Projected Changes

The majority of the Rainbow River springshed lies within Marion County, which in 2014 had an estimated population of 339,367 with a density of 214 persons per square mile and 164,037 housing units. Portions of the springshed extend into Levy and Alachua counties. The Levy County population was 39,613 with 35.4 persons per square mile. Alachua County’s population was 256,380 people with 293 persons per square mile and 113,371 housing units (U.S. Census Bureau, 2015).

From 2000-2010, Florida increased its population approximately 18 percent. Both Levy and Alachua counties were at or below this trend, with 13 percent for Alachua and 18 percent for Levy. Marion County, however, saw a 28 percent increase during this time period. Future projections show similar trends, with a 2040 medium projection increasing the Marion County population by almost half, the Levy County population by 38 percent, and the Alachua County population by 24 percent (University of Florida, 2013).

As population increases in the coming decades, more land will transition from agricultural to residential, commercial, and transportation uses (Water Resource Associates, Inc. and Sdii Global Corporation, 2005). These land use changes along with an abundant increase in population size will present greater challenges to the aquatic preserve with increased pollution from fertilizers and wastewater disposal. These changes, if not properly managed, may continue to degrade water quality (Water Resources Associates, Inc. and Sdii Global Corporation, 2005).

County/ State	04/01/2012	2015	2020	2025	2030	2035	2040	% Change from 2012 to 2040
Marion	332,989	350,000	384,700	417,200	447,200	474,000	497,500	49.4%
Levy	40,339	41,700	44,400	47,100	49,900	52,700	55,500	37.6%
Alachua	246,770	252,900	265,800	277,600	287,900	297,000	305,400	23.8%
Florida	19,074,434	19,750,600	21,141,300	22,434,000	23,601,100	24,639,500	25,583,200	34.1%

Table 1 | Population estimates and projections, 2012-2040. (University of Florida, 2013)

Topography and Geomorphology

Florida has very little topographical variation because of its relatively recent rise from the sea and lack of significant tectonic deformation (Bryan, Scott, & Means, 2008). The rise and fall of sea level, however, has shaped and reshaped peninsular Florida by alternately depositing and scouring sediments resulting in a succession of generally north to south parallel dunes and valleys.

Elevations of RSAP range from 30 feet above sea level in the interior portions of the aquatic preserve, close to the banks of the Rainbow River, up to 100 feet above sea level in the surrounding areas. There are also some outlying depressions as well. The majority of the aquatic preserve is in the Dunnellon Gap physiographic province, while the upper portion extends into the Western Valley. The northern portion of the river borders on Brooksville Ridge, jutting into Brooksville Ridge at two locations (Brooks, 1981).

The Rainbow River lies within the Withlacoochee River’s drainage basin, which has a drainage area of approximately 2,300 square miles (DEP, 1991). This drainage basin lies within the Ocala Uplift, a geologic feature composed of limestone which is an important aspect in spring formation. Generally referred to as karst topography, this limestone layer is prevalent throughout Marion County, and in many instances, becomes exposed at the surface of the larger spring vents. Additionally, the majority of soil running adjacent to the Rainbow River is either very poorly drained or somewhat poorly drained (City of Dunnellon, 2009). However, looking just beyond the banks of the river, most of the remaining land within the drainage basin of the aquatic preserve is either well drained or excessively drained.

The Rainbow River is narrow and winding, with an average depth of two to eight feet and an average width of 150 feet. The headwaters are composed of a 250 foot diameter, semicircular spring pool with four main boils. In the headspring area the two deepest vents are 11.6 feet and 14.2 feet deep. This spring group combines with numerous other vents and sand boils in the first 3,000 yards downstream, including the flow from Indian Creek on the eastern side of the river (DEP, 1991).

Rainbow Springs, like most of the large springs in Florida, is artesian, meaning that it issues from a breach in the sediments that confine water under pressure in the aquifer. This complex system of underlying fractures and solution channels are comprised of limestone and dolomite, typical of Florida's karst topography. Limestone surfaces along the first mile of the river form an almost solid limestone floor in some places. Approximately 2.5 miles further downstream, an unusual area called "the Narrows" is characterized by many small and large boulders of lime rock. The river continues along a gently rolling topography with a predominant floodplain forest on the east bank. Eventually the water clarity diminishes as it flows into the naturally occurring "tea-colored" tannic waters of the Withlacoochee River (DEP, 1991).

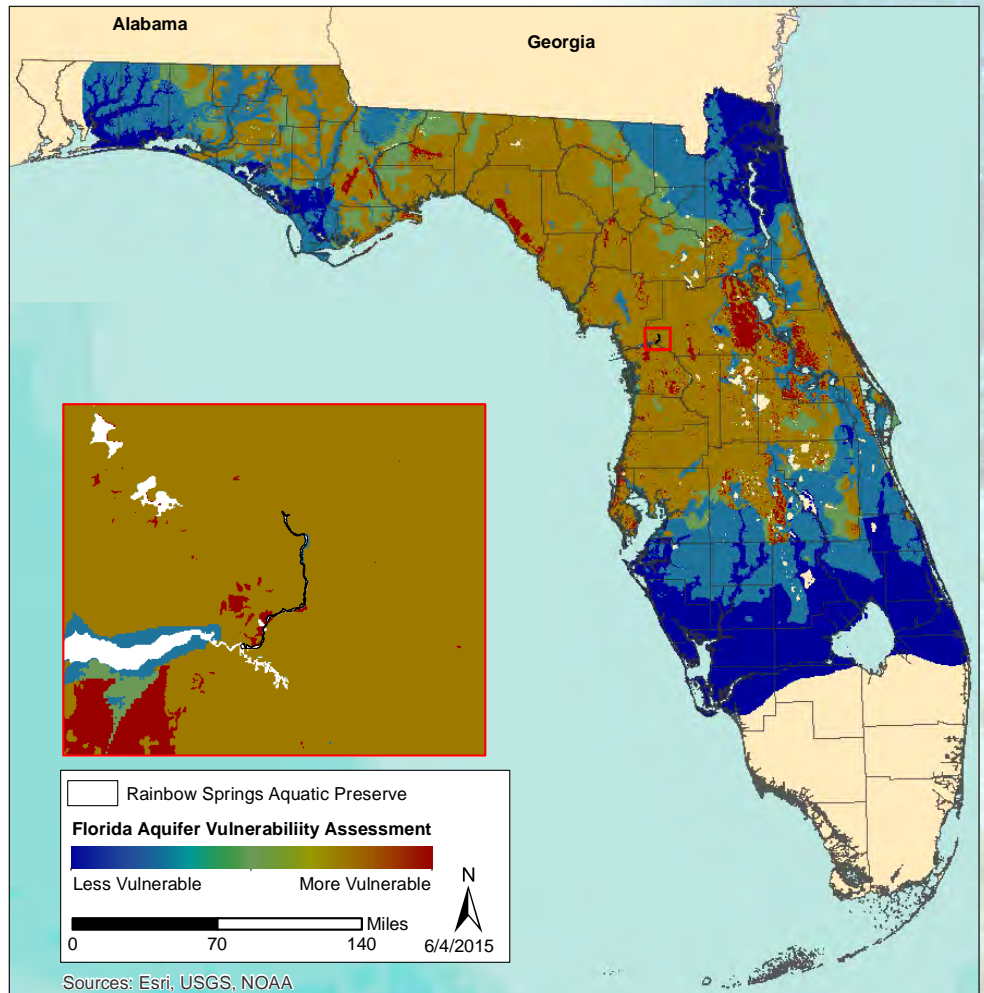
Aquifer Vulnerability

Ground water is one of the most important and sensitive components of Florida's ecosystems. Aquifer vulnerability is defined as: the tendency or likelihood for contaminants to reach the top of a specified aquifer system after introduction at the lands surface based on existing knowledge of natural hydrogeologic conditions (Arthur, Baker, Cichon, Wood, & Rudin, 2005). To better understand these functions, the Florida Geological Survey (FGS) developed a model to estimate aquifer vulnerability called the Florida Aquifer Vulnerability Assessment in 2005. The Florida Aquifer Vulnerability Assessment was developed to identify areas of relative aquifer vulnerability based only on natural properties of Florida's hydrogeology, excluding anthropogenic factors (Arthur et al., 2005) (Map 3).

A more refined aquifer vulnerability assessment was created for Marion County in 2007 - Marion County

Aquifer Vulnerability Assessment). The goal of the project was to identify areas of Marion County where the Floridan aquifer is more vulnerable to contamination from land surface activities as part of an overall strategy for ground water management (Advanced Geospatial Inc., 2007).

The rate that water moves through soil is a critical component of any aquifer vulnerability analysis, as soil is an aquifer system's first line of defense against potential contamination (Arthur et al., 2005). According to the National Soil Survey Handbook (U.S. Department of Agriculture, 2005), saturated hydraulic conductivity is defined as "the amount of water that would move vertically through a unit area of saturated soil in unit time under unit hydraulic gradient." Advanced Geospatial Inc. (2007) indicates that the soil hydraulic conductivity is high in southwest Marion County - between 20.00 and 34.95 inches/hour (Map 4).



Map 3 | Florida Aquifer Vulnerability Assessment.

Geology

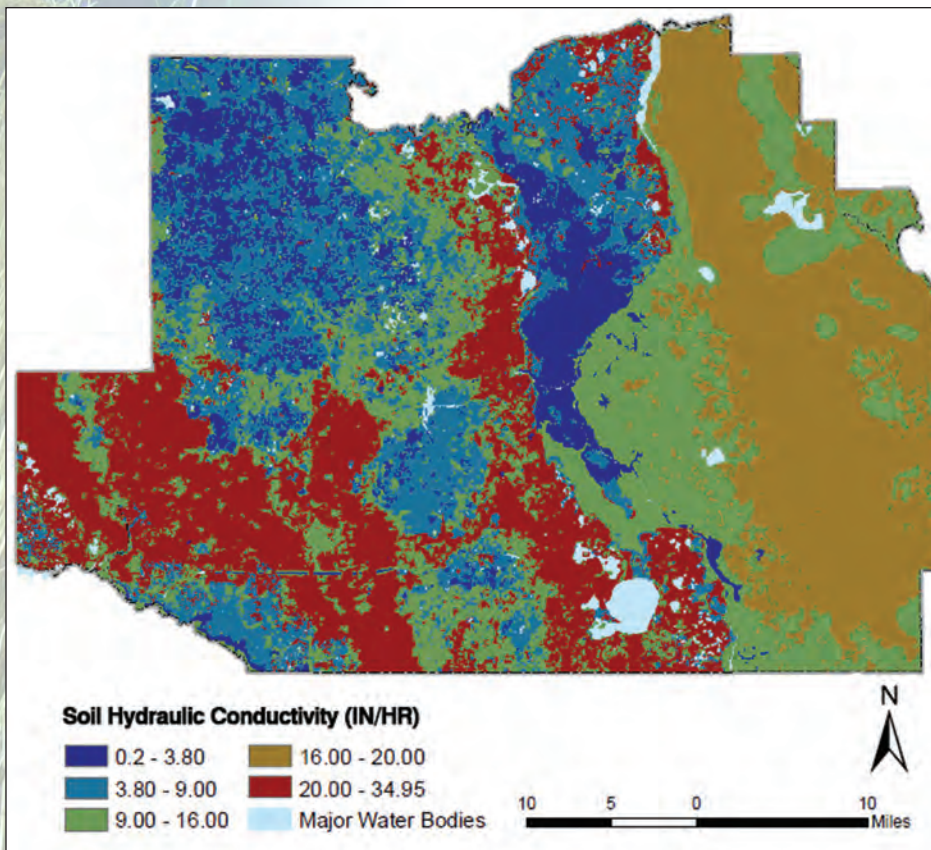
Recent geological eras have resulted in deposition of fossils and sediments. The bedrock forming what is now Florida separated from Africa and joined the North American continent in the Triassic period (250 to 200 million years ago). All exposed rock in Florida is the result of sediments (fragments of rocks, minerals, fossils, or organic particles) “glued” together by a variety of natural cements (such as calcium carbonate) in water percolating through the sediments (DEP, 2012a).

According to the physiographic classification system developed by Brooks (1981), RSAP lies within Ocala Uplift District of Florida. Early Tertiary limestones are at or near the surface in most places. Structurally, this is a broad uplift that occurred in Middle and Late Tertiary time (65 to 2.6 million years ago). The most distinctive features are the low rolling limestone plains, but the landscape is varied (Brooks, 1981).

The Ocala Uplift is a very important geologic feature in Florida. It runs parallel and west of Interstate 75 and is characterized by high, rolling hills. It is a major recharge zone for the Floridan aquifer and major discharge from the aquifer occurs from Rainbow Springs (The Amy H. Remley Foundation, 2013). The area is mostly devoid of surface water because much of it is diverted underground through all of the cracks and

caves below the surface. The water that falls along the uplift is quickly channeled underground and generally reappears to the west and to the east of the uplift (Florida Speleological Society, n.d.). The Ocala Uplift District is centrally located within the Floridan aquifer. It is considered part of the Upper Floridan section of the aquifer and consists of the Suwannee and Ocala Limestones and the upper portion of the Avon Park formation. This area is highly permeable and for the most part provides sufficient water volumes to the area (Haas, 2007).

The underlying geology of the area belongs to the Undifferentiated Sediments group of the Pleistocene/Holocene series (Maps 5 and 6). This series is characterized by undifferentiated sediments consisting of siliciclastics (made from broken parts of silica rocks), organics, and freshwater carbonates (USGS, 2001a). The geological unit



Map 4 | Marion County Aquifer Vulnerability Assessment.

description of Undifferentiated Sediments (Qu) combines components of Alluvium (Qal), Beach ridge and dune (Qbd), Trail Ridge sands (Qtr) (Scott, 2001). The categorizations within parenthesis are part of the United States Geological Survey (USGS) classification system. Each of the components is the Pleistocene Age (USGS, 2001b). The primary rock type in the Undifferentiated Sediments group is clay or mud. The secondary rock type is beach sand, and other rock types include silt, gravel, and peat. The Alluvium geological unit contains the primary rock alluvium, with the secondary rock type of clay or mud and other rock types of sand, silt, gravel, peat and biogenic sediment. The Beach Ridge and Dune geological unit contains the primary rock of beach sand with clay or mud as secondary rock types and silt as other. Finally, the Trail Ridge Sands geological unit has the primary rock type as sand with secondary rock type of clay or mud, and other as silt/gravel/peat (USGS, 2001b). The general thickness of the Undifferentiated Sediments group is a very shallow layer sitting on the surface of the earth. Beneath it lies the Ocala Limestone group, and beneath that is the Avon Park Formation (USGS, 2001b).

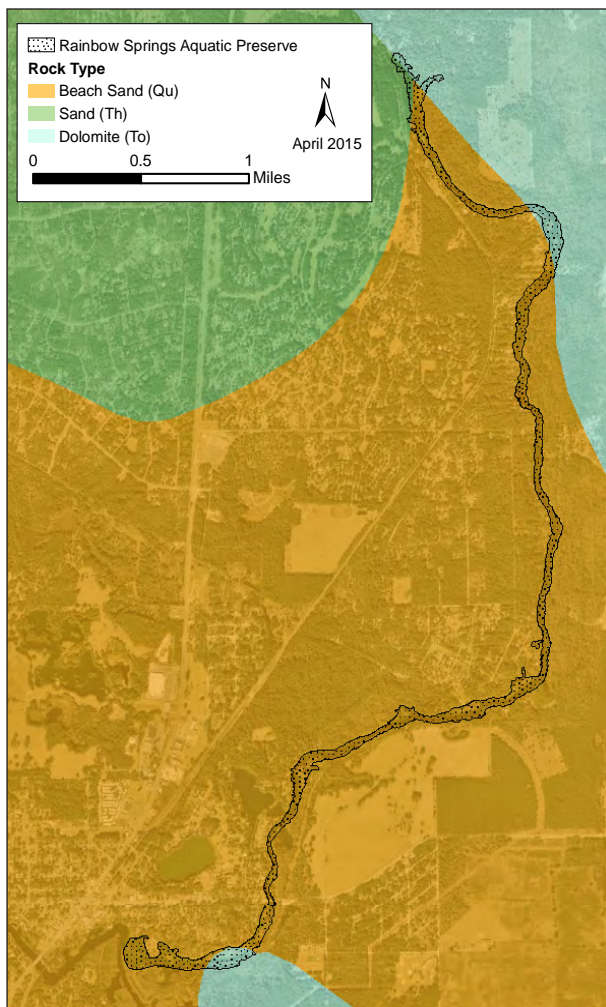
Immediately to the east of the aquatic preserve, and partly within is an Eocene series consisting of Ocala Limestone Group (To). The aquatic preserve ventures into this series at its very eastern, northern and southern tips. The Eocene epoch lasted from about 56 to 34 million years ago, and lies within the Paleogene Period. This Ocala Limestone consists of marine limestones and occasional dolostones (DEP, 2012a). Immediately to the northwest of the aquatic preserve is a Miocene series consisting of Hawthorn (Th) group geological formations. The aquatic preserve ventures into this series at its most northwestern edge. The Miocene epoch lasted from 23.03 to 5.33 million years ago, and lies within the Neogene Period (Cox & Moore, 1993).

Hydrology and Springshed

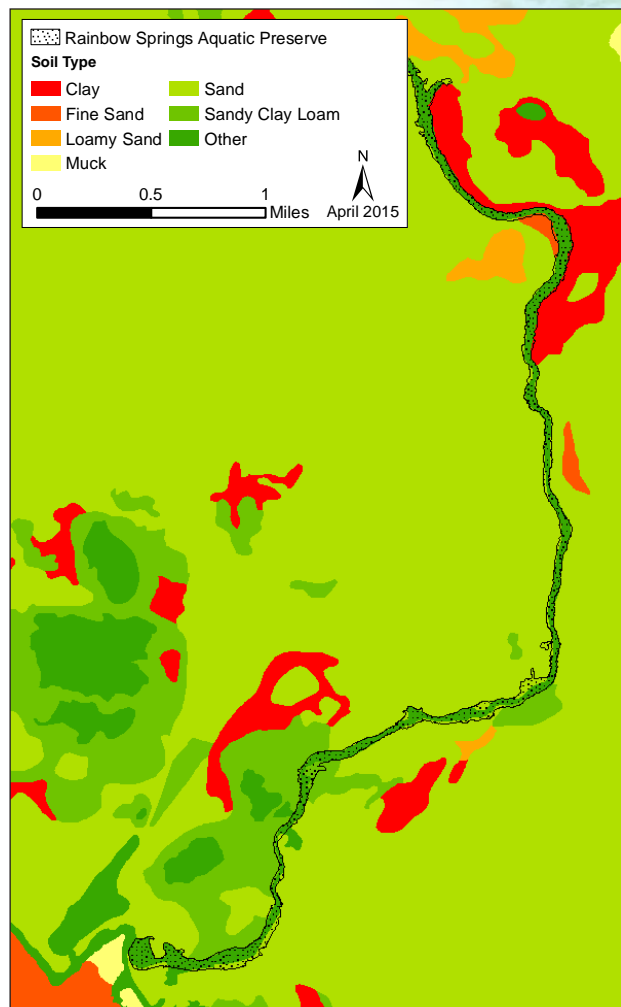
RSAP, fed by one of 33 first magnitude springs in Florida, is a spring-fed tributary that encompasses all 5.7 miles of Rainbow River. It empties into the Withlacoochee River just upstream of Lake Rousseau. Based on the amount of water discharge, it is Florida's fourth largest spring. Rainbow Springs is composed of multiple discharge vents located throughout the upper portion of the river.

The Rainbow Springs Group is made up of 11 named springs in the headsprings area, four named springs along the spring run and four springs on Indian Creek (Map 7), a tributary that joins the spring run from the northeast approximately one mile to the south of the headsprings area (Pandion Systems, Inc., 2009). The average water temperature is 72 degrees year around.

The Rainbow River watershed boundary - made up of the Blue Run and Rainbow River drainage basins (Map 8) - has an area of approximately 77 square miles (Holland & Hicks, 2013). Although an area's watershed typically plays a primary role in discharge rates, the Rainbow Springs watershed has little influence on the river's flow (SWFWMD, 2008). The vast majority of the river's recharge comes from the karst topography of the springshed, which covers an area of approximately 735 square miles, encompassing portions of Marion, Levy and Alachua counties. Approximately 98 percent of the water discharged from the Rainbow Springs Group and numerous vents along the Rainbow River is received



Map 5 / Stratigraphic geology of Rainbow Springs Aquatic Preserve.



Map 6 / Soils of Rainbow Springs Aquatic Preserve.

from groundwater sources within the springshed (SWFWMD, 2008). This springshed area is indefinite and dynamic, depending on precipitation and withdrawals. (Holland & Hicks, 2013).

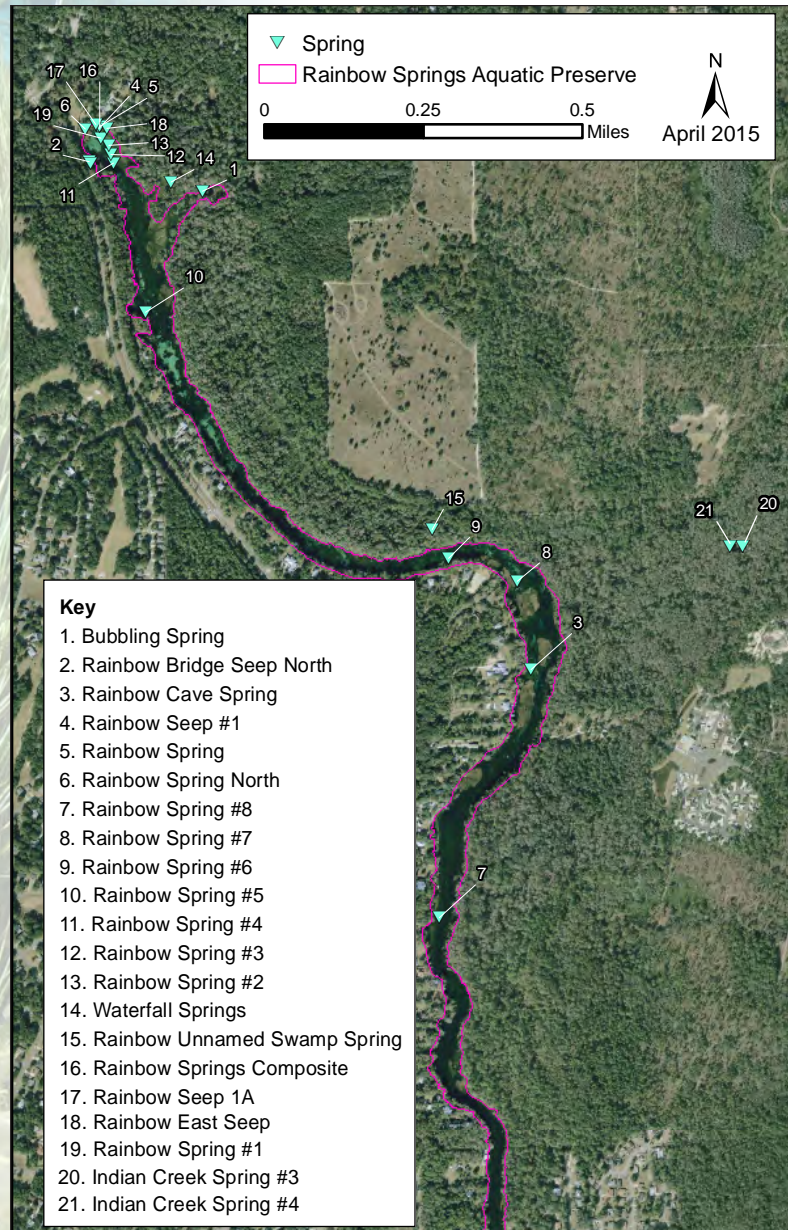
Historic discharge rates of the springs average 22 cubic meters per second or 493 million gallons of water per day (SWFWMD, 2004). Long-term discharge measurements indicate that flow has fluctuated between 386 and 1,060 cubic feet per second during the period from 1965 to 2012. It has been estimated that groundwater can take on average 30 years to reach spring vents from the recharge areas, but that recharge rate can be much faster due to fissures or channels in the limestone (SWFWMD, 2008). Due to the karst topography of the springshed creating high recharge rates for Rainbow Springs, the Rainbow River is tremendously vulnerable to nutrient loadings from nitrogen-laden fertilizers and wastewater pollutants used within the springshed area, which speaks to the importance of responsible development and management within the watershed and springshed.

Rainbow River discharge varies seasonally and has been shown to correlate directly with rainfall (Holland & Hicks, 2013). Long periods of drought or times of heavy rainfall can have a substantial effect on water levels. From 2005-2011 flows were generally below average, with a few high flow events occurring around 2005 (Atkins North America, Inc. & Debra Childs Woithe, Inc., 2012).

Historic Hydrologic Alterations

Located downstream of the Withlacoochee River is Lake Rousseau, a man-made reservoir built in the 1930s by the federal government. The Lake Rousseau Dam controls water levels in the Withlacoochee

and Rainbow rivers, altering their natural hydro-period (Downing, Flannery, Buickerood, Mann, & Matheison, 1989). The effects on water elevation are more prevalent in the lower third of the Rainbow River (SWFWMD, 2015). Other historic alterations include phosphate mining which began along Blue Run (Rainbow River) in late 1889 by the Marion Phosphate Company (Dinkins, 1968) as well as transportation bridges and rail lines during the phosphate mining period, reconnecting Blue Cove to the Rainbow River and various dredge and fill activity along the banks of the river.



Climate

The aquatic preserve is located in the humid sub-tropic climate zone. This zone is characterized by long, hot, humid summers and mild, dry winters, as well as ample precipitation. Most precipitation occurs as rainfall in the summer months. These conditions influence the aquatic preserve in several ways. Ultisols are the dominant soil type of this climatic region, and this red soil is less fertile because abundant summer rainfall leaches mineral nutrients from the topsoil.

The average annual temperature in Marion County is 69.3 degrees Fahrenheit (F) (Advameg, 2012). Occasional cold fronts may lower the temperature to 25 degrees F. For the month of January, the

average minimum monthly temperature for the county is 42.1 degrees F. February and March also have average minimum temperatures under 50 degrees F. The record low from 1893-2015 for the nearby city of Ocala was 11 degrees F set in 1981. For the months of June, July, and August, the average maximum monthly temperature for Ocala is 92 to 93 degrees F. The record high from 1893-2015 for Ocala was 105 degrees F set in 1933 (National Oceanic and Atmospheric Administration, 2015).

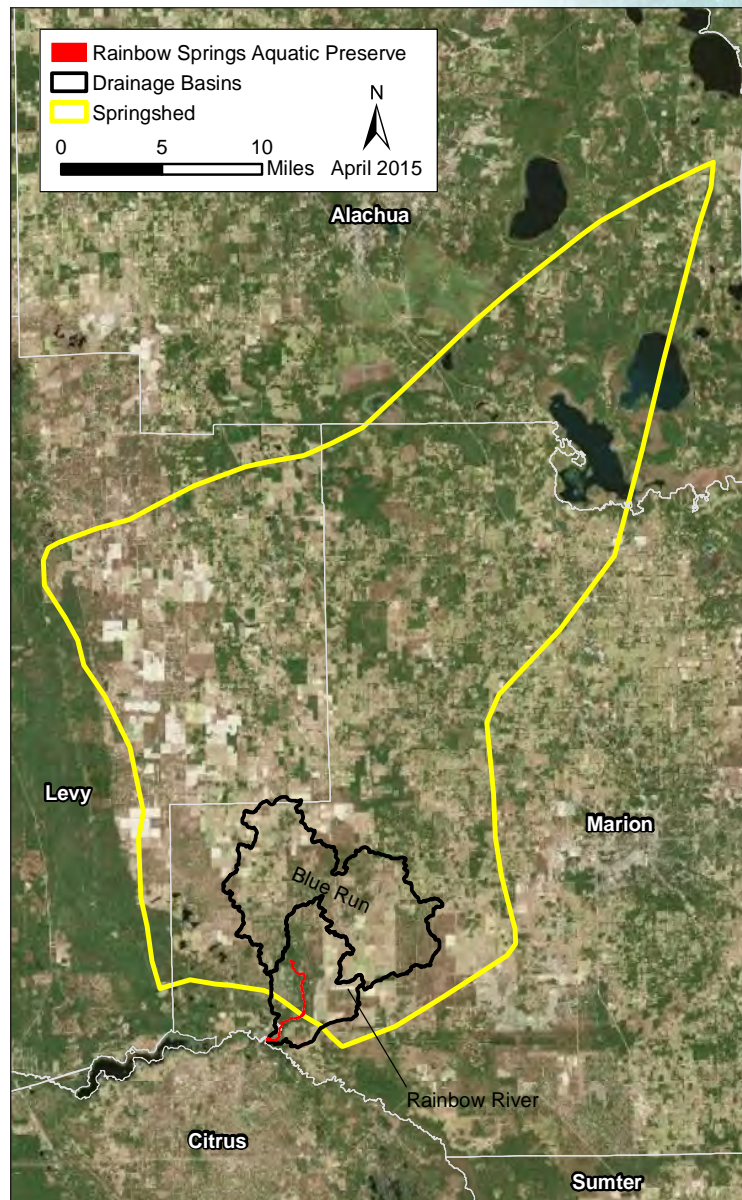
The average annual precipitation for the county is 51.12 inches. The heaviest rainfall months are the summer months of June-August, averaging 6.9 inches per month. The lowest rainfall months are the autumn months of October-December, with rainfall averaging 2.3-2.8 inches per month, as well as May, averaging 2.7 inches per month. November has the lowest annual rainfall, at 2.3 inches per month (World Media Group, LLC, 2013). The record rainfall in Marion County for any year on record was 74.71 inches in 1982, and April of 1982 was the wettest month on record, with 16.72 inches (Callahan, 2011).

The main factors influencing Florida's climate are latitude, land and water distribution, prevailing winds, pressure systems, ocean currents, and storms (Winsberg, 2006). Some of these storms include hurricanes and tornadoes. Historically speaking, Marion County had dodged hurricanes for about a century. That was until 2004, when two hurricanes, Frances and Jeanne, slammed the county just two weeks apart. Frances, which struck September 5, damaged 2,000 homes and caused \$20 million in damages (Callahan, 2011). Jeanne, which came two weeks later, did not damage as many homes or cause as much damage. Between 1957 and 2007, fifty-six tornadoes were documented in Marion County and only one in the Dunnellon area, a F1 (second weakest level of tornado, usually corresponding to moderate damage) occurred on September 15, 2004 (Tornado History Project, 2015).

Additionally, the county has more thunderstorms each year than most any other place in the United States, with about 90 thunderstorm days a year (Callahan, 2011). Most of these occur between June and October. Most of the storms form along the Interstate 75 corridor, a place where the Gulf of Mexico and Atlantic Ocean breezes collide, prompting the severe thunderstorms. The area between southern Marion County and Tampa is referred to as Lightning Alley, and receives more lightning strikes than anywhere else in the county, with roughly 37,000 strikes annually (Callahan, 2011). There are also occasional deep freezes, where the temperature dips into the mid-teens. During these freezes, most of the citrus trees north of Orlando die, and other flora suffers as well.

Natural Communities

The natural community classification system used in this plan was developed from the 2014 Cooperative Land Cover Map, which uses the Florida Land Cover Classification System, a hierarchical classification system developed by FWC. This system integrates both the Florida Natural Areas Inventory (FNAI) natural community classification and the Florida Land Use and Forms Classification System used by DEP and Florida's five water management districts. The Florida



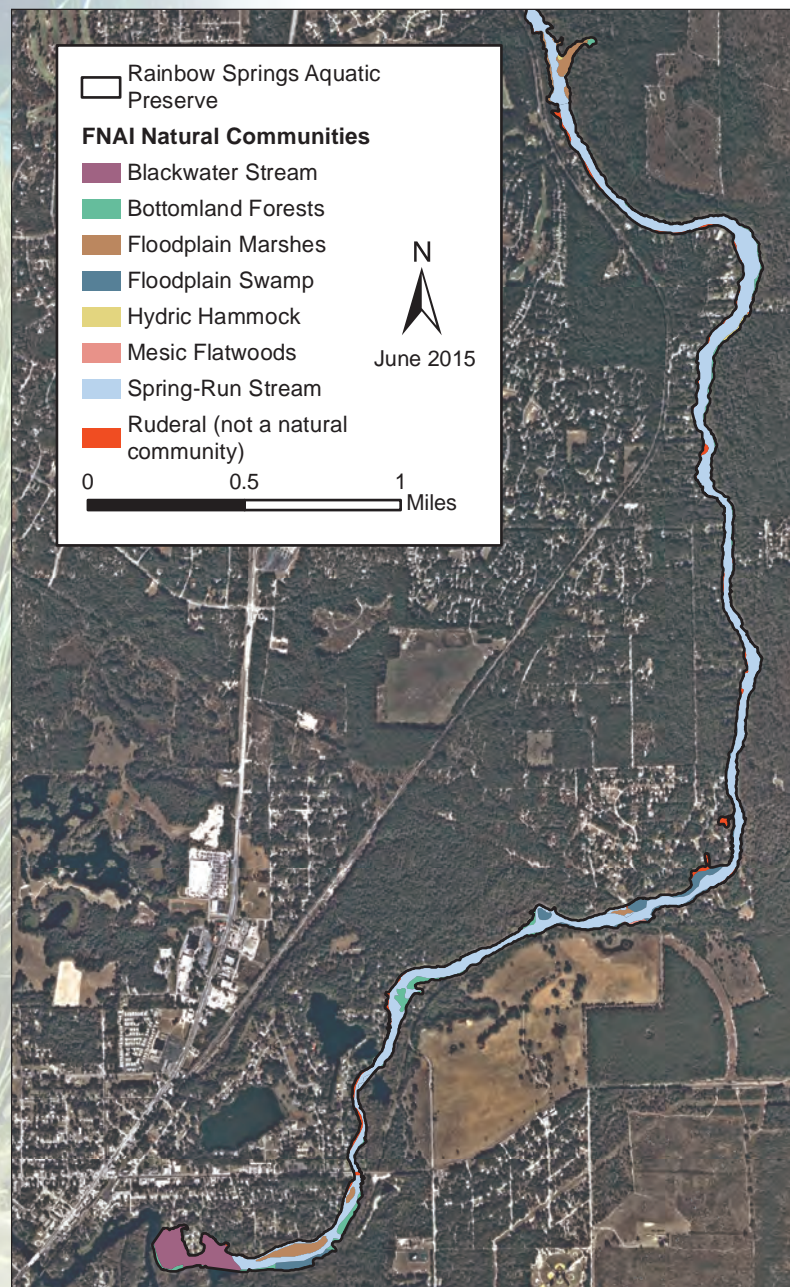
Map 8 | Springshed and drainage basin boundaries for Rainbow Springs Aquatic Preserve.

Land Cover Classification System is meant to provide a schema that is easily cross-walked between other classification systems, providing easier facilitation among varying entities (FWC, 2009).

This data is 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 RSAP have been adapted from the Guide to the Natural Communities of Florida (FNAI, 2010) and the Florida Land Cover Classification System Final Report (FWC, 2009). 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).

The majority of the aquatic preserve is made up of two natural communities: spring-run stream and blackwater stream (Map 9). The aquatic preserve also includes communities of hydric hammock, mesic flatwoods, and floodplain swamps.

Spring-run Streams - Perennial watercourse with deep aquifer headwaters and characterized by clear water, circumneutral pH and, frequently, a solid limestone bottom (FNAI, 2010).



The majority of the aquatic preserve is categorized as a spring-run stream. As noted in the hydrology section, Rainbow Springs' overwhelming majority of recharge comes from groundwater sources, through the artesian openings in the underground aquifer. Water from the springheads generally runs clear, with a temperature that averages around 72 degrees F.

Spring-run streams are among the most productive aquatic habitats (FNAI, 2010). A variety of species depend upon the aquatic vegetation near springs for shelter. The diversity of the spring-run stream may be reduced due to disturbances in water quality, concentrated human use, and by the proliferation of exotic species. These impacts can be difficult to control, and overuse can be likely to increase due to the limited number of publicly-owned springs and the desire for recreational activity (FNAI, 2010).

Rainbow Springs struggles with the intensity of recreational use it receives, especially in shallow depth areas which can be easily disturbed by boaters and swimmers. Motorized boats, excluding self-propelled canoes and kayaks, are prohibited in the first 1700 feet of the headsprings area for this reason. Although the removal of motorized vessels has benefited aquatic plant beds and improved water quality, designated swimming areas continue to have a dramatic impact on aquatic plant cover, uprooting native vegetation

Map 9 | Rainbow Springs Aquatic Preserve Florida Natural Areas Inventory natural communities.



Bubbling spring run in headspring area.

(DEP, 2002). Exotic species, such as hydrilla, may also benefit from increased recreational use, as they can outpace native vegetation growth or regrowth, and spread downstream due to human disturbance. Proper management of the spring-run stream is a delicate balance between appropriate recreational use and preservation (FNAI, 2010).

Blackwater Streams - Perennial or intermittent/seasonal watercourse characterized by tea-colored water with a high content of particulate and dissolved organic matter derived from drainage through swamps and marshes; generally lacking an alluvial floodplain (FNAI, 2010).

There is a small segment of blackwater stream in the lower portion of the Rainbow River. This segment stretches for the final quarter mile of the aquatic preserve, and forms the transition zone between the Rainbow and Withlacoochee rivers. It is bordered to the north by spring-run stream, to the north by ruderal land, and to the south by mixed wetland hardwood. This natural community is also in decline, with vegetation loss, and water quality and clarity issues.

The tea-colored waters of blackwater streams are laden with tannins, particulates, dissolved organic matter, and iron derived from drainage through swamps and marshes. Water temperatures may fluctuate substantially and are generally correlated with seasonal fluctuations in air temperature. The dark-colored water reduces light penetration and, thus, inhibits photosynthesis and the growth of submerged aquatic plants. Emergent and floating aquatic vegetation may occur along shallower and slower moving sections, but their presence is often reduced because of typically steep banks and considerable seasonal fluctuations in water level.

Vegetation found in this natural community includes smartweed (*Polygonum* spp.) and sedges (*Cyperus* spp.). Typical animals include longnose gar (*Lepisosteus osseus*), a variety of sunfish, snapping turtles, watersnakes, and American alligators (*Alligator mississippiensis*).

Blackwater streams have sandy bottoms overlain by organics and frequently underlain by limestone. Limestone outcroppings may also occur. Blackwater streams generally lack the continuous extensive floodplains and natural levees of alluvial streams. Instead, they typically have high, steep banks alternating with floodplain swamps. High banks confine water movement except during major floods. The absence of significant quantities of suspended sediments reduces their ability to construct natural levees.

Aquatic Cave – Although the spring vents within the aquatic preserve are too small for human access and exploration, there are large cave systems underground. Since this community remains undisturbed, their condition is assumed to be excellent (DEP, 2002).



Spring vent discharging cool clear water.

Adjacent Communities

The natural communities which run adjacent to the aquatic preserve (within 50 feet of the aquatic preserve) are: blackwater stream, floodplain swamp, hydric hammock, mesic flatwoods, as well as cypress, mixed wetland hardwoods, mixed hardwood-coniferous, along with a small portion of sandhill.

FNAI Community Type	Acres	% of Area	Federal/State Rank
Mesic Flatwoods	>1	0.2%	G4/S4
Floodplain Marsh	9	5.8%	G3/S3
Floodplain Swamp	10	6.0%	G4/S4
Hydric Hammock	1	0.9%	G4/S4
Bottomland Forest	14	8.3%	G4/S3
Blackwater Stream	13	8.2%	G4/S2
Spring-Run Stream	106	64.9%	G2/S2
Ruderal	10	6.0%	NA
	162.9		

Table 2 | Florida Natural Areas Inventory natural communities of Rainbow Springs Aquatic Preserve.

The largest natural community adjacent to the aquatic preserve is hydric hammock, which borders the river for various lengths along its eastern bank. This stretch begins just southeast of the headwaters, and runs intermittently down to the southern-central portion of the aquatic preserve. Hydric hammock, along with a few other adjacent communities, is impacted from certain intensities of flooding that can influence the type of species and vegetation found in the area. These adjacent natural communities face threats from a variety of causes, such as: invasive, problematic, and exotic species; man-made disturbances, and historic hydrological alterations.

Adjacent ruderal/disturbed lands make up a predominant portion of surrounding undeveloped land. Ruderal land dominates the east bank of the river, bordering the aquatic preserve for nearly its entire length. There is also ruderal land bordering the northern edge of the river, as well as two separate stretches along the west side of the river.

Native Species

The diverse habitat in and around the aquatic preserve supports an abundant variety of wildlife. Approximately 600 species have been recorded in the area. Submerged Aquatic Vegetation (SAV) within the aquatic preserve plays an integral role in providing adequate protection and resources for waterfowl, spawning fish and other species. The two predominant native species of vegetation within the aquatic preserve are strap-leaved sagittaria (*Sagittaria kurziana*) and eelgrass (*Vallisneria americana*), also known as tapegrass.



An American alligator with its young basking in the shallows.

Strap-leaved sagittaria

Strap-leaf sagittaria forms dense stands from rhizomes and is found throughout north and central Florida. This species of sagittaria tends to be found in clear cool waters of many of Florida's rivers and springs. It forms dense stands, which can impede boat traffic, but is generally considered beneficial to waterfowl and fish species populations (Hoyer, Canfield, Horsburgh, & Brown, 1996). Recent vegetation studies have shown strap-leaved sagittaria to cover the largest area of all SAV, accounting for 54 percent of SAV coverage in 2011. Sagittaria has decreased in the upper-most zone of the river since the mid-90s after the construction of the state swimming area (Atkins North America, Inc. & Debra Childs Woithe, Inc., 2012). As mentioned previously, recreational use can impact the amount of aquatic vegetation coverage. Sagittaria has seen fluctuations in abundance in the middle areas of the river, and has seen a consistent increase in the lower portions of the area, especially during the 2005-2011 period when hydrilla had a pronounced decrease in the lower portions). The degree of cover by sagittaria in the upper regions of the river is the driving factor behind the relatively small number of changes in SAV cover for other vegetation species in the upper area (Atkins North America, Inc. & Debra Childs Woithe, Inc., 2012).

Eelgrass or tapegrass

Eelgrass is common in streams and lakes from Nova Scotia and Quebec west to North Dakota, generally south to Texas and Florida. Florida distribution shows that eelgrass is found scattered in lakes and streams across the entire state, but primarily in central and south Florida. Eelgrass is a valuable plant as food for waterfowl and also as refuge and habitat for invertebrate and fish (Hoyer et al., 1996). Eelgrass is the second most common native SAV in Rainbow River, accounting for 11 percent of SAV in 2011, a decrease of five percent from 2005 (Atkins North America, Inc. & Debra Childs Woithe, Inc., 2012).

Listed Species

There are currently 12 state or federally listed species which have been recorded in or directly adjacent to the aquatic preserve, consisting of seven birds, two reptiles, two mammals and one plant. (For a comprehensive list of listed species reported within and adjacent to the aquatic preserve, refer to Appendix B.3.)

There is an abundance of listed birds which depend on the aquatic preserve: wood stork (*Mycteria americana*), white ibis (*Eudocimus albus*), tricolored heron (*Egretta tricolor*), limpkin (*Aramus guarauna*), sandhill crane (*Grus canadensis*), little blue heron (*Egretta caerulea*), and snowy egret (*Egretta thula*).

Many of these species nest in a variety of wetland habitats and are dependent on the small aquatic species within the shallow waters of the aquatic preserve, such as insects, snails or fish. Current threats to these birds comes from fragmentation and deterioration of habitats due to human development and agricultural use, accumulation of non-native vegetation making foraging difficult, and the decline in small prey.

There are two listed reptiles which directly reside within the aquatic preserve: the American alligator and the Suwannee cooter (*Pseudemys suwanniensis*). The Suwannee cooter primarily feeds off of aquatic vegetation within the river, such as strap-leafed sagittaria. The current threats to this species come from habitat degradation, natural predators and the reduction in water clarity affecting the growth of aquatic vegetation on which this species feeds. The American alligator is listed due its similarity in appearance to the American crocodile (*Crocodylus acutus*). The main threats to alligators come from the destruction and degradation of their habitat due to the encroachment of human development and predation of eggs or juvenile alligators.

Invasive Non-native and/or Problem Species

In RSAP, as is common throughout Florida ecosystems, non-natives compete with native species over space and resources. Non-native and invasive species have been introduced into the Rainbow River ecosystem in a variety of ways, both deliberately and accidentally. Common methods of introduction include transportation by boaters, use in horticulture, use for aesthetic value and migration. There are several documented invasive/non-native species located within or adjacent to the aquatic preserve. Although not all of the non-native species pose a significant threat to the aquatic preserve, two main species have been detrimental to the health of the river: hydrilla and the problematic blue-green algae.

Hydrilla

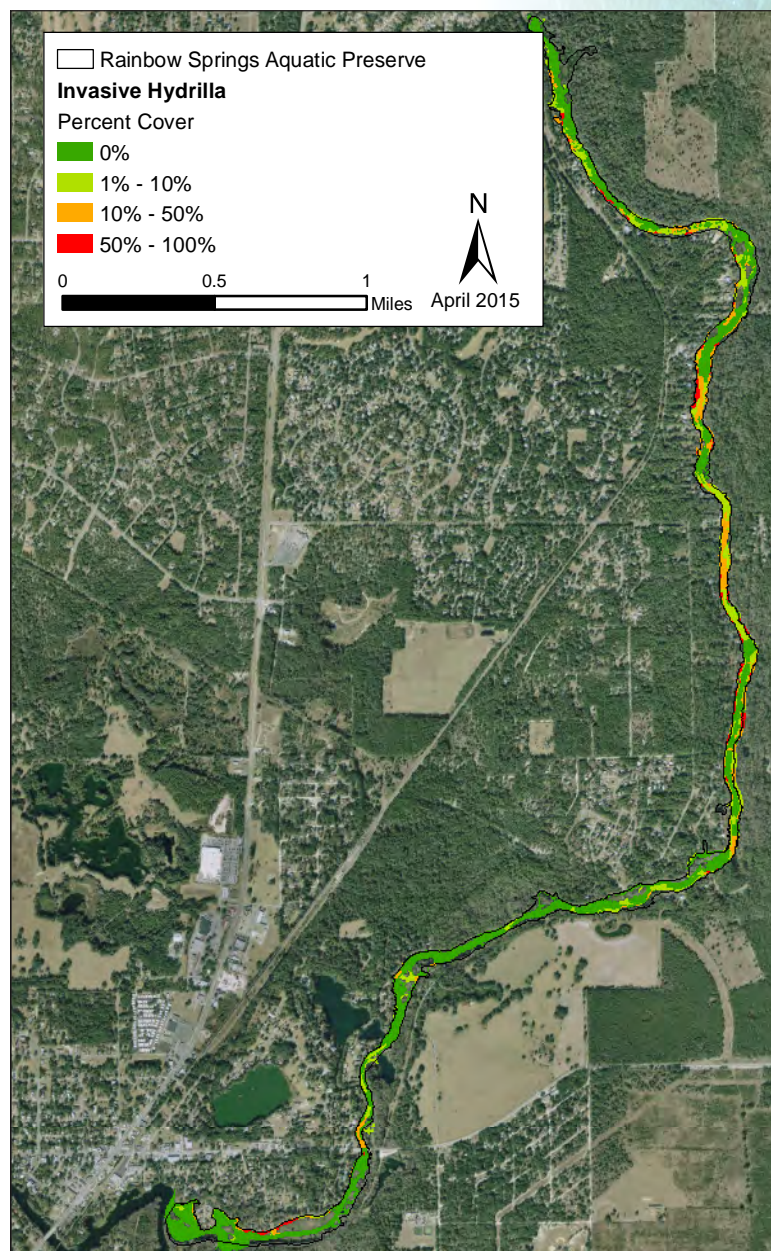
Hydrilla is a submerged aquatic plant native to Africa and Southeast Asia, brought over to the United States by aquarium plant horticulturists in the mid-20th century and has been established in the Rainbow River since the 1970s. It has the ability to grow up to an inch per day, commonly out-competing native SAV (SWFWMD, 2004). In addition to crowding out native vegetation, hydrilla has been known to clog drainage and residential canals, preclude boating access for fishing and other water-related recreation, and impede navigation (SWFWMD, 2004). Hydrilla has minimal wildlife value except for diving ducks and



coots that consume tubers and vegetative parts (Tarver, Rogers, Mahler, & Lazor, 1986). In the absence of other SAV, low to moderate amounts of hydrilla may be beneficial, but is difficult to maintain at low levels and excessive amounts of hydrilla are known to negatively impact native plant communities (FWC, 2011). The 2004 SWIM Plan states that hydrilla most notably occurs in the last mile south of County Road Bridge 484 (SWFWMD, 2004) (Map 10). The 2011 Rainbow River Vegetation Evaluation showed hydrilla vegetation to have a decrease of 63 percent from 2005 to 2011, most coming from the lower portions of the river. Much of this decrease in hydrilla coverage can be contributed to control methods and increasing amounts of benthic algal mats.

Normal treatment strategies are not always adequate due to the high flow rate of the Rainbow River. Current treatment is done with the aquatic herbicide Aquathol Super K in the areas below the County Road 484 Bridge when hydrilla impedes navigation. The upper portions of the river are treated when requested by the aquatic preserve staff. Many of these treatment efforts lead to minimal results due to the lack of concentration and contact time of the herbicide. Treating larger portions of the river or using a continuous drip treatment would result in more effective hydrilla control. However, these methods have the potential to negatively impact non-target species of plants. Given the small presence of hydrilla in the upper sections of the river, large-scale treatment has never been considered a viable option by management entities (B. Nelson, Personal Communication, December 7, 2015).

There are four common treatment options available for control of undesirable aquatic vegetation: herbicide treatment, biocontrol using insects which attack only the target plant, biocontrol using triploid grass carp (*Ctenopharyngodon idella*), and physical removal or harvesting (Atkins North America, Inc. & Debra Childs Woithe, Inc., 2012). Chemical control through use of registered aquatic herbicides and algicides is a technique that is widely employed by aquatic plant managers in private and public water bodies. Treatments can target a broad spectrum of plant species or a specific invasive plant. There are approximately 300 herbicides registered in the U.S. with only about a dozen registered for aquatic use. Biocontrol using insects of aquatic plants has yielded mixed results in the southeast from the highly successful alligator-weed flea beetle (*Agasicles hygrophila*) to introduced insect species that exhibit no control. The greatest limiting factor of insect biocontrol is the species must be plant specific before it can be introduced in the U.S. Biocontrol using triploid or sterile grass carp can only be used in closed systems in Florida. Grass carp are not vegetation-specific and will consume almost any aquatic plant. Physical removal or harvesting methods are usually non-chemical, non-motorized techniques that are employed to control aquatic weeds. This ranges from hand pulling to water level manipulation and sediment removal (Gettys, Haller, & Bellaud, 2009).



Map 10 | Non-native invasive plant distribution in Rainbow Springs Aquatic Preserve.

Blue-green algae

Lyngbya is a cyanobacteria (blue-green algae) that develops as thick mats on river bottoms creating a major threat as it accumulates on or around native vegetation. If these mats detach, they are carried downriver impeding navigation, impairing the recreational use of the water body, and often accumulating around other emergent and submerged vegetation. This species can also impair the aesthetic value of the water body due to the release of a strong, musty odor compound (geosmin) during decomposition (SWFWMD, 2004). Algae were mapped for the first time in 2011 but increase of benthic algae have been generally observed in recent years. In 2011, algae coverage was lower in the upper Rainbow River and increased on a fairly even gradient moving downstream (Atkins North America, Inc. & Debra Childs Woithe, Inc., 2012). There are few effective treatment regimes to control benthic algae mats in RSAP other than physical removal by diver-assisted suction dredging in areas of the main channel or on a smaller scale, removal by individual property owners operating under an aquatic plant removal permit issued by FWC's Invasive Plant Management Section.

Feral hog

Feral hogs (*Sus scrofa*) pose a significant threat to the natural communities within the RSSP and those adjacent to the aquatic preserve. Particularly vulnerable to this threat are the wetlands and ecotones (DEP, 2002). Feral hogs destroy native vegetation due to hog wallows and rooting. The Division of Recreation and Parks is active in the removal and control process of this species.

Eurasian Water Milfoil and Sailfin Catfish (Success stories)

Two species that have posed threats to the aquatic preserve have not been documented in the RSAP in the last six years. Eradication and treatment measures have successfully controlled the expansion of the Eurasian water milfoil (*Myriophyllum spicatum*), an invasive vegetation, and the vermiculated sailfin catfish (*Pterygoplichthys disjunctivus*), an invasive fish species in RSAP.

Archaeological and Historical Resources

An archaeological survey was conducted in 1980 as part of a Development of Regional Impact for the Village of Rainbow Springs. This included the 455 acres surrounding the headwaters. Three prehistoric sites were identified by archaeologist Marsha A. Chance, including a large prehistoric Native American archaic village dated between 8,000-1,000 B.C. Of the three sites, one had no significance. However, Site #3 was subsequently recorded in the Florida Master Site File as 8Mrl-66, and has since been changed to MR206 (also known as Rainbow Springs 1). Chance has assessed this site as being a significant cultural resource. Numerous artifacts and fossils have been found along the eastern side of the aquatic preserve and in the first mile of the submerged lands of the waterbody. Over the years, most of these artifacts and fossils have been removed, and today many swimmers and divers continue to search and dig in the submerged lands for artifacts, but collecting artifacts or fossils is illegal without a permit. Protection of the archaeological and historical resources is necessary. Many of the Native American artifacts and fossils in the Florida State Museum came from the Rainbow River and immediate area (DEP, 1991).

After a combination of cultural resource assessment surveys, archaeological investigations, identification and evaluation of historic properties, pedestrian surveys, shovel tests, surface inspections and subsurface tests, a number of results were found (Table 3). There are many historical private residences, two abandoned railroads, a historic bridge, a historical cemetery, two quarries and the prehistoric village mentioned previously.

The Atlantic Coastline Railroad, completed in 1914, appears to have been the last of about six railroads that reached the Dunnellon area. As of 2008, the original Atlantic Coastline Railroad (Master Site File MR03402) was abandoned in the area of Marion County. The integrity of MR03402 has been compromised due to the removal of approximately 200 feet of the railroad grade.

The idea of a navigational waterway spanning the width of Florida existed back in the 1700s, and was studied extensively by the Army Corps of Engineers prior to the 20th century. The Florida Ship Canal Project was started in 1935 as part of President Franklin D. Roosevelt's New Deal agency. The construction was started under the Workers Progress Administration which was the largest New Deal agency. The Florida Ship Canal Project came to a halt in the spring of 1936 when Congress refused to appropriate any funds to continue the work. For one year, 10,000 people were employed to dig down to the limestone bedrock. The result of these efforts is a series of rectangular "diggings" that stretch across southwest Marion County. When the year ended, the construction of a ship canal was stopped and the digging was put on hold. In the 1960s, the idea of a canal was resurrected, but this time the canal would be constructed as a series of locks and dams and was known as the Cross Florida Barge

Site ID	Site Name	Site Description	Culture
Sites within Rainbow Springs Aquatic Preserve			
MR00208	Rainbow Springs 3	Lithic scatter/quarry (prehistoric: no ceramics)	Early Archaic
MR02667	Jungle cafe	Lithic scatter/quarry (prehistoric: no ceramics)	Prehistoric
MR02701	Tipi	Habitation (prehistoric)	Archaic, 8500 B.C.-1000 B.C.
MR03270	Abandoned Railroad Grade		Some maps indicate construction as early as 1910. Destroyed ca. 1980s.
MR03402	Atlantic Coast Line/ CSX Railroad		Twentieth century American, 1900-present
MR03410	Cross Florida Greenway		Twentieth century American, 1900-present
Sites within 2,500 feet of Rainbow Springs Aquatic Preserve			
MR00098	FLA Barge Canal 26	Lithic scatter/quarry (prehistoric: no ceramics)	
MR02397	Rainbow Springs State Park	Historic refuse / dump	Suwannee Valley Culture, A.D. 750 to early 16th c.
MR03268	Rainbow Bridge	Habitation (prehistoric)	Late Archaic
MR03269	Campground East	Campsite (prehistoric)	St. Johns I, 700 B.C.-A.D. 800
MR03650	Rainbow Springs Phosphate Pit 3	Historic mine, phosphate or other	
MR03651	Rainbow Springs Phosphate Pit 4	Historic mine, phosphate or other	
MR03652	Rainbow Springs Phosphate Pit 5	Historic mine, phosphate or other	
MR03653	Rainbow Springs Phosphate Pit 6	Historic mine, phosphate or other	
MR03656	Phosphate Pit and Mining Spoil	Historic mine, phosphate or other	
MR03750	None		Built in 1910.
MR02057	Cemetery		1884
MR02752	Blue Run Cemetery		Established c1880, Graves + 10
CI01223	Dunnellon Abandoned Railroad Line	Abandoned rail bed	
MR03271	SR40 Railroad Grade		Nineteenth century American, 1821-1899

Table 3 | Archaeological sites within 2,500 feet of Rainbow Springs Aquatic Preserve.

Canal. The project was only partially completed at the eastern and western ends. All construction of the canal was stopped in 1971 by President Richard Nixon as a result of lawsuits (Florida Department of State, 2007).

Rainbow Springs 3, also known as site MR00208, appears to be a very large, fairly homogenous scatter of artifacts, indicative of a relatively narrow range of aboriginal activity. It likely does not represent a village, but rather a location which attracted repeated visits throughout a relatively long timespan. Most of the artifacts are stone debris resulting from tool making, and diagnostic stone tools indicate that the site was exploited primarily during the Archaic Period (3000 to 5000 years ago). However, there is also a small quantity of pottery, implying later usage, as well as at least one tool from the Paleo Period (10,000 to 12,000 years ago). It seems evident that chert (compact rock consisting essentially of microcrystalline quartz) outcroppings must have been located nearby, and other resources may have attracted early people to the springs area as well.

Rainbow Springs itself, of course, is a primary resource which would have always drawn visitors, as it has done in modern times. In fact, the definition of the relationship between the spring and the aboriginal site use patterns is probably the most important aspect of site significance in this case. The Division of Historical Resources recommended that site MR00208 be protected from destruction or development,



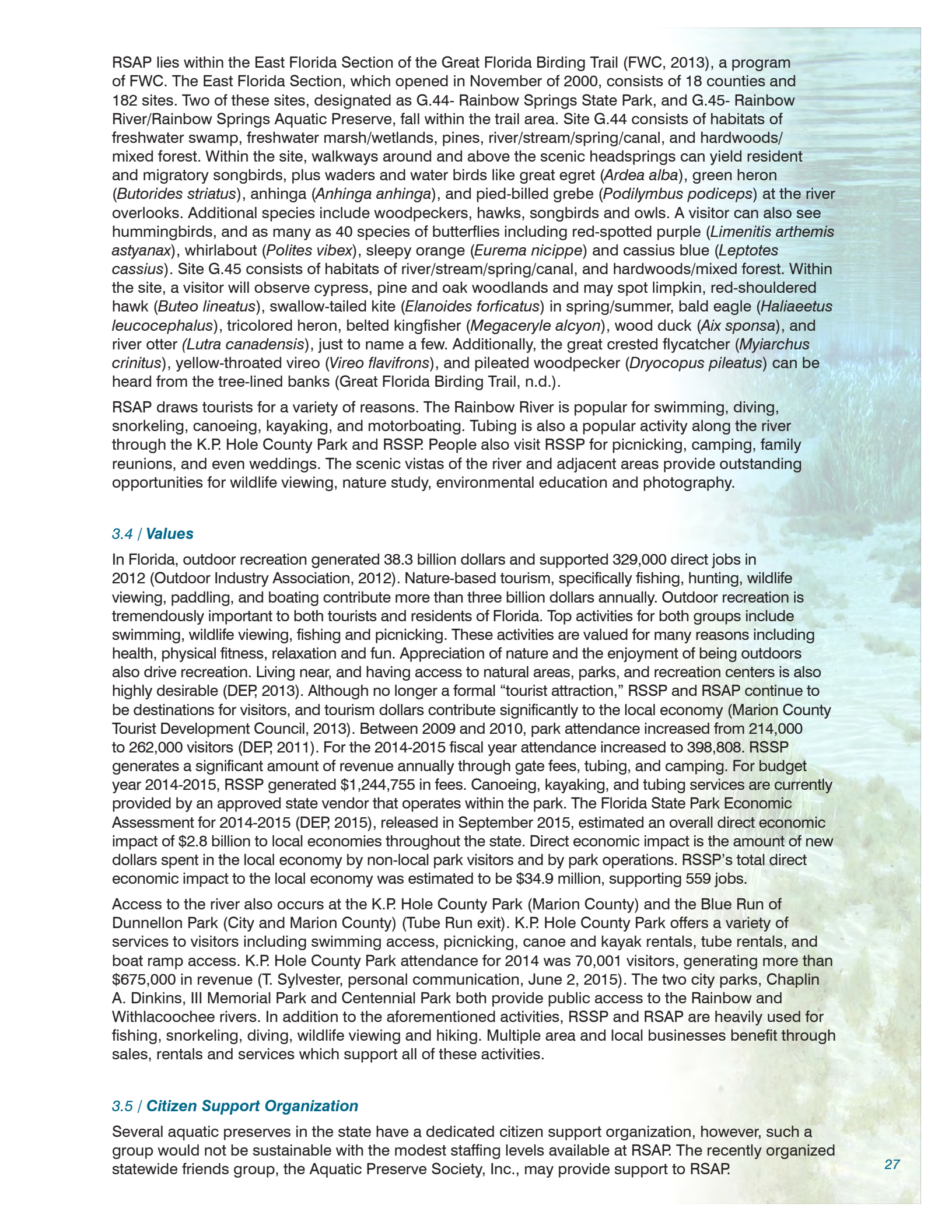
Multiple recreational activities are available.

because it is a very valuable and distinctive cultural resource. The fact that aboriginal populations camped or lived adjacent to the spring increases the overall intrinsic value of the Rainbow Springs complex. The cultural value of the spring should be considered along with other environmental factors whenever the tract is evaluated (Florida Department of State, 2007).

Archaeologists believe that early Native American hunters camped around Rainbow Springs ten thousand years ago and several prehistoric sites have been identified, including MR02701. The first known white settlers came to the Rainbow Springs area around 1854. In the 1890s, phosphate was discovered in the area and was mined extensively in the river bottom and adjacent uplands. As the phosphate market declined during the early 1900s, the Rainbow River became a popular recreational area (DEP, 1991). A tourist hotel was operated at the headsprings during the 1890s, and in 1937, a new resort was built featuring glass-bottom boats and nature trails. At one time a floating raft was anchored in the head pool for swimmers to enjoy. However, the construction of Interstate 75 and especially the opening of Walt Disney World caused the number of visitors to decline. The commercial attraction was closed in 1974 (Hollis, 2006). By the 1970s and 1980s, an increase in the variety of activities, such as diving, boating, rafting, fishing, and swimming was becoming established on the river. The narrow and winding character of the river, along with the number of people using the resource, has caused some conflict between the various recreational activities from both a safety and liability standpoint (DEP, 1991). In a recent report for DEP, it was concluded that these recreational activities are still a source of concern (Normandeau Associates, Inc., 2011).

Other Associated Resources

The pristine natural resources of the Rainbow Springs and River area are a major attraction for the nature based recreational enthusiast and eco-tourist. Much of this can be found within RSSP, which provides shady gardens laced with azaleas, oaks, and magnolias. The gardens and waterfalls at RSSP are cultural assets that remain from the days when the headsprings were a private attraction. They have been renovated and replanted while preserving their historical significance. In early spring, the entire headsprings area bursts into pinks, purples and whites with its famous azalea blooms. There are hiking and nature trails comprised of walkways that pass by three man-made waterfalls and a native plant garden. The walkways are both historically unique and offer great views of both the river and the gardens. The native garden, which is a special attraction for butterflies and hummingbirds, lies behind the cultural gardens.



RSAP lies within the East Florida Section of the Great Florida Birding Trail (FWC, 2013), a program of FWC. The East Florida Section, which opened in November of 2000, consists of 18 counties and 182 sites. Two of these sites, designated as G.44- Rainbow Springs State Park, and G.45- Rainbow River/Rainbow Springs Aquatic Preserve, fall within the trail area. Site G.44 consists of habitats of freshwater swamp, freshwater marsh/wetlands, pines, river/stream/spring/canal, and hardwoods/mixed forest. Within the site, walkways around and above the scenic headsprings can yield resident and migratory songbirds, plus waders and water birds like great egret (*Ardea alba*), green heron (*Butorides striatus*), anhinga (*Anhinga anhinga*), and pied-billed grebe (*Podilymbus podiceps*) at the river overlooks. Additional species include woodpeckers, hawks, songbirds and owls. A visitor can also see hummingbirds, and as many as 40 species of butterflies including red-spotted purple (*Limenitis arthemis astyanax*), whirlabout (*Polites vibex*), sleepy orange (*Eurema nicippe*) and cassius blue (*Leptotes cassius*). Site G.45 consists of habitats of river/stream/spring/canal, and hardwoods/mixed forest. Within the site, a visitor will observe cypress, pine and oak woodlands and may spot limpkin, red-shouldered hawk (*Buteo lineatus*), swallow-tailed kite (*Elanoides forficatus*) in spring/summer, bald eagle (*Haliaeetus leucocephalus*), tricolored heron, belted kingfisher (*Megaceryle alcyon*), wood duck (*Aix sponsa*), and river otter (*Lutra canadensis*), just to name a few. Additionally, the great crested flycatcher (*Myiarchus crinitus*), yellow-throated vireo (*Vireo flavifrons*), and pileated woodpecker (*Dryocopus pileatus*) can be heard from the tree-lined banks (Great Florida Birding Trail, n.d.).

RSAP draws tourists for a variety of reasons. The Rainbow River is popular for swimming, diving, snorkeling, canoeing, kayaking, and motorboating. Tubing is also a popular activity along the river through the K.P. Hole County Park and RSSP. People also visit RSSP for picnicking, camping, family reunions, and even weddings. The scenic vistas of the river and adjacent areas provide outstanding opportunities for wildlife viewing, nature study, environmental education and photography.

3.4 / Values

In Florida, outdoor recreation generated 38.3 billion dollars and supported 329,000 direct jobs in 2012 (Outdoor Industry Association, 2012). Nature-based tourism, specifically fishing, hunting, wildlife viewing, paddling, and boating contribute more than three billion dollars annually. Outdoor recreation is tremendously important to both tourists and residents of Florida. Top activities for both groups include swimming, wildlife viewing, fishing and picnicking. These activities are valued for many reasons including health, physical fitness, relaxation and fun. Appreciation of nature and the enjoyment of being outdoors also drive recreation. Living near, and having access to natural areas, parks, and recreation centers is also highly desirable (DEP, 2013). Although no longer a formal “tourist attraction,” RSSP and RSAP continue to be destinations for visitors, and tourism dollars contribute significantly to the local economy (Marion County Tourist Development Council, 2013). Between 2009 and 2010, park attendance increased from 214,000 to 262,000 visitors (DEP, 2011). For the 2014-2015 fiscal year attendance increased to 398,808. RSSP generates a significant amount of revenue annually through gate fees, tubing, and camping. For budget year 2014-2015, RSSP generated \$1,244,755 in fees. Canoeing, kayaking, and tubing services are currently provided by an approved state vendor that operates within the park. The Florida State Park Economic Assessment for 2014-2015 (DEP, 2015), released in September 2015, estimated an overall direct economic impact of \$2.8 billion to local economies throughout the state. Direct economic impact is the amount of new dollars spent in the local economy by non-local park visitors and by park operations. RSSP’s total direct economic impact to the local economy was estimated to be \$34.9 million, supporting 559 jobs.

Access to the river also occurs at the K.P. Hole County Park (Marion County) and the Blue Run of Dunnellon Park (City and Marion County) (Tube Run exit). K.P. Hole County Park offers a variety of services to visitors including swimming access, picnicking, canoe and kayak rentals, tube rentals, and boat ramp access. K.P. Hole County Park attendance for 2014 was 70,001 visitors, generating more than \$675,000 in revenue (T. Sylvester, personal communication, June 2, 2015). The two city parks, Chaplin A. Dinkins, III Memorial Park and Centennial Park both provide public access to the Rainbow and Withlacoochee rivers. In addition to the aforementioned activities, RSSP and RSAP are heavily used for fishing, snorkeling, diving, wildlife viewing and hiking. Multiple area and local businesses benefit through sales, rentals and services which support all of these activities.

3.5 / Citizen Support Organization

Several aquatic preserves in the state have a dedicated citizen support organization, however, such a group would not be sustainable with the modest staffing levels available at RSAP. The recently organized statewide friends group, the Aquatic Preserve Society, Inc., may provide support to RSAP.

The Rainbow River Conservation, Inc. (www.rainbowriverconservation.com), is a 501(C)(3) organization whose objectives, in part, are to protect, maintain, and preserve the natural beauty, quality and purity of the river, the river bed and its flood plains. The Rainbow River Conservation, Inc. coordinates with the aquatic preserve on resource management projects, including the wood duck habitat enhancement effort. They also sponsor a yearly Rainbow River debris removal event to enhance the aquatic preserve.

3.6 / Adjacent Public Lands and Designated Resources

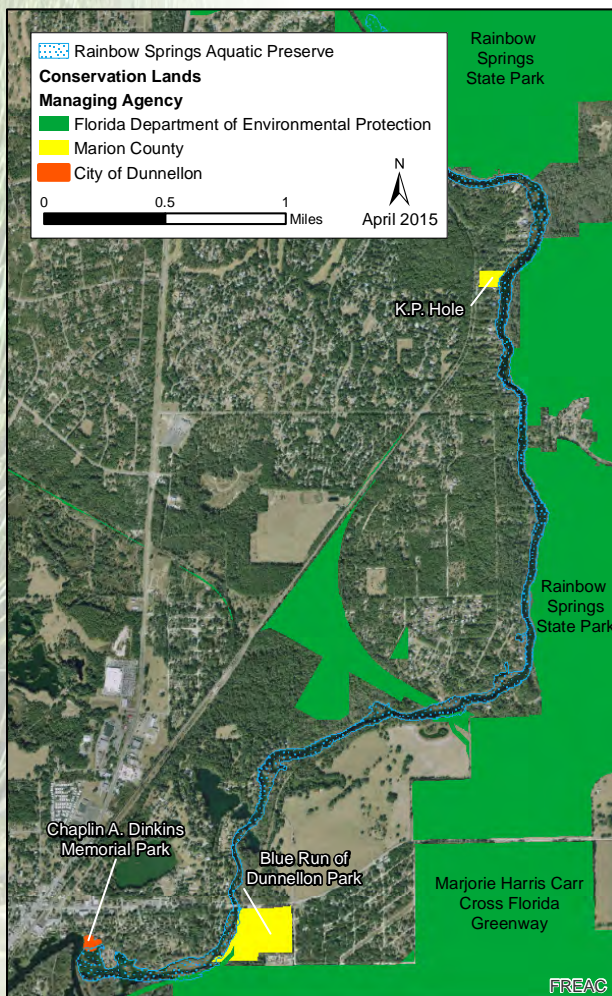
State Managed Lands

Marjorie Harris Carr Cross Florida Greenway State Recreation and Conservation Area

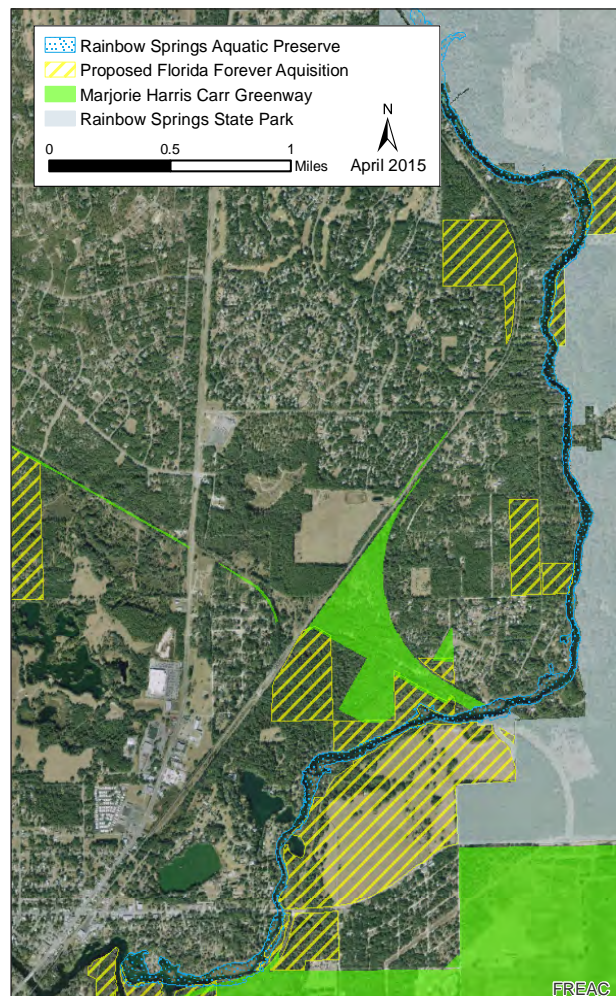
The Marjorie Harris Carr Cross Florida Greenway stretches 110 miles and covers roughly 42,765 acres. The trail heads westward, running parallel to State Road 484, and meets the southern tip of the Rainbow River near the Withlacoochee River. It is managed by the Office of Greenways and Trails within the DEP Division of Recreation and Parks. The trail provides recreational activities such as hiking, biking, equestrian and paddling trails, boat ramps, fishing spots, and campgrounds.

Rainbow Springs State Park - The park encompasses the Rainbow River headsprings, located in the northern portion of the river. The approximately 1,472 acres of state park land, managed by DEP Division of Recreation and Parks, extends south along the east side of the river for the majority of the river's length. The total acquisition contains about 13,400 feet of shoreline, 2,300 feet on the western shoreline and 11,100 feet on the eastern shoreline (DEP, 2002).

The mission of DEP's Division of Recreation and Parks is "to provide resource-based recreation while preserving, interpreting, and restoring natural and cultural resources." Public outdoor recreation and conservation is the designated single use of the land (DEP, 2002). Park uses include swimming,



Map 11 / Adjacent conservation lands of Rainbow Springs Aquatic Preserve.



Map 12 / Florida Forever proposed acquisitions near Rainbow Springs Aquatic Preserve.

snorkeling, canoeing, picnicking, camping, interpretive programs, special events and sightseeing. Motor boating is banned in the upper regions of the river due to the impacts on natural and cultural resources, and for the safety of the park visitors (DEP, 2002). There are three community access points into the aquatic preserve. The first two are near the beginning of the river, with a public swimming area at the main headsprings and the second a kayak and canoe launch a few hundred feet south. The third provides the users a community exit, which is located in the second portion of the state park-managed land, near the Rainbow Springs Campground.

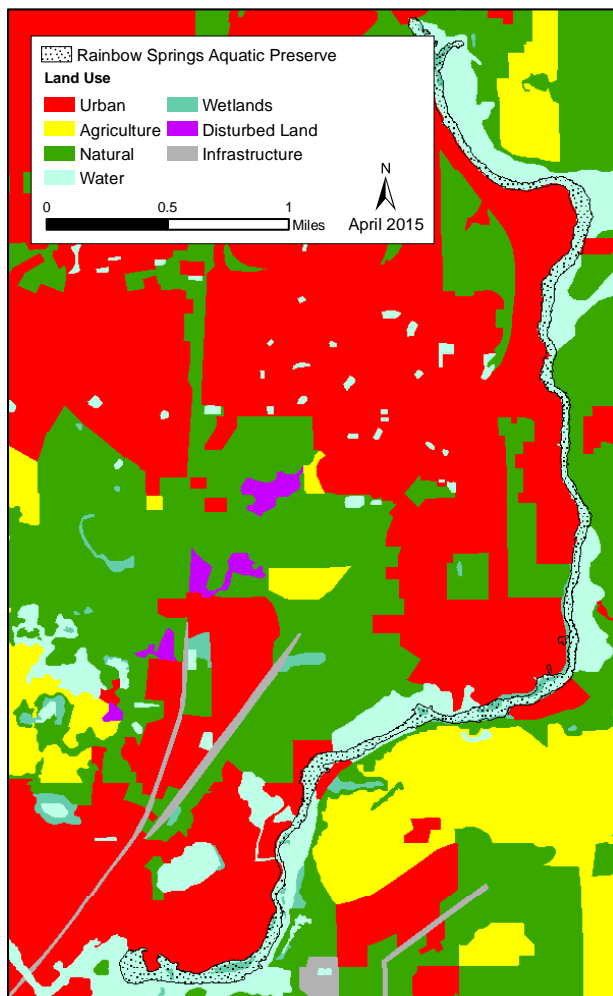
Local Government Managed Lands

K.P. Hole County Park - The 3.82 acres of K.P. Hole County Park is under management by the Marion County Parks and Recreation Department. Their mission is to serve “Marion County residents and visitors by providing park facilities, recreation services, park planning and protection of our natural resources” (Marion County Parks and Recreation Department, 2007). The K.P. Hole County Park provides users with tube, canoe, and kayak rentals, while also providing picnicking sites. The public access point also includes a boat ramp.

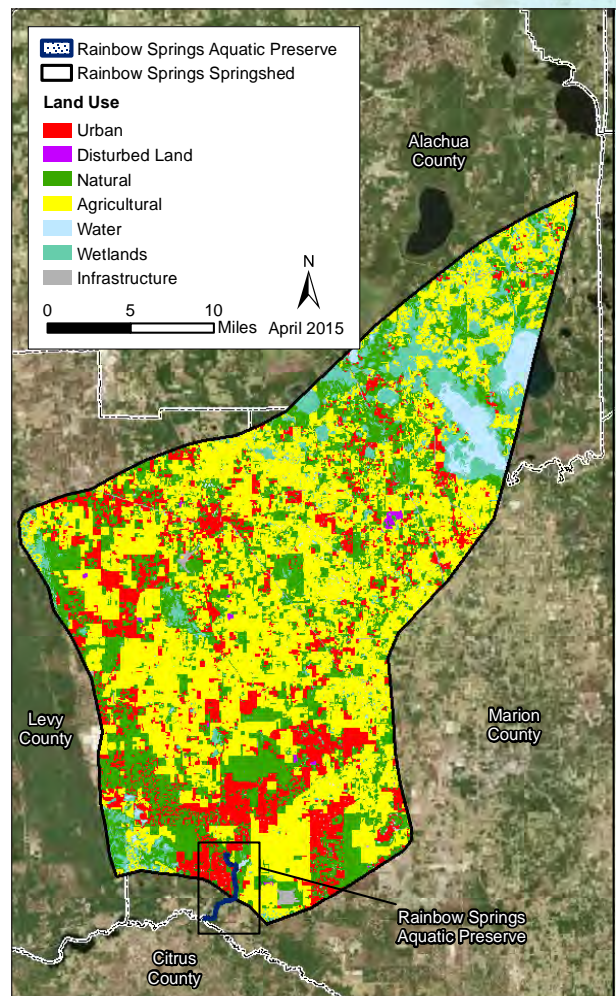
Blue Run of Dunnellon Park (tuber exit) - Blue Run is also managed by Marion County Parks and Recreation. This quarter of an acre lot is commonly used as an exit point of the river, serving as the end point for users with K.P. Hole County Park tube, canoe and kayak rentals.

Chaplin A. Dinkins, III Memorial Park - Chaplin A. Dinkins, III Memorial Park is located near where the Rainbow and Withlacoochee rivers meet. It is managed by the city of Dunnellon and provides picnicking sites and a swimming community access point.

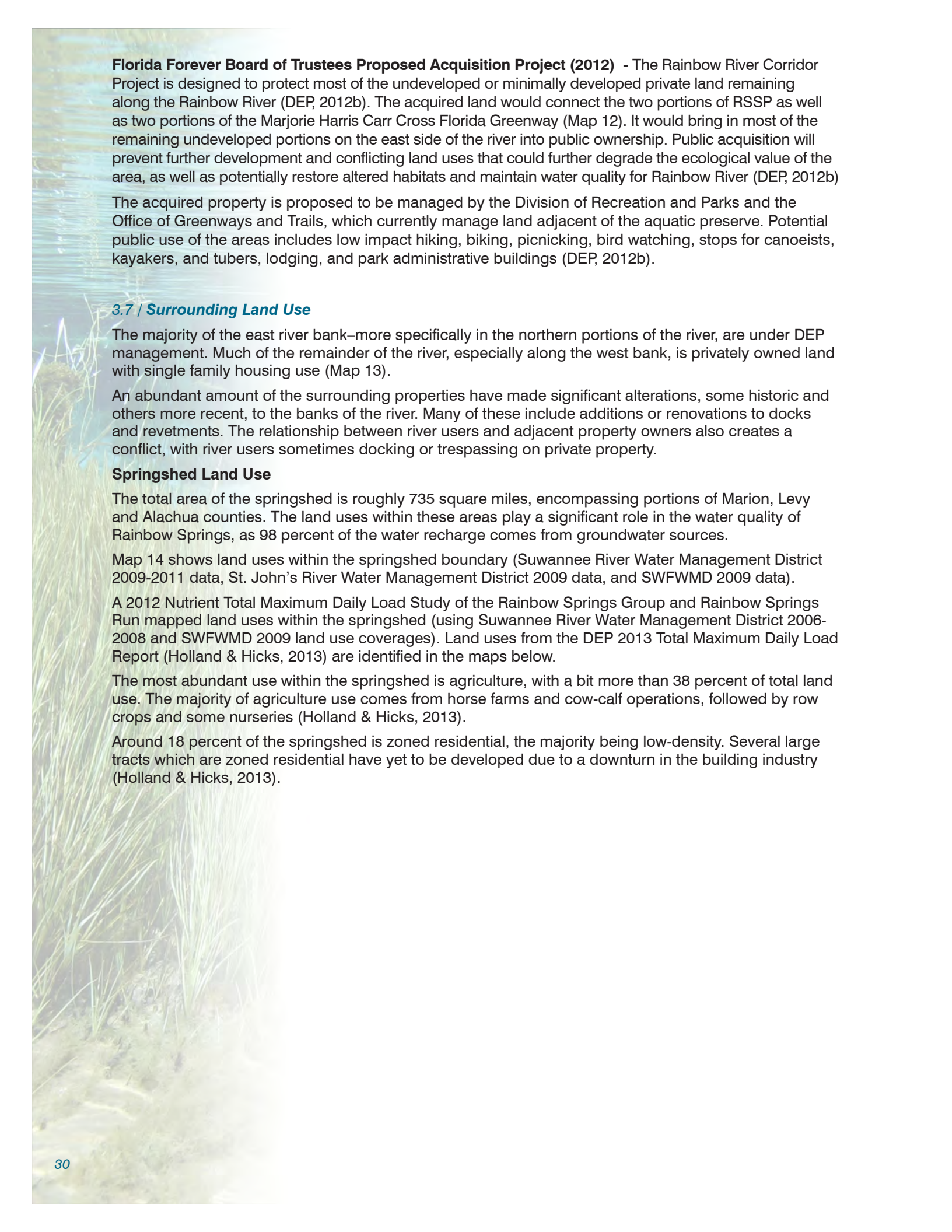
City of Dunnellon Boat Ramp - Located on the Withlacoochee River, the City of Dunnellon Boat Ramp is a common access point used for boaters traveling along the Withlacoochee River and northward into the Rainbow River area.



Map 13 | Land use surrounding Rainbow Springs Aquatic Preserve.



Map 14 | Land use within the springshed of Rainbow Springs Aquatic Preserve.



Florida Forever Board of Trustees Proposed Acquisition Project (2012) - The Rainbow River Corridor Project is designed to protect most of the undeveloped or minimally developed private land remaining along the Rainbow River (DEP, 2012b). The acquired land would connect the two portions of RSSP as well as two portions of the Marjorie Harris Carr Cross Florida Greenway (Map 12). It would bring in most of the remaining undeveloped portions on the east side of the river into public ownership. Public acquisition will prevent further development and conflicting land uses that could further degrade the ecological value of the area, as well as potentially restore altered habitats and maintain water quality for Rainbow River (DEP, 2012b)

The acquired property is proposed to be managed by the Division of Recreation and Parks and the Office of Greenways and Trails, which currently manage land adjacent of the aquatic preserve. Potential public use of the areas includes low impact hiking, biking, picnicking, bird watching, stops for canoeists, kayakers, and tubers, lodging, and park administrative buildings (DEP, 2012b).

3.7 / Surrounding Land Use

The majority of the east river bank—more specifically in the northern portions of the river, are under DEP management. Much of the remainder of the river, especially along the west bank, is privately owned land with single family housing use (Map 13).

An abundant amount of the surrounding properties have made significant alterations, some historic and others more recent, to the banks of the river. Many of these include additions or renovations to docks and revetments. The relationship between river users and adjacent property owners also creates a conflict, with river users sometimes docking or trespassing on private property.

Springshed Land Use

The total area of the springshed is roughly 735 square miles, encompassing portions of Marion, Levy and Alachua counties. The land uses within these areas play a significant role in the water quality of Rainbow Springs, as 98 percent of the water recharge comes from groundwater sources.

Map 14 shows land uses within the springshed boundary (Suwannee River Water Management District 2009-2011 data, St. John's River Water Management District 2009 data, and SWFWMD 2009 data).

A 2012 Nutrient Total Maximum Daily Load Study of the Rainbow Springs Group and Rainbow Springs Run mapped land uses within the springshed (using Suwannee River Water Management District 2006-2008 and SWFWMD 2009 land use coverages). Land uses from the DEP 2013 Total Maximum Daily Load Report (Holland & Hicks, 2013) are identified in the maps below.

The most abundant use within the springshed is agriculture, with a bit more than 38 percent of total land use. The majority of agriculture use comes from horse farms and cow-calf operations, followed by row crops and some nurseries (Holland & Hicks, 2013).

Around 18 percent of the springshed is zoned residential, the majority being low-density. Several large tracts which are zoned residential have yet to be developed due to a downturn in the building industry (Holland & Hicks, 2013).



Indian Creek is the lone tributary to the river.

Part II

Management Programs and Issues

Chapter Four

The Rainbow Springs Aquatic Preserve's 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 storm water 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 Rainbow Springs Aquatic Preserve (RSAP) 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. In this management plan, RSAP will characterize each of its issues 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 and strategies associated with each issue.

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 the state of 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.

Pertinent information about RSAP is available from a variety of sources. Through the collective efforts of federal, state and local agencies, institutions, non-profit organizations and individuals many topics have been researched and investigated through a range of time periods. Entities include the United States Geological Survey (USGS), Florida Department of Environmental Protection (DEP), Southwest Florida Water Management District (SWFWMD), Florida Geological Survey, University of Florida, University of South Florida, Eckerd College, Rainbow River Conservation, Inc., Marion County, and the city of Dunnellon.

4.1.1 / Background of Ecosystem Science at Rainbow Springs Aquatic Preserve

The Rainbow River was designated an aquatic preserve in 1986 for the purpose of maintaining the springhead and associated river run. Prior to designation, the land surrounding the Rainbow River was in private ownership until 1990, when some of the land was acquired using Conservation and Recreation Lands Program funds, later designated Rainbow Springs State Park (RSSP). A portion of surrounding land was, and is still, in private residential ownership. In 1991, potential management requirements were addressed in the first RSAP Draft Management Plan. A large portion of historical ecosystem science activities that occurred within RSAP were conducted by staff and graduate students from the University of Florida as well as various other state and federal agencies. The following section outlines some of the historical mapping, modeling, monitoring and research that has been completed within RSAP.

Mapping and Modeling

To effectively manage resources within RSAP, it is important that consistent mapping and modeling of important resources be conducted. This allows for the identification of impacted areas within the aquatic preserve where increased research, monitoring, and management focus is necessary.

- In 1991, Water and Air Research, Inc. performed mapping efforts that were utilized as a baseline for more current projects with RSAP.
- In 1996, SWFWMD began mapping submerged and emergent vegetation in the Rainbow River.
 - In 2011, algae was added to the mapping efforts made by SWFWMD.
- RSAP completed the RSAP 2000 Vegetation Mapping and Change Analysis Report: An Assessment of the Plant Assemblages in September 2000. This report included vegetation mapping and a change analysis report.



Aquatic turtle research is ongoing in the aquatic preserve.

- Karst Environmental Services, Inc. completed the Spring Protection Zone Database in April of 2002 for DEP. This database was intended to provide a basic guide to establishing spring source protection areas for first magnitude spring sites.
- Holland and Cichra conducted the first study focused on environmental and social impacts of recreational use in the Rainbow River titled: *Human and Environmental Dimensions of the Recreational Use of Blue Run and Rainbow Springs State Park, Dunnellon, Florida* in 1994.
- Beginning in 2003, quarterly invasive, exotic submerged and emergent vegetative mapping efforts have been underway through a partnership between the aquatic preserve and Florida Fish and Wildlife Conservation Commission (FWC).
- In 2006, SWFWMD created an Optical Model relating horizontal transparency versus chlorophyll concentration in the Rainbow River. (Anastasiou, 2006)
- Advanced GeoSpatial Inc. (2007) conducted the Marion County Aquifer Vulnerability Assessment model to characterize the natural vulnerability of the Floridan aquifer system. The results from this assessment provides a science-based, water-resource management tool allowing for a proactive approach of the Floridan aquifer system.
- The Northern District Model, created for SWFWMD, was calibrated to steady-state in 1995, with the original version of the model completed by Hydrogeologic, Inc. in 2008. This model is unique for west-central Florida in that it was the first regional flow model that represents the groundwater system as fully three-dimensional.

Monitoring and Research

A variety of contributors have aided in the compilation of historical data associated with Rainbow River. Both monitoring and research efforts provide pertinent information related to the Rainbow River. These efforts provide evidence and support for appropriate management requirements within RSAP.

- SWFWMD established the first Surface Water Improvement and Management (SWIM) Plan for the Rainbow River in 1989. The SWIM legislation requires the water management districts to protect the ecological, aesthetic, recreational, and economic value of Florida's surface water bodies. This plan was revised in 1995 and again in April 2004.

- Michael Mumma, a graduate student with the University of Florida, conducted a series of research projects and monitoring associated with the effects of recreation on the water chemistry and submerged aquatic vegetation of the Rainbow River in 1996.
- The Ambient Ground-Water Quality Monitoring Program with SWFWMD published: Jones et al. (1996) *Origin of Nitrate in Groundwater Discharging from Rainbow Springs, Marion County*. The nitrate-nitrogen level was approximately 1.0 mg/l in the groundwater discharge in 1996.
- In May 2001, SWFWMD's Water Quality Monitoring Program incorporated the Rainbow River in their analysis of multiple springs in the Hydrology and Water Quality of Select Springs in the Southwest Florida Water Management District Report.
- In December 2001, RSAP completed a *Lyngbya* removal and re-vegetation project that was funded by SWFWMD's SWIM program.
- Walsh and Williams with the United States Geological Survey conducted an *Inventory of Fishes and Mussels in Springs and Spring Effluents of the North-Central Florida State Parks* for the Florida Park Service in April 2003.
- A *Density and Species Composition of Algae in the Rainbow River* study was submitted by Cowell and Dawes of the University of South Florida in January of 2003.
- In 2004, water quality analyses were published in the Springs of Florida Bulletin Number 66 by Florida Department of Environmental Protection, Division of Resource Assessment and Management, and Florida Geological Survey.
- Dr. Bruce C. Cowell and Dr. Clinton J. Dawes, from the University of South Florida, completed *Lyngbya Bio-assessment Project (W427)* for SWFWMD's SWIM Program in April 2002.
- In 2004, Dr. Peter A. Meylan of Eckerd College published his research on the turtles of the Rainbow Run of the genus *Pseudemys*.
- *Marion County Water Resource Assessment and Management Study* was published outlining potential future hazards to both water quantity and quality associated with the Groundwater in Marion County; April 2007.
- In October of 2007, Dr. Bruce C. Cowell and Dr. Clinton J. Dawes from University of South Florida submitted a study to SWFWMD analyzing the influence of phosphate on phytoplankton in the Rainbow River.
- PBS&J submitted a *Characterization of Woody Wetland Vegetation Communities along the Rainbow River* draft to SWFWMD in May 2008.
- A study by Joseph Bryce Pfaller from Florida State University studied the *Bite-Force Generation and Feeding Biomechanics in the Loggerhead musk turtle*. In this study, Pfaller utilized the species' high numbers in 2009.
- In 2009, Andrea Ruth Albertin submitted a dissertation on *Nutrient Dynamics in Florida Springs and Relationships to Algal Blooms* to the University of Florida.
- Chapin and Meylan published a study focusing on the *Turtle Populations at a Heavily Used Recreational Site: Ichetucknee Springs State Park, Columbia County, Florida* in December of 2010. The turtle population assessed in the Ichetucknee Springs State Park was compared to that of the Rainbow Run, where Meylan has completed other works.
- Rainbow Springs was one of 12 springs featured in *An Ecosystem-Level Study of Florida's Springs* published in February 2010. The study was prepared by Wetland Solutions, Inc. for FWC, SJWMD, SWFWMD, Florida Park Service, Florida Springs Initiative and Three Rivers Trust, Inc.
- Cohen et al. 2010 submitted a report to DEP in regards to the *Vegetative and Morphologic Controls of Solute Transport and Carbon and Nitrogen Metabolism in Florida Spring-fed Rivers*.
- Holland and Cichra conducted a follow up study of the environmental impacts of recreation in the Rainbow River titled: *Rainbow River Environmental Study, Dunnellon, Florida* in 2012.

4.1.2 | Current Status of Ecosystem Science at Rainbow Springs Aquatic Preserve

Water Quality

Research and monitoring are essential parts of resource and ecosystems management. Data collected from various monitoring programs provide staff with crucial information to make resource management

decisions. These monitoring efforts allow for the creation of baseline data for future comparison. Baseline data can also provide insight to short and long term variations in environmental conditions. Historically, efforts included conducting research and monitoring activities relevant to understanding the ecological processes of RSAP. These efforts give rise to management strategies that ensure the preservation of RSAP's aesthetic, biological and scientific values for the enjoyment of future generations (Florida Administrative Code 18-20). RSAP's current monitoring and research programs are designed and executed based on current and potential future impacts to the resources within the Rainbow River system.

Major management issues within RSAP relate to water quality changes, health of submerged aquatic vegetation (SAV), and land use changes and development. Florida's rapid growth increases public use and development pressures within the aquatic preserve (Cichra & Holland, 2012). Effective ecosystem management, public outreach and education, monitoring and research, and interagency cooperation are essential pieces of the puzzle in maintaining and protecting the resources associated with RSAP. Programs associated with the Current Ecosystem Science Programs are discussed in the following section.

Nutrient Total Maximum Daily Load (TMDL)

Section 303(d) of the federal Clean Water Act requires states to submit to the U.S. Environmental Protection Agency a list of surface waters that do not meet applicable water quality standards (impaired waters) and establish a Total Maximum Daily Load (TMDL) for each pollutant causing the impairment of listed waters on a schedule. DEP has developed such lists, commonly referred to as 303(d) lists, since 1992. The list of impaired waters in each basin, referred to as the Verified List, is also required by the Florida Watershed Restoration Act (Subsection 403.067[4], Florida Statutes), and the state's 303(d) list is amended annually to include basin updates.

In 2012, DEP verified that two segments of Rainbow River were impaired for nutrients (nitrate) and algae (benthic mats). For assessment purposes, DEP has divided the Withlacoochee Basin into water assessment polygons with a unique water body identification number for each watershed or stream reach. Rainbow Springs Group and Rainbow Springs Group Run are segments of the Rainbow River designated as water body identifications 1320A and 1320B, respectively (Holland & Hicks, 2013).

A TMDL represents the maximum amount of a given pollutant that a water body can assimilate and still meet water quality standards, including its applicable water quality criteria and its designated uses.



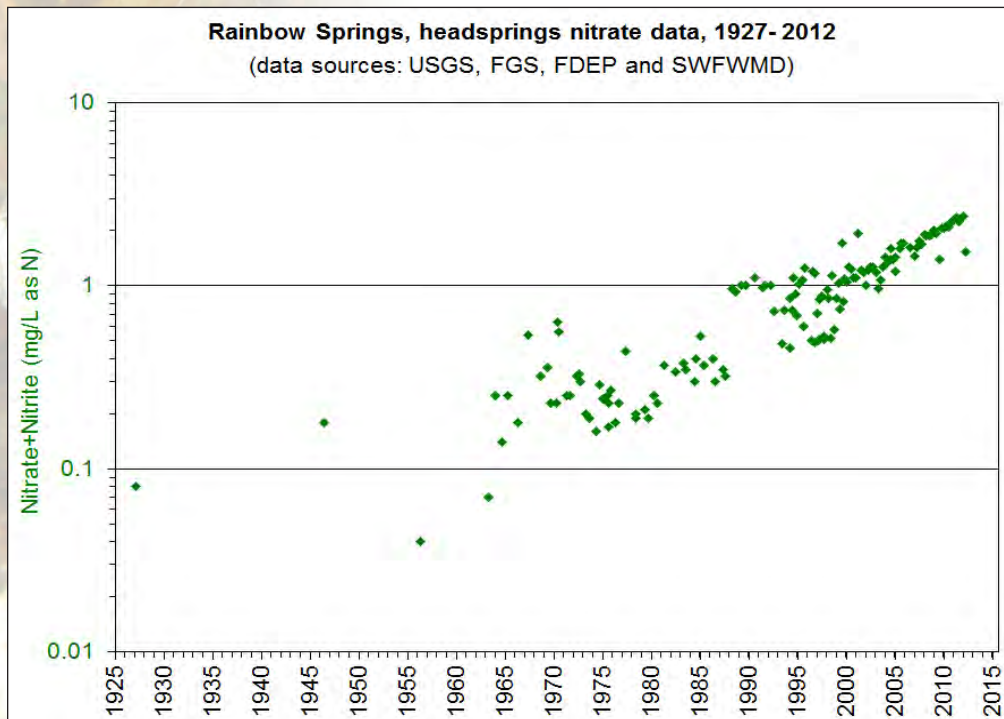
Water clarity is vital to the health of the aquatic plants of the aquatic preserve.

TMDLs are developed for water bodies that are verified as not meeting their water quality standards and provide important water quality goals that are intended to guide restoration activities. According to DEP, achieving a monthly average nitrate target of 0.35 mg/L should be sufficiently protective of, and will not cause an imbalance in, the aquatic flora or fauna in the Rainbow Springs Group and the Rainbow Springs Group Run. Given that the average monthly nitrate levels were 1.92 mg/L for the Rainbow Springs Group and 1.42 mg/L for the Rainbow Springs Group Run during the verified period, DEP proposed that an 82 percent reduction in nitrate concentrations for both water bodies would be required to satisfy the nutrient reduction goals for the system (Holland & Hicks, 2013).

The means of achieving the TMDL goals for the Rainbow River will be the creation of a Basin Management Action Plan (BMAP). BMAPs are the primary mechanism through which TMDLs are implemented in Florida. The BMAP is a restoration plan developed by DEP and basin stakeholders that formalizes the activities that will reduce the pollutant loads and achieve the TMDL. Stakeholders in the BMAP include RSAP, SWFWMD, Florida Department of Agriculture and Consumer Services, local governments, agriculture and other businesses, and interested citizens. The BMAP represents a formal commitment for various responsible parties who will take corrective actions to meet the TMDL. The BMAP process for Rainbow Springs began in July 2013 and August of 2014 a draft BMAP document was created by DEP.

Rainbow Springs Water Quality Monitoring

Due to the unique nature of the Rainbow River being a first magnitude, spring fed system with ground water contributing 97-99 percent of the river flow (Water and Air Research, 1991) and a groundwater recharge area or springshed encompassing approximately 735 square miles (470,000 acres), data collection has been a cooperative effort crossing multiple jurisdictions. The quality of waters discharged from the numerous vents and seeps in the upper 1.5 miles of the Rainbow River are important to the overall health and quality of the riverine system. USGS has monitored the water quality of the headspring area of the Rainbow River since 1927. Long term records of spring water quality indicate that nitrate concentrations have increased in the Rainbow Springs Group from background concentrations of



0.1 mg/L in 1927 to concentrations of 2.2 mg/L in 2013. Unlike phosphate - which sorbs onto metal oxides and carbonate minerals in calcitic soils (Phelps, 2004), nitrate is readily transported into aquifers making spring ecosystems susceptible to land applications of nitrogen (Katz, Hornsby, Bohlke, & Mokray, 1999). The partitioning of nitrogen sources is difficult due to the complexity of land use patterns (Vasques, Grunwald, Comerford, & Sickman, 2010) and the hydrologic flow paths within the aquifer (Martin & Dean, 2001).

A detailed study of

nitrogen sources in the Rainbow Springs basin was conducted by Jones et al. (1996), who sampled 60 wells within the basin, as well as, multiple springs within the Rainbow Springs Group. They found that the majority of the wells had nitrate nitrogen levels above what is considered the background concentration (<0.1 mg/L); 29 percent had concentrations between 1.0 and 5.2 mg/L, 54 percent had concentrations between 0.1 and 1.0 mg/L, and 17 percent had concentrations ≤ 0.1 mg/L. Nitrate concentrations were all above 1.0 mg/L for the largest springs in the Rainbow Springs Group. Jones et al. (1996) reported the highest groundwater nitrate concentrations west of Ocala, which coincides with a fracture zone trending

Table 4 / Headsprings nitrate concentrations (surface water).

northwest from the headsprings. High nitrate concentrations were also found along the fracture zone trending northeast from the headsprings. The lowest concentrations were found in Fairfield Hills, in the north central portion of the basin, and this observation was attributed to the presence of Hawthorne clays overlying the aquifer that impede direct infiltration of water, possibly resulting in the de-nitrification of soluble nitrogen seeping through the confinement layer.

Jones et al. (1996) identified 10 anthropogenic sources of nitrogen that contributed to groundwater-nitrate loading in the Rainbow Springs basin: septic tanks, residential turf fertilizer, golf courses, sewage effluent disposal, land disposal of sewage sludge, land disposal of septic sludge, row crops, cattle, horse farms, and pasture fertilization with inorganic nitrogen. Fertilization of pastures, horse farms, and cattle farms were reported to be the three largest sources, with applications of 3,963 tons/year, 1,501 tons/year, and 1,256 tons/year, respectively. Nitrogen isotope values ($\delta^{15}\text{N}$) supported the finding that inorganic fertilizer was the principal source of nitrogen in the basin; 19 wells and five springs had $\delta^{15}\text{N}$ values between -0.5 and +4.6 percent, which fall within the range for inorganic fertilizers (Jones et al., 1996). Albertin (2009) found $\delta^{15}\text{N}$ values of +3.9 to 4.2 percent in the waters of the Rainbow Springs Group, again, also within the range for inorganic fertilizers.

While much historic water quality data exists, recent and current research and monitoring for the Rainbow River is being coordinated by SWFWMD and DEP for Pollutant Load Reduction Goals (PLRG) and TMDL programs. The Florida Legislature recognized the need to place additional emphasis on restoration, protection and management of the surface waters of the state by enacting the SWIM Act of 1987 which directed the State's water management districts "to design and implement plans and programs for the improvement and management of surface waters" (Section 373.451 F.S.). SWFWMD adopted the Rainbow River as a SWIM water body in 1989 and developed the first Rainbow River SWIM Plan. The SWIM Plan has been updated periodically (1995, 2004). The 1995 SWIM plan recognized the need to establish a PLRG which is an estimated numeric reduction in pollutant loading need to preserve or designated uses of receiving water bodies and maintains water quality consistent with state standards (SWFWMD, 2008). The 1995 and 2004 plan established a PLRG of zero which means that the goal was to prevent nutrient levels from increasing beyond current levels. However, nitrate levels continue to increase at the headspring from historic background levels of 0.1 mg/L to concentrations of >2.0 mg/L in 2013. Aquatic preserve staff will continue the partnership with appropriate entities to expand the water quality knowledge base of the aquatic preserve and the associated springshed through cooperative efforts supplying staff time and equipment to further research and to identify issues affecting the aquatic preserve.

Surface Water Monitoring

In 2002, RSAP began a partnership with SWFWMD conducting extensive water quality data collection in the Rainbow River. Data originally was collected monthly from 2002 through 2005, then was reduced to bi-monthly through 2009, and is currently being sampled quarterly (four times per year). Parameters collected via YSI 650 MDS handheld data sonde include temperature ($^{\circ}\text{C}$), salinity (ppt), pH, specific conductivity ($\mu\text{S}/\text{cm}$), total depth (m), and dissolved oxygen (mg/L). Water clarity is evaluated using a horizontal Secchi disk. Water grab samples are collected for chlorophyll assessment and



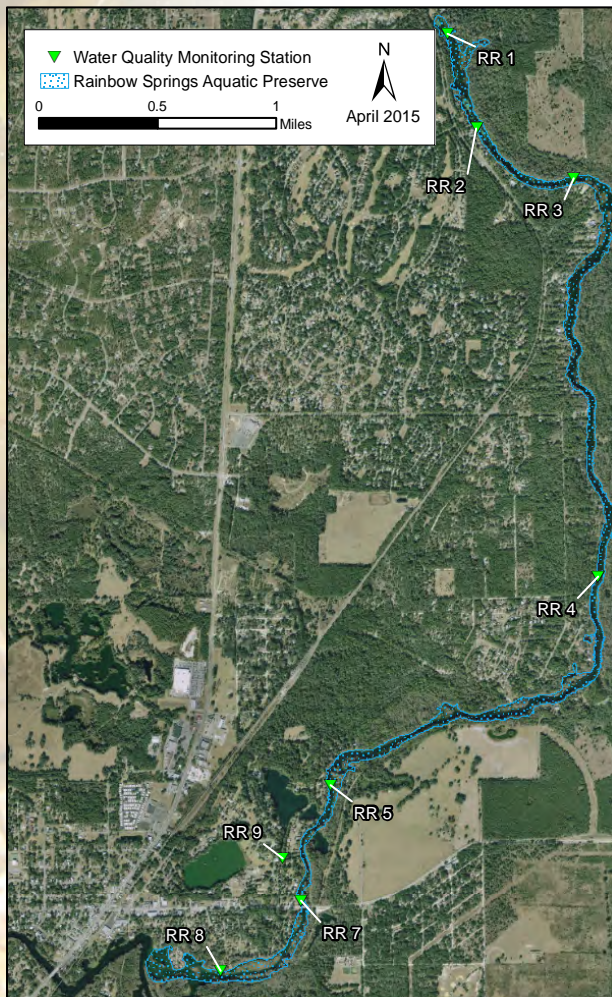
Staff collecting water chemistry samples.

phosphorus and nitrogen analysis. Specific parameters collect in the laboratory from these samples include: Chlorophyll a Mono (ug/L), pheophytin (ug/L), Chlorophyll A Tri (ug/L), Chlorophyll C (ug/L), color (mg/L), turbidity (NTU), total suspended solids (mg/L), volatile suspended solids (mg/L), ortho phosphorus (mg/L), total phosphorus (mg/L), Ammonia (mg/L), nitrate+nitrite (mg/L), nitrite (mg/L), nitrogen (mg/L), total kiehdahl nitrogen (mg/L), alkalinity (mg/L), dissolved Iron, dissolved copper, dissolved molybdenum, dissolved Zinc, dissolved cobalt, dissolved manganese, dissolved calcium (mg/L), dissolved magnesium (mg/L), dissolved potassium (mg/L), dissolved sodium (mg/L), and total organic carbon.

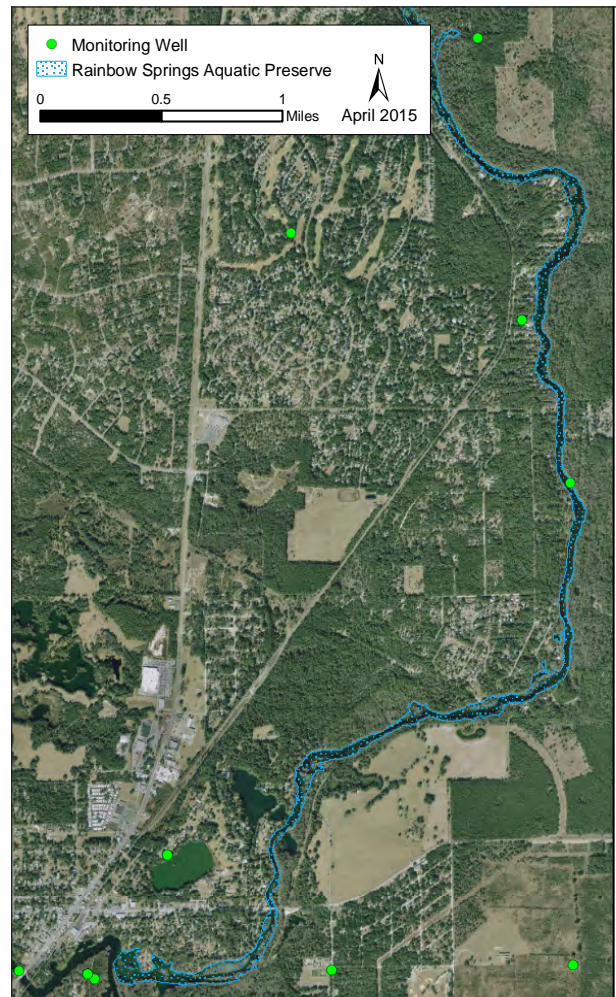
RSAP began monthly surface water monitoring efforts in 2006 at eight sampling stations using YSI 6600 EDS-S data sonde equipment (Map 15). Measured parameters include sample time, temperature (°C), specific conductivity (uS/cm), salinity (ppt), pH, dissolved oxygen (mg/L), and total depth (m) all parameters are recorded at 0.5 m depth. Water clarity is also measured using the horizontal Secchi disk technique based on SWFWMD sampling protocol. To ensure quality assurance, YSI equipment is calibrated prior to and after each sampling event. A GPS handheld unit is utilized to ensure samples are taken at the same locations monthly. Sampling objectives are to quantify spatial/temporal variability and trends of the selected abiotic parameters within the Rainbow River. Data associated with these stations is available upon request to RSAP. Generally water quality data collected at Station RR-1 (headspring) are consistent over the period of record including water temperature averaging approximately 23.1 (°C) annually, pH 7.84, specific conductance 184 (uS/cm), total alkalinity 68 mg/L as CaCO₃ and total phosphorus 0.03 mg/L.

Dissolved Oxygen

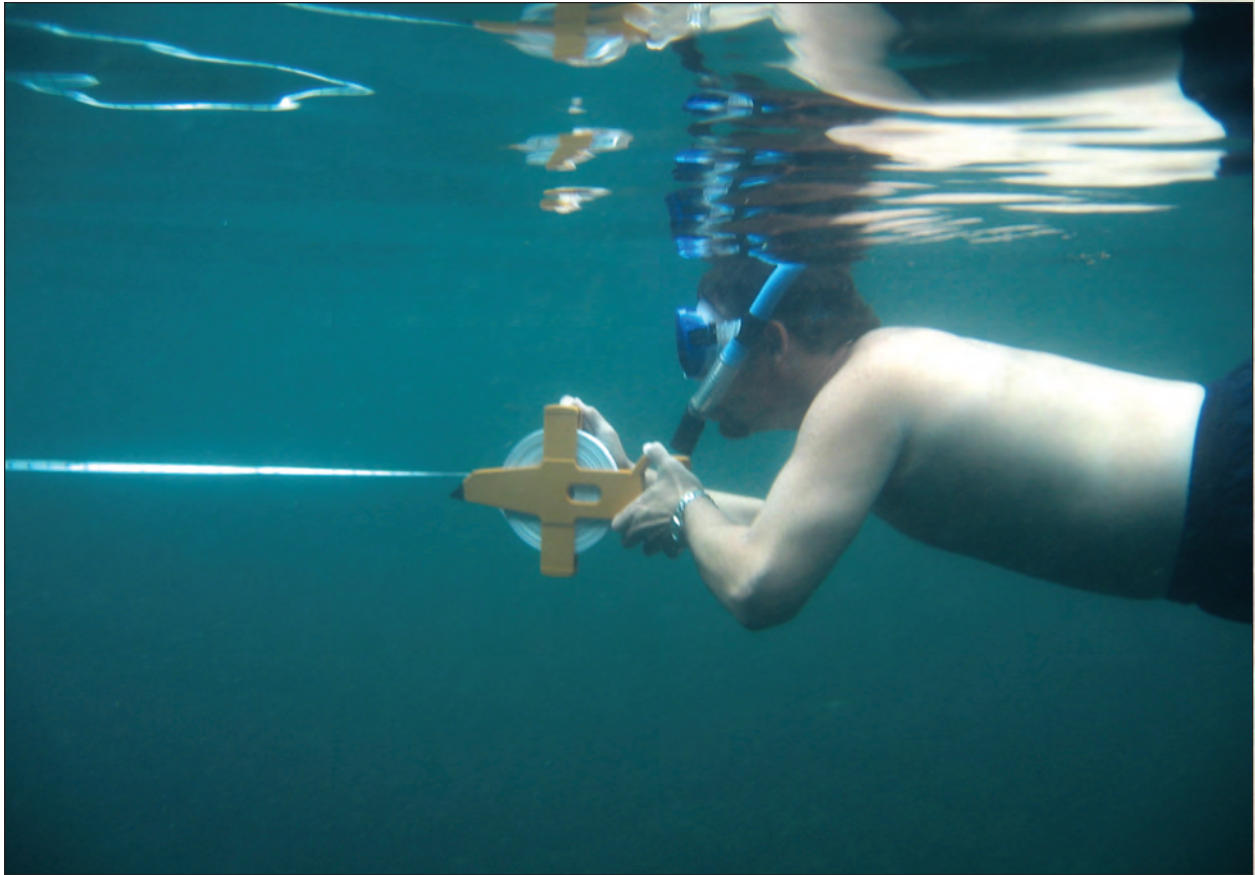
Dissolved oxygen (DO) concentrations in the Rainbow River are some of the highest in any large spring in the state. From 2006 to 2013, mean average DO was 7.42 mg/L at RR-1 (headspring), 9.41 mg/L at RR-4 (mid-river), and 9.01 mg/L at RR-8 (lower river). DO concentrations generally increase with distance downstream in the Rainbow River as a result of high levels of primary productivity (Wetland Solutions,



Map 15 / Surface water quality monitoring stations in Rainbow Springs Aquatic Preserve.



Map 16 / Wells sampled within the Rainbow Springs Aquatic Preserve springshed.



Staff collecting water clarity data.

Inc., 2010). Variability in the concentrations of DO between stations can also be impacted by water depth, clarity, time of day and presence or absence and density of submersed aquatic vegetation. The most commonly accepted explanation for high DO at spring vents is that the water being released is mostly derived from the upper portion of the aquifer and is therefore comparatively “young” water whose residence time in the aquifer has been relatively short (Katz et al., 1999).

Water Clarity

Water clarity is the measurement of the transparency of water. Few places in the world can match the exceptional water clarity of the Rainbow River. Water clarity is measured using a Secchi disk deployed horizontally due to the shallow nature of the spring runs. Water clarity in spring runs can be affected by many factors. The most important being rate of ground water discharge, current velocity (residence time), nutrient concentrations, distribution of SAV and the size and makeup of the surrounding flood plain. Clarity has been measured as high as 81.4 meters. From the headspring, water clarity decreased rapidly within the first 1.2 miles from approximately 68.6 meters to 22.9 meters (Stations 1-3). Water clarity continues to decline further down river (Stations 4-7) but at a much slower rate. At station 7, clarity has decreased by 85 percent to approximately 10.7 meters compared to the headspring station. While this is a dramatic decline, the trend is commonly observed in similar systems such as the Silver River, Silver Glen, Salt Springs and the Weeki Wachee River.

Ground Water Monitoring

SWFWMD, with assistance from DEP, continue to monitor groundwater chemistry through various programs in their environmental section. The wells sampled within the springshed and watershed (Map 16) are associated with the Upper Floridan Aquifer Nutrient Monitoring Network. This project involves yearly water sample collection and analyses from wells located in springs-groundwater basins across Levy, Marion, Citrus, Hernando, and Pasco counties. The data are collected to monitor and evaluate nitrate levels in the Upper Floridan aquifer. They are also used to determine potential water-quality impacts to both potable groundwater resources and the sources of nitrate discharging at down gradient springs that form the headwaters of streams in SWFWMD’s Coastal Rivers and Withlacoochee River basins.

SWFWMD and DEP also sample water chemistry from several springs associated with the main boil and upper river. These sites are associated with the Quarterly Springs Water Quality Monitoring Network.

This network involves quarterly to yearly sampling and analyses to track and assess increasing trends in dissolved nitrate discharging from the Upper Floridan aquifer at springs. Data are also used to identify the sources of elevated nitrate concentrations through nitrogen isotope analysis. Other concerns include monitoring major constituents of salinity and dissolved mineral content in coastal regions, as well as periodic monitoring for anthropogenic pollutants such as synthetic hydrocarbons and pesticides. General trends indicate an increasing nitrate concentration from the common spring vents sampled (#1, #4, Bubbling Spring and #6) with variable values between vents for the period 2001 to 2015 (Table 5). Mumma (1996) sampled six spring vents of the Rainbow River headspring in 1995 for total nitrogen and reported mean averages of (0.73 mg/L #1), (0.67 mg/L #2), (0.56 mg/L #3), (1.10 mg/L #4), (1.21 mg/L #5) and (0.48 mg/L #6).

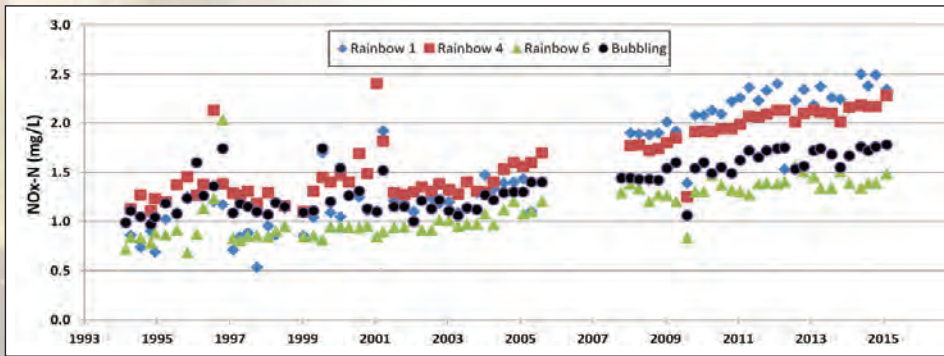


Table 5 / Spring vent nitrate graph 1994-2014.

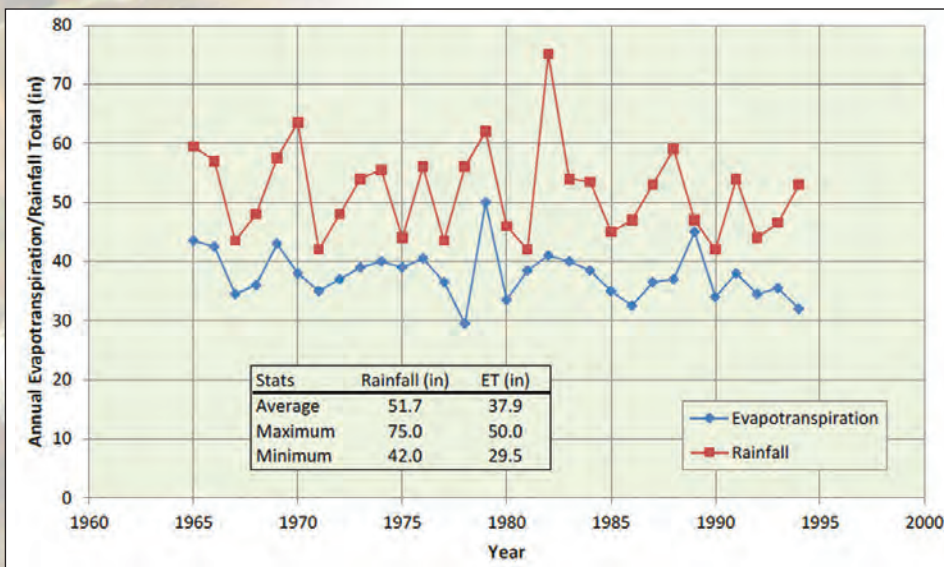


Table 6 / USGS annual evapotranspiration / rainfall total.

Groundwater recharge is directly related to annual dry and wet weather events. USGS estimated the average recharge rate between 1965 and 1994 to be about 13.9 inches per year. This figure was obtained taking the average evapotranspiration rate of 37.9 inches per year and subtracting it from the average rainfall total of 51.7 inches per year (Table 6).

USGS has monitored the groundwater discharge of the Rainbow River since 1917, reporting average annual discharge data. Daily average well elevation data was recorded starting in 1964. The method of measuring discharge is based on the relationship between the discharge measurements and the artesian pressure at a well located near the headsprings. The annual average discharge from 1917 to 2012 was 702 cubic feet per second (cfs) or 453 million gallons per day (MGD), with a minimum annual average of 502 cfs (324 MGD) from 2011, and a maximum annual average of 911 cfs (588 MGD) from 1965 (Wetland Solutions Inc., 2013).

In a cooperative cost sharing effort, the USGS and SWFWMD have partnered in 2013-2014 to establish two new fixed gauge stations in the Rainbow River system to complement the two existing stations. The purpose of these new gauges is to provide baseline stage data to assist in the establishment of Minimum

RSAP will continue to partner with all entities that contribute to the water quality knowledge base of the Rainbow River and to identify issues pertinent to the aquatic preserve and continue to encourage and participate in additional research in RSAP.

Water Quantity

Water quantity associated with the Rainbow River is a complex issue of hydrological interactions spanning over an approximate 735 sq. mile (470,000 acres) ground water recharge area. This springshed area encompasses Marion and parts of Levy and Alachua counties. The quantity of waters discharged from the numerous vents and seeps in the upper 1.5 miles of the Rainbow River are important to the overall health and quality of the riverine system with ground water contributing 97-99 percent of the river flow. According to Jones et al. (1996), of the total flow associated with the Rainbow River, 89 percent of the water discharges in the upper 1.5 mile portion of the river.

Flows and Levels (MFL) for the Rainbow River (Map 17). The Rainbow River MFL is tentatively scheduled for completion by 2016. Stations are located at varying intervals, ranging from the headspring to the lower river. These stations are designed to act as a water-stage recorder, acoustic-velocity meter, and as a data-collection platform.

The original USGS non-recording gauge located at Latitude 29°06'09" N, Longitude 82°26'15" W was established in the headspring area of the Rainbow River in 1994. RSAP staff retrieve data from this location on a weekly basis. Data are supplied to SWFWMD's MFL section as scientific support. Data associated with this station are available upon request from RSAP.

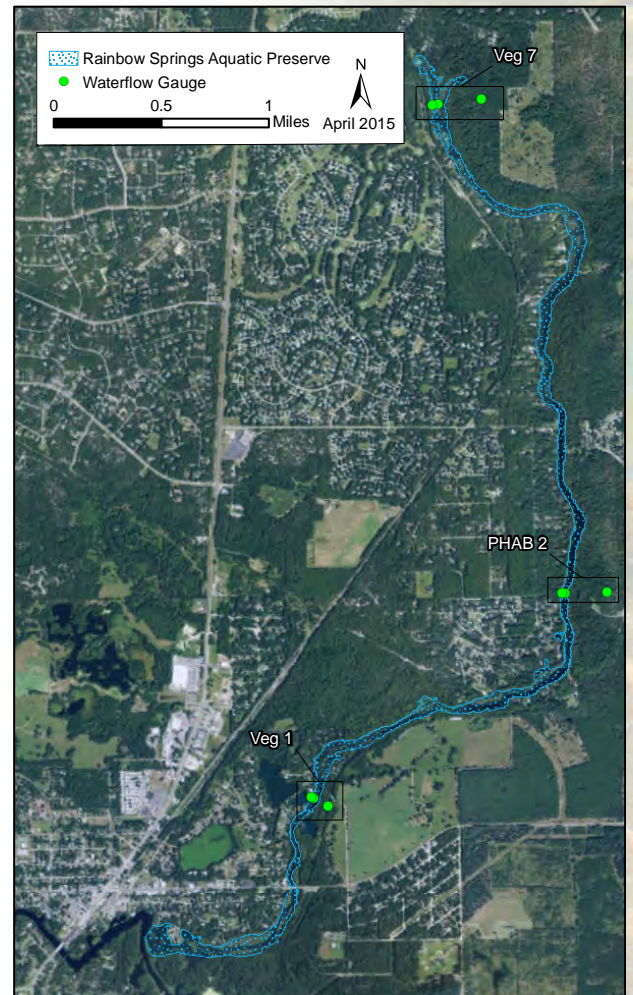
The SWFWMD has responsibility to permit the consumptive use of water and a legislative mandate to protect water resources from "significant harm", has been directed to establish MFLs for streams and rivers within its boundaries (Section 373.042, Florida Statutes). As currently defined by statute, "the minimum flow for a given watercourse shall be the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area." Development or adoption of a minimum flow or level does not in itself protect a water body from significant harm. However, protection, recovery or regulatory compliance can be gauged and achieved once a standard has been established. SWFWMD's purpose in establishing MFLs is to create a yardstick against which permitting and/or planning decisions regarding water withdrawals, either surface or groundwater, can be made. Should an amount of withdrawal requested cause "significant harm," then a permit cannot be issued. If it is determined that a system is either not in compliance, or expected not to be in compliance during the next 20 years, as a result of withdrawals, then a recovery plan is developed and implemented. RSAP recognizes the importance of protecting the springs and wetlands associated with the Rainbow River and will continue to assist SWFWMD and associated researchers in completion of the MFL process.

Aquatic Vegetation Mapping

The aquatic plant communities found within RSAP are vital to the productivity and health of the river ecosystem. The condition of SAV is considered to be an important indicator of wetland ecosystem health. Therefore, RSAP continues to partner in a recurring plant survey and mapping project funded by SWFWMD that has taken place approximately every five years since 1991 (1991, 1996, 2000, 2005 and 2011). The most recent survey and mapping project was conducted in 2015. The project has resulted in precise and detailed SAV distribution maps. The results of the survey demonstrated several changes in the dynamics of individual plant species as well as the entire plant community of the Rainbow River. A brief overview of the survey includes information on four of the most dominant SAV plant species found in the Rainbow River.

The most dominant plant species in the Rainbow River for the period of record of the survey was strap-leaf sagittaria which accounted for approximately 54 percent of the relative area for SAV in 2011 (Atkins North America, Inc. & Debra Childs Woithe, Inc., 2012). By far, this plant species occupied more submerged acres than any other aquatic plant species. The relative area of sagittaria has declined 23 percent since 2000 and 20 percent between 2005 and 2011.

The second most dominant species, hydrilla is an invasive exotic species. It was found throughout the entire river and occupied 25.65 acres of submerged riverbed in the 2005 survey. Between 1996 and 2005, the amount of hydrilla in the Rainbow River increased by 13 percent. However the dynamics of the hydrilla plant community have changed somewhat in that time period. Prior to the 2005 survey, the vast majority of the hydrilla plant community did not extend far beyond the river edges. Although hydrilla was largely confined to the river edges in the 2005 survey, there were areas of the river where hydrilla formed



Map 17 | Flow monitoring stations near Rainbow Springs Aquatic Preserve.

large beds extending across the river channel that were not present in the 1996 and 2000 surveys. However, between 2005 and 2011 the relative area of coverage declined 63 percent primarily in the lower Rainbow River (Atkins North America, Inc. & Debra Childs Woithe, Inc., 2012).

The third most dominant species over the period of survey was tapegrass or eelgrass. It occupied a total of 8.05 acres in 2005. Of the three dominant plant species listed here, tapegrass has shown the most increase in acreage occupied since 1996. Between 1996 and 2005, the tapegrass plant community increased by 33 percent but decreased in relative coverage five percent from 2005 to 2011. Tapegrass accounted for 11 percent of the SAV relative coverage in 2011. An interesting aspect of the tapegrass plant community is that it has demonstrated the ability to establish itself in areas that have been predominantly hydrilla (Atkins North America, Inc. & Debra Childs Woithe, Inc., 2012).

Southern naiad (*Najas quadalupensis*) was the fourth most prevalent SAV species in the Rainbow River between 1996 and 2011. It accounted for eight percent of the SAV species relative coverage in 2011. RSAP staff have noted that southern naiad often occurs in the same areas as the invasive exotic hydrilla and is susceptible to the herbicides used for hydrilla treatment, which could impact its relative coverage in these areas.

Algae was mapped for the first time in 2011, but it has been observed qualitatively by RSAP staff to be increasing over the last several years. Algae coverage is lowest in the upper Rainbow River and increases as you move down stream. Atkins North America, Inc. & Debra Childs Woithe, Inc. (2012) reports that the lower river is dominated by benthic algal mats with an average coverage of 60 percent.

RSAP considers this Rainbow River mapping and evaluation program to be critical to monitoring ecosystem health of the aquatic preserve and will continue to partner with SWFWMD to continue these efforts.

4.1.3 / Ecosystem Science Issue

Issue 1: Water Quality

Water quality is one of the primary issues of importance for RSAP. Without adequate safeguards, historical land use or changes in current land uses often lead to degradation of water quality through increased nutrient loads. RSAP has experienced changes in water quality that have negatively impacted the natural habitats and wildlife, as well as decreased the aesthetic benefit for public use.

Goal One: Further develop and improve the strategic long-term water quality monitoring program within RSAP that will assist with identifying and addressing issues pertaining to the natural resource.

Objective One: Analyze and interpret the status and trends of RSAP's water quality throughout the aquatic preserve to identify potential impacts to natural resources and provide quality scientific data and recommendations to address such issues.

Integrated Strategy One: Maintain a strategic long-term water quality monitoring program that includes both biotic and abiotic parameters to compile and analyze data to evaluate water quality status and trends. This will be achieved through monthly field data collection by RSAP staff to supplement the quarterly coordinated efforts conducted by SWFWMD and RSAP. RSAP will collect parameters measured by YSI equipment (including time, temperature, specific conductivity, pH, salinity, dissolved oxygen, and depth) as well as water clarity measurements.

Integrated Strategy Two: Continue to coordinate and collaborate with DEP, SWFWMD, and other entities that collect water quality data within the aquatic preserve to inform managers and the general public about water quality conditions. Staff maintains a fair amount of historic water quality monitoring data, but additional historic data is available.

Performance Measure One: Conduct monthly water quality data collection with YSI data sondes.

Performance Measure Two: Develop an annual report detailing scientific results and recommendations regarding the water quality of RSAP.

Objective Two: Identify specific and emerging water quality issues related to nutrients, pollution, and environmental contaminants and coordinate with other agencies to develop appropriate response strategies to these issues.

Integrated Strategy One: Support implementation of the TMDL and BMAP programs for RSAP, whose goal is to reduce nutrient loads in degraded water bodies, as determined by DEP criteria, throughout the state of Florida.

Integrated Strategy Two: Staff will increase awareness of specific and emerging water quality issues related to nutrient, pollution and environmental contaminants through environmental outreach by attending various local workshops and public meetings.

Performance Measure One: Conduct bi-annual meetings with appropriate entities SWFWMD, FWC's Invasive Plant Management Section (IPMS) and DEP to evaluate emerging trends in water quality.

Performance Measure Two: Track attendance at public meetings discussing or presenting water quality data.

Goal Two: Protect flow regimes of the Rainbow River system.

Objective One: Support planned implementation of the MFLs of the Rainbow River.

Integrated Strategy One: Collaborate with SWFWMD and interested stakeholders to review and comment on issues related to the implementation of the MFLs and proposal of future MFLs.

Integrated Strategy Two: Staff will assist in the collection of pertinent field data, as well as provide additional existing data, associated with the MFL process.

Performance Measure: RSAP staff will continue to collect and provide staff gauge data from the location of the historic, but non-recording, headspring USGS staff gauge.

4.2 / *The Resource Management Program*

The Resource Management Program addresses how FCO manages RSAP and its resources. The primary concept of RSAP 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 springshed. Springshed and adjacent area management activities, and the resultant changes in environmental conditions, affect the condition and management of the resources within their boundaries.

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 Management 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. RSAP also collaborates with these groups by reviewing various protected area management plans. The sound science provided by the Ecosystem Science Management Program is critical in the development of effective management projects and decisions. The nature and condition of natural and cultural resources within RSAP are diverse. This section explains the history and current status of our Resource Management efforts.

4.2.1 / *Background of Resource Management at Rainbow Springs Aquatic Preserve*

Water quality, submerged aquatic vegetation monitoring, exotic plant control, and wildlife enhancement programs have been developed in house and in coordination with other agencies, research entities, and local private organizations to support resource management activities. A majority of the resource management needs have remained the same and include evaluating and documenting any impacts or changes as they occur within RSAP. The primary focus of resource management has been on both impacts of individual action and that of the cumulative impacts of all changes on the natural system. RSAP staff have been involved with the commenting and review of proposed environmental regulatory permits, MFLs, TDMLs, land acquisition projects and adjacent state land management reviews. Technical support is also provided by staff to other land managers and regulatory authorities regularly such as conducting field assessments, making suggestions to appropriate agencies, ensuring compliance with established rules and regulations, and notifying the appropriate agencies of violations and illegal activities within the aquatic preserve. Proper and continuous communication with appropriate local, state, federal agencies, as well as private organizations, is crucial in protecting and properly managing the resources within RSAP.

Protection and the acquisition of adjacent lands plays a considerable role in protecting the RSAP resources. In 2006, Rainbow River Conservation Incorporated submitted a Florida Forever application to preserve open land along the Rainbow River corridor in Marion County. The acquisition of the proposed

properties will have a significant impact on the water quality and habitat within RSAP. The ongoing efforts made by state, local and private entities to purchase land adjacent to the aquatic preserve are key to the success of the Resource Management Program.

4.2.2 / Current Status of Resource Management at Rainbow Springs Aquatic Preserve

Staffing and Management Strategic Approach

RSAP currently has one select exempt employee serving as manager and field staff. RSAP has an allocated OPS Environmental Specialist I position that is currently unfunded. Management of RSAP and Oklawaha River Aquatic Preserve encompasses more than 33 miles of submerged land. Due to the significant nature of RSAP (the fourth largest first magnitude springs system in Florida) and limited program resources, aquatic preserve staff work with a variety of different stakeholders to protect and restore RSAP resources. Staff often partner with other land managers, agencies, researchers and private entities to accomplish resource management goals. RSAP strives to be as effective as possible and shares resources such as staff time, vessels, and equipment to accomplish common goals. Management of RSAP primarily takes on a proactive and preventative approach. Currently, the upper and middle portions of RSAP require limited restoration. Focus and efforts there are primarily on prevention of further decline. Due to the extensive degradation of the lower portion of RSAP, long-term planning, involving multiple stakeholders, is needed for the appropriate management and restoration of the lower portion of the river.

The present status of RSAP Resource Management Programs, accompanied by future needs, are detailed in the following sections.

Permitting, Enforcement, and Mitigation

RSAP staff provides technical support to many local entities including: Southwest DEP regulatory districts, U.S. Army Corp of Engineers, SWFWMD, St. John's River Water Management District, Florida Park Service District 2, FWC, City of Dunnellon and Marion County Code Enforcement.

RSAP staff often assist these agencies with permit application reviews and comments, mitigation planning, and public interest project opportunities. Due to the high rate of turnover of regulatory staff, communication and cooperative relationships are hard to maintain between RSAP staff and regulatory districts. RSAP staff assessments are often relied on by regulatory as a source of information related to resource conditions and possible impacts within the Rainbow River. Staff meets with the environmental regulatory permitting staff on an as needed basis for field site inspections and pre-application meetings. DEP provides materials and training to regulatory staff which ensures consistent permitting and application of the Aquatic Preserve Rule, Chapter 18-20, Florida Administrative Code. RSAP staff will continue assisting the regulatory agencies and stakeholders to ensure impacts to the aquatic preserve are kept to a minimum to protect the resource.

Habitat Restoration & Enhancement

The Society for Ecological Restoration defines ecological restoration as an “intentional activity that initiates or accelerates the recovery of an ecosystem with respect to its health, integrity and sustainability” (Society for Ecological Restoration, 2015). Restoration activities should reestablish the ecological integrity of degraded ecosystems including structure, composition, and the natural processes of biotic communities and the physical environmental. Ecosystems with integrity are self-sustaining and resilient natural systems that are able to accommodate stress and change. Restoration activities should be designed to achieve ecological integrity at the greatest extent that is practical under current environmental conditions and limitations. An important step in any restoration project is to identify the causes of degradation and eliminate or remediate those causes. Restoration efforts are likely to fail if the sources of degradation persist. Early in the planning stage, it is important to identify if the restoration project is scientifically, financially, socially, and ecologically feasible to ensure that limited fiduciary resources are used in the most appropriate manner and to increase the probability of success. Restoration projects must have clear, measurable and achievable goals to 1) help guide project implementation activities and 2) provide the standard for measuring project success. Each restoration project presents a unique set of environmental conditions, variables and project goals (U.S. Environmental Protection Agency, 2012). Therefore, it is important to evaluate each project on a case by case basis.

Shoreline Restoration

Human influence in spring ecosystems can have both a positive and/or negative effect. Unfortunately, the aquatic preserve can be damaged and overused if human use is excessive or improperly managed.

Being one of the most popular spring-fed rivers in the state, Rainbow River has two access points via RSSP and Marion County K.P. Hole County Park, which allows for high intensity human use. In addition to these access points, additional usage occurs by the means of vessels entering the aquatic preserve from the City of Dunnellon boat ramp on the Withlacoochee River (Wetland Solutions, Inc., 2013). Causes of shoreline damage associated with RSAP include storm water runoff, unregulated boat landings, user access points, and unauthorized vegetation removal. All of these activities impact the integrity of the river shoreline. Shoreline restoration efforts include the utilization of materials like rip rap, vegetative restoration planting, and topography contouring via the use of swales and berms.

RSAP has partnered with RSSP, Marion County, city of Dunnellon and local property owners to promote the protection and restoration of the shoreline of the Rainbow River and properties and parks adjacent to RSAP. In 2004 aquatic preserve staff identified a shoreline area at the RSSP campground that was highly impacted by overuse related to boat docking and foot traffic. Through a coordinated effort between park and RSAP staff, a 125 foot area of shoreline was closed to boat docking through the creation of a "Vessel Exclusion Area" and restored by aquatic preserve staff using native submerged and emergent vegetation. In 2007, RSAP collaborated with Marion County Parks and Recreation with the design and installation of shoreline stabilization material at K.P. Hole County Park to restore an area of high erosion. RSAP also provided and assisted county staff in planting bald cypress and red maple trees to enhance the shoreline area. These are examples of the multiple projects undertaken by RSAP staff to coordinate and participate in restoration and enhancement of the Rainbow River.

Invasive Non-Native Removal and Treatment

Invasive exotic species have negative effects on the communities in which they invade by threatening the structure and function of diverse native aquatic ecosystems. Many invasive aquatic plants pose a significant threat to human welfare by impeding flood control, stop recreation like swimming and fishing, and reduce tourism and property values. FWC IPMS is the lead agency responsible for permitting, coordinating, and funding statewide programs designed to control invasive aquatic and upland non-native plants on public conservation lands and waterways.

Like many areas throughout Florida the proliferation of non-native or exotic nuisance plant species has been a long standing issue within RSAP. A cooperative effort between IPMS, SWFWMD and aquatic preserve staff has been in place since 2003 to survey the Rainbow River for invasive exotic vegetation on a quarterly basis. The two invasive species that are currently managed for in RSAP by FWC are hydrilla and water-lettuce. IPMS contracts with SWFWMD to apply chemical treatments to the Rainbow River.

Hydrilla is a submersed plant native to Africa and Southeast Asia and introduced to Florida in the 1950s and has been routinely treated with chemical herbicides on a regular basis since 1997 in the RSAP. The acreage treated has varied from year to year but has decreased dramatically since 2010. Hydrilla is difficult to control due to the persistence of turions (reproductive structures) and tubers in the substrate. Hydrilla is the only member of the Hydrocharitaceae family to form both tubers and turions (Gettys et al., 2009). In areas of high flow or current velocity chemical treatments are not as effective due to limited residence time of the herbicide. After observing treatment results between 2003 and 2005 RSAP, FWC IPMS and SWFWMD staff determined that the amount of control was not satisfactory. At the request of RSAP staff the treatment regime was modified from one single day treatment per area to back to back applications over two days per area, which has resulted in a much more effective treatment regime and an extended duration of control. For the period of 2005-2011, hydrilla relative coverage decreased from 10.90 hectares to 4.05 hectares. This represents a 63 percent decline in hydrilla coverage over the time period (Atkins North America, Inc. & Debra Childs Woihte, Inc., 2012).



Removing invasive exotic plants from the river.

Water-lettuce is a floating plant native to South America is considered to be one of the worst weeds in subtropical and tropical regions of the world. Water-lettuce was first documented in Florida in 1765, linked to early shipping commerce between Florida and South America. Under optimal environmental conditions water-lettuce can double its population size in less than three weeks and seed production makes it resilient to freezing and drought conditions (FWC, 2015). Water-lettuce is primarily located in the middle and lower sections of the Rainbow River with small populations located in back areas throughout the preserve. Annual treatments are applied in the winter months by SWFWMD, to avoid browning of surrounding emergent vegetation. Water-lettuce population size varies between years and has been routinely treated since 1997.

Date	# Plants Removed	Presence /Absence
12/19/2008	5	Y
3/5/2009	7	Y
3/12/2009	4	Y
4/6/2009	3	Y
5/1/2009	6	Y
6/4/2009	4	Y
7/7/2009	4	Y
8/18/2009	3	Y
10/14/2009	5	Y
1/15/2010	3	Y
2/23/2010	2	Y
3/31/2010	3	Y
5/21/2010	4	Y
6/22/2010	2	Y
7/28/2010	0	N
12/19/2008	0	N
10/7/2010	0	N
11/30/2010	0	N
1/6/2011	2	Y
2/15/2011	2	Y
3/16/2011	0	N
4/28/2011	0	N
6/28/2011	0	N
8/1/2011	0	N
10/19/2011	0	N
12/21/2011	0	N
3/2/2012	0	N
5/22/2012	0	N
10/21/2012	0	N
2/18/2013	0	N
6/15/2013	0	N
2/18/2014	0	N

Table 7 | Eurasian water milfoil removal.

While the large scale non-native vegetation control program is coordinated by RSAP through its partnership with FWC IPMS and contracted to SWFWMD, the aquatic preserve also maintains a permit through FWC IPMS to control hydrilla, water-lettuce, wild taro, umbrella flat sedge (*Cyperus involucratus*), lyngbya, Eurasian water milfoil, torpedo grass, arrow-leaf elephant's ear (*Xanthosoma sagittifolium*) and water trumpet for hand removal and chemical treatment. Aquatic plant control permits are also available through FWC IPMS to private landowners along the Rainbow River to control non-native species. Aquatic preserve staff review all non-native plant control applications and perform site visits with IPMS staff before permits are issued.

Eurasian water milfoil is a non-native invasive weed that was first introduced from Europe to the United States in the 1940s; its geographic and ecological distribution surpasses that of most other North American aquatic weeds (Gettys et al., 2009). On December 10, 2008, Eurasian water milfoil was discovered in a 0.5 acre area of the Rainbow River during a scheduled aquatic plant survey by RSAP staff, south of the K.P. Hole County Park. Aquatic preserve staff coordinated with FWC IPMS to determine an appropriate control strategy and began a hand removal program on December 19, 2008 with IPMS staff (Table 7). All visible plants were removed by hand monthly through March 2011. No new plants have been documented in RSAP during scheduled survey events to present. It was determined by FWC IPMS and RSAP that the likely source of the introduction was from commercial boat trailers from the Crystal River, Florida area unloading vessels at the K.P. Hole County Park. To limit the prospect of re-introduction of the Eurasian water milfoil FWC IPMS and RSAP staff coordinated to distribute an informational letter to commercial dive interests in the Crystal River area that frequent RSAP.

Water trumpet is an evergreen, low growing, herbaceous plant belonging to the Arum family. It originates from the tropical coasts of India to Southeast Asia and the island regions of Malaysia and Indonesia. Water trumpet is cultivated worldwide as an aquarium plant. The site in RSAP and one in Texas are the only known naturalized occurrences of water trumpet in North America (Jacono, 2002). In 1989, water trumpet was first noted for Florida in the RSAP in a shallow secluded side run located in the headspring area known

as Bubbling Spring. Since 2002, aquatic preserve staff has maintained a barrier around the 1270 square foot area to contain the infestation. Several different management options have been considered by the aquatic preserve, FWC IPMS and the University of Florida, including herbicide, hand removal, and light limiting ground cover. In 2006, aquatic preserve personnel installed three 1m x 2.5m black plastic framed covers to test light limitation control methods. Plots were monitored monthly for six months and resulted in limited control. Due to the biology of water trumpet it was determined that total coverage of the site would result in better control. RSAP continues to monitor the water trumpet and maintain the barrier that prohibits the plant's expansion. A cautious approach by RSAP and FWC IPMS to determine additional control methods has been taken because of the ability of water trumpet to expand rapidly in uncontrolled conditions. Future plans to treat with herbicide or to apply shade cloth to the entire area are under consideration with FWC IPMS and the University of Florida.

Wildlife Habitat Enhancement

Wildlife habitat enhancement is an important aspect of proper management for threatened and endangered, as well as specialist species. By providing one or more habitat requirement in a particular area, the survival or success of a particular species can increase. RSAP is home to many threatened and endangered species, as well as species with limiting requirements for survival. Wood ducks are the only cavity nesting waterfowl species that resides in RSAP, which classifies them as a specialist species. High-quality wood duck habitat is directly connected to preservation and management of old growth woodlands along river corridors and the availability of nesting sites. The primary threat to their population success is the continued decline of suitable nesting habitat. "Optimal nesting habitat contains up to five suitable cavities per acre in close proximity to brood-rearing habitat; however, since most natural cavities are not suitable for use by nesting wood ducks, these conditions frequently require that 50 or 60 natural cavities per acre exist. This illustrates the utility of providing suitable artificial nesting boxes to augment the availability of natural cavities" (United States Department of Agriculture, n. d.). Wood duck nesting boxes are installed throughout the RSAP to provide supplemental nesting cavities for this specialist species.

Beginning in 1995, thirty-five nesting boxes were installed within the RSAP by the local conservation group Rainbow River Conservation Inc. As of 2013, fifty wood duck nesting boxes are in operation within the aquatic preserve. Annually RSAP staff assist the Rainbow River Conservation members in a maintenance and data collection program to install new bedding material and count the number of nesting boxes containing egg fragments from the previous year to indicate usage. Percent usage varies from the low in 1995 (17 percent) to a maximum of 100 percent in 2007. Since 2003 to present percent usage has never been below 83 percent indicating a successful habitat enhancement program.

Species Monitoring

RSAP has had the opportunity to take part in a study on the dynamics of the turtle population on the Rainbow River. Although RSAP has only been a part of the study since 2004, this research project has been ongoing since 1990. It was begun by Dr. Peter Meylan of Eckerd College in St. Petersburg, Florida. The primary contribution of RSAP has been to provide staff and equipment to facilitate field sampling.

The aquatic turtle sampling area consists of approximately one mile of the Rainbow River, beginning at the RSSP campground north to the water boundary of the state park headspring. Species that have been collected include: Suwannee cooter, peninsula cooter (*Pseudemys floridana peninsularis*), Florida red-bellied turtle (*Pseudemys nelsoni*), common musk turtle (*Sternotherus odoratus*), loggerhead musk turtle, Florida softshell turtle (*Apalone ferox*), chicken turtle (*Deirochelys reticularia*), snapping turtle (*Chelydra serpentina*), and red-eared slider (*Trachemys scripta elegans*).

A comparison of data from one of the earliest turtle studies on the Rainbow River completed in 1942 shows that the dynamics of the turtle community has changed substantially. In 1942, the dominant turtle species



Volunteers assisting with wood duck habitat enhancement.



Turtles are captured and released after data collected for the aquatic turtle sampling.

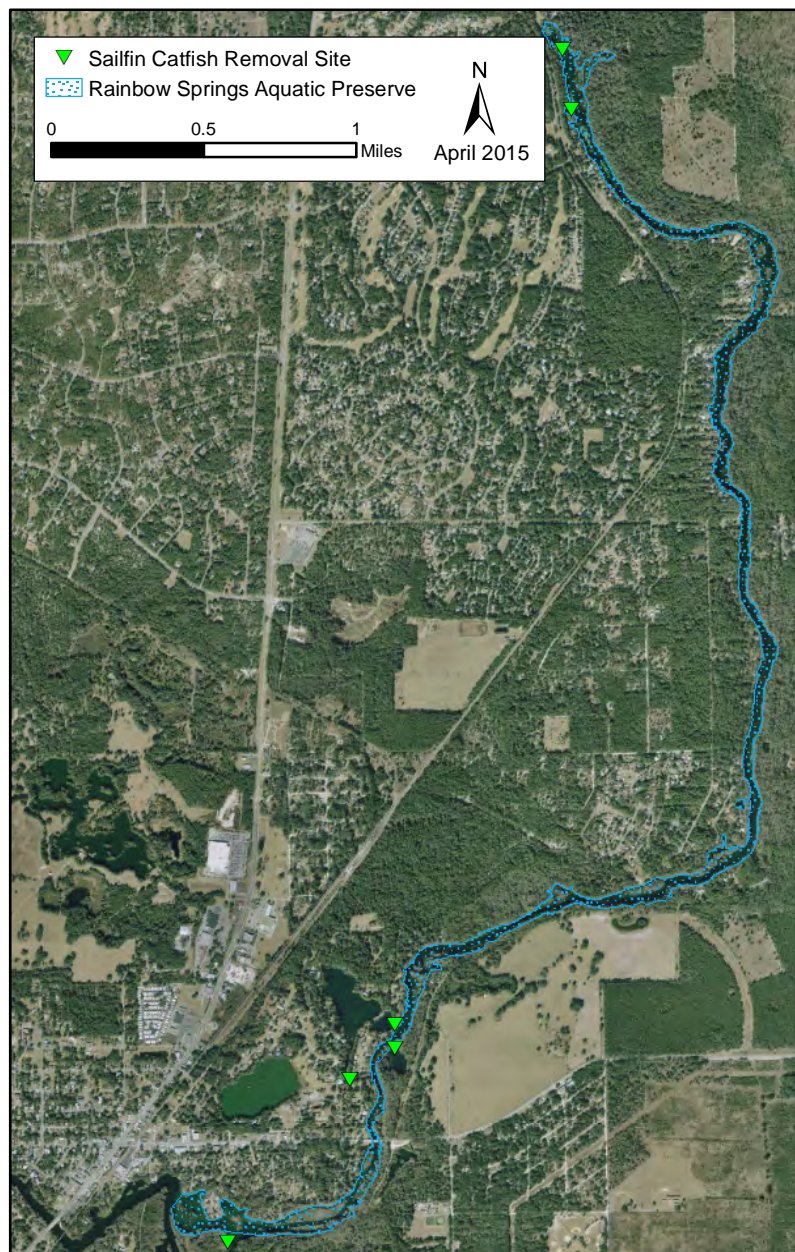
was the Suwannee River cooter. Today, the dominant species is the loggerhead musk turtle. This species is native to Florida, but not to the Rainbow River drainage. It is thought to have been introduced in the Withlacoochee drainage basin in the late 1950s. Between the 1950s and 1990, the loggerhead musk turtle population increased to more than 66 percent of the total turtle community. The populations of all of the larger turtle species declined during that time period - in particular, reproducing females in the 300 mm and greater range (Huestis & Meylan, 2004). This type of data collection has led to a greater understanding of the impact of human activity on turtle populations. This greater understanding has led to the elimination of commercial turtle harvest by FWC for all *Pseudemys* species throughout the state of Florida.

Non-native *Pterygoplichthys* (Loricariidae) are increasingly introduced and established in tropical and subtropical regions worldwide. Florida has a long history of introduction of loricariid catfish. These catfishes are of management concern, particularly when they occupy sensitive habitats such as springs and spring runs. Limiting introduction and spread is important because springs are among the most imperiled aquatic habitats in Florida and provide thermal refuge in the winter for *Pterygoplichthys* (Hill & Sowards, 2015). The exotic species vermiculated sailfin catfish was first documented in small numbers in the lower Rainbow River in December 2002; by March of 2003 they had disappeared and were not documented again by aquatic preserve staff until April 2006. At that time, staff began an intensive removal program throughout the entire Rainbow River run. The areal distribution was easily determined by their burrowing activities in the river bank (Map 18). The location of these areas were marked using a GPS device. Methods of removal were by gig (spearing device) and hand removal by aquatic preserve staff. A total of 28 catfish were removed from the Rainbow River between 2006 and March of 2008. Only adult specimens have been documented to date with an average length of 52.1 cm. Since the last removal period in 2008, no new sailfin catfish have been documented by aquatic preserve staff. RSAP staff continue to monitor the river quarterly for any indication of the sailfin catfish.

Nuisance Alligator Program

The Statewide Nuisance Alligator Program (SNAP) is administered by the FWC's Division of Hunting and Game Management. SNAP is one of five components of Florida's comprehensive Alligator Management Program. Its mission is to address complaints concerning alligators. Generally, an alligator may be deemed a nuisance if it is at least four feet in length and the caller believes it poses a threat to people, pets or property.

SNAP uses contracted nuisance alligator trappers throughout the state to remove alligators from locations where they are unwanted or unwelcome. If a complaint meets the qualifying criteria, SNAP will issue a permit to a contracted nuisance alligator trapper authorizing the removal of the animal.



Map 18 | Sailfin catfish removal sites in Rainbow River, 2006

Complainants must be able to grant legal access to the property on which the alligator is located. SNAP does not permit the removal of nuisance alligators from private or publicly managed property without first obtaining permission from the property owner or management authority.

Between the inception of SNAP in 1977 through 2012, 177,835 nuisance alligators have been harvested throughout Florida. In 2013, SNAP received 14,915 nuisance alligator complaints resulting in the removal of 8,053 nuisance alligators statewide. Due to the unique nature of RSAP and the mission and goals of FCO, protection of both flora and fauna are integral to resource management within the aquatic preserve. In 2012, RSAP entered into an agreement with FWC to create a targeted harvest area that encompasses the entire aquatic preserve. The targeted harvest area allows the removal of nuisance alligators from RSAP only with approval from the aquatic preserve manager or their designate. The targeted harvest area permit is active through August 2017, at which time it can be renewed.

4.2.3 / Resource Management Issue

Issue 2: Wildlife Protection and Habitat Restoration

RSAP is an important natural resource to both wildlife and the people of Florida. From an ecological perspective, RSAP has an abundance of flora communities that provide excellent habitat for Florida's native fauna. Resource management continues to be one of the most important strategies in maintaining the overall health and success of RSAP. Although many resource management needs have remained fairly similar over the last decade, additional needs do arise.

Goal One: Improve conditions for native flora and fauna.

Objective One: Monitor and assess the impacts of non-native and/or invasive flora located within RSAP.

Integrated Strategy One: Evaluate submerged and emergent aquatic vegetation compositions within the aquatic preserve, including the interaction between native and non-native and/or invasive species, and restore native species where feasible. Staff will also continue the RSAP partnership with SWFWMD on the Rainbow River Vegetation Evaluation which occurs at least every five years.

Integrated Strategy Two: Staff will continue to survey for non-native and/or invasive flora species, and develop treatment schedules to prevent further infestations and reduce current population sizes. This includes an existing partnership with FWC IPMS and SWFWMD.

Integrated Strategy Three: Increase public awareness through various educational outlets (literature, attend public meetings, etc.) relating to non-native vegetation and the importance of eradication within RSAP.

Integrated Strategy Four: Continue to coordinate with FWC IPMS to control non-native vegetation. Where appropriate, this partnership will replant treatment areas with suitable, native vegetation.

Integrated Strategy Five: RSAP staff will continue to review, and perform site visitations, for FWC IPMS invasive aquatic plant removal permit requests as they arise.

Integrated Strategy Six: RSAP staff will assess and implement restoration projects as they arise. Staff will continue to propagate transplant specimens for this purpose.

Performance Measure One: Staff will conduct monthly video transects at three stations in the upper RSAP to monitor any changes in the plant communities and will provide appropriate information to FWC IPMS and SWFWMD.

Performance Measure Two: Staff will conduct annual system wide non-native plant survey to determine area coverage in conjunction with FWC IPMS.

Objective Two: Monitor and assess wildlife populations located within RSAP.

Integrated Strategy One: Establish long-term monitoring sites for sailfin catfish and other non-native and/or invasive fish species. These sites will be established in conjunction with existing water monitoring stations and assessments will be performed monthly.

Integrated Strategy Two: Increase public awareness through various educational outlets (literature, attend public meetings, etc.) relating to non-native and/or invasive wildlife species and the importance of eradication within RSAP.

Integrated Strategy Three: Staff will continue the partnership with Rainbow River Conservation, Inc. in the monitoring and maintenance of 50 wood duck nesting boxes located at various points throughout RSAP.

Integrated Strategy Four: Continue partnership with Eckerd College in the study of aquatic turtle dynamics within RSAP.

Integrated Strategy Five: Continue to monitor nuisance alligator removal in RSAP through the targeted harvest area permit.

Performance Measure One: Track and record monthly monitoring for sailfin catfish and other non-native, invasive fish species.

Performance Measure Two: Produce an annual report on the state of non-native invasive fauna in RSAP.

Performance Measure Three: Produce an annual report on the effectiveness of the wood duck habitat augmentation program.

Performance Measure Four: Develop a Wildlife Management Strategy in conjunction with FWC, as staff and funding are available, to address imperiled fish and turtle species, and associated management prescriptions for their habitats; based on site-specific occurrence, population and sustainability data.

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 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 Rainbow Springs Aquatic Preserve*

The educational and outreach practices conducted by RSAP are geared towards promoting the goal of maintaining, and restoring the aquatic preserve for future generations. By coordinating and participating in various education and outreach events, RSAP is able to reach out to a wide and varied audience. Common target audiences for such events include: landowners and developers, commercial and recreational resource users, public and private students of all ages, organized working groups, the general public, as well as local, regional, state, and federal government agencies. While education and outreach is extremely important, participation proves difficult at times due to limited budget and lack of staff at RSAP.

4.3.2 / *Current Status of Education and Outreach at Rainbow Springs Aquatic Preserve*

Education and outreach play a crucial role in the management of RSAP. Efforts are made by RSAP to provide readily accessible literature that is both comprehensive and accurate regarding RSAP. A wide variety of information is available in the form of flyers, pamphlets, kiosks, and educational video programs. While some of this literature is created in house, some documents are also provided by other agencies and private entities to better represent resources within RSAP. This literature is distributed to the public via various posted permanent kiosks and through distribution by stakeholders and other state, local, and government agencies. Information ranges from proper uses of equipment within RSAP, pamphlets on native and non-native species, and additional information on the Aquatic Preserve Program and FCO. An informational exhibit representing RSAP is on display in the RSSP Visitor's Center as well as a second display in the park's campground recreation center. Signage and interpretive materials are on display and literature is available to the public free of charge.

In addition to posted and distributed literature, staff also attends various local and regional meetings and participates in working groups relating to RSAP. Involvement in these types of meetings is important to present and explain relevant information, such as data trends, to ensure the protection, preservation,



Snorkeling and diving are two of the recreational activities within the aquatic preserve.

and enhancement of the natural resources and to encourage sound decision making regarding both land use and natural resource management strategies. Furthermore, staff also participates in various local events to not only promote the aquatic preserve, but also to encourage environmental stewardship and share the importance of proper use and management of the natural resources. Examples of these community based events are: Marion County Springs Festival, National Public Lands Day, and the Friends of Rainbow Springs Kindergarten Days Program.

No issues have been explicitly associated with education and outreach at RSAP. However, education and outreach is an important component of management strategies associated with other issues.

4.4 / The Public Use Management Program

The Public Use Management Program addresses the delivery and management of public use opportunities at the 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 preserves and reserves that supports the research, education, and stewardship mission of the FCO."

While access by the general public has always been a priority, the conservation of FCO's sites is the primary management concern for the 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 Rainbow Springs Aquatic Preserve

RSAP which encompasses the entire Rainbow River to the ordinary high water line is one the largest spring-fed rivers in Florida with substantial ecological significance and scenic beauty. RSAP receives

hundreds of thousands of visitors per year which are drawn to its cool, clear waters. The aquatic preserve draws nature based tourism from across the state of Florida, nationally and internationally. Recreational uses within RSAP includes motor boating, tubing, canoeing, kayaking, paddle boarding, swimming, snorkeling, SCUBA diving, nature study and fishing.

Historically, the headspring area and the first 3000 feet of the river were privately owned and operated as a commercial attraction from the early 1930s until May of 1974 (Hollis, 2006). In 1990 the state of Florida acquired the fifty-five acre headspring area and an additional six hundred acres along the eastern shore of the Rainbow River. RSSP allowed limited visitation beginning in 1992 but was officially opened in 1995. Also in 1995 a campground located approximately one mile south of the headspring on the eastern shore was established by RSSP and was managed by Marion County until 2005 when the state park resumed management responsibilities. In 2008 RSSP opened a tubing operation between the campground and a newly completed facility 1.5 miles downriver. However, these state lands only encompass approximately two miles of river shoreline. The majority of the remaining shoreline and uplands are privately owned and allow access to RSAP for many additional visitors that are difficult

to quantify. Other significant points of entry to RSAP are a small park established in the 1920s owned by Marion County, known as the K.P. Hole County Park on the western shore 1.6 miles south of the headspring and the associated Blue Run Park of Dunnellon on the lower Rainbow River adjacent to County Road 484 Bridge. Blue Run Park serves as the tubing exit for K.P. Hole County Park and as a canoe and kayak entry and exit point. Another entry point in the vicinity of RSAP is the City of Dunnellon boat ramp located 0.75 miles south of the confluence of the Rainbow and Withlacoochee rivers. This access point allows large numbers of motor boats and paddle craft entry to RSAP.

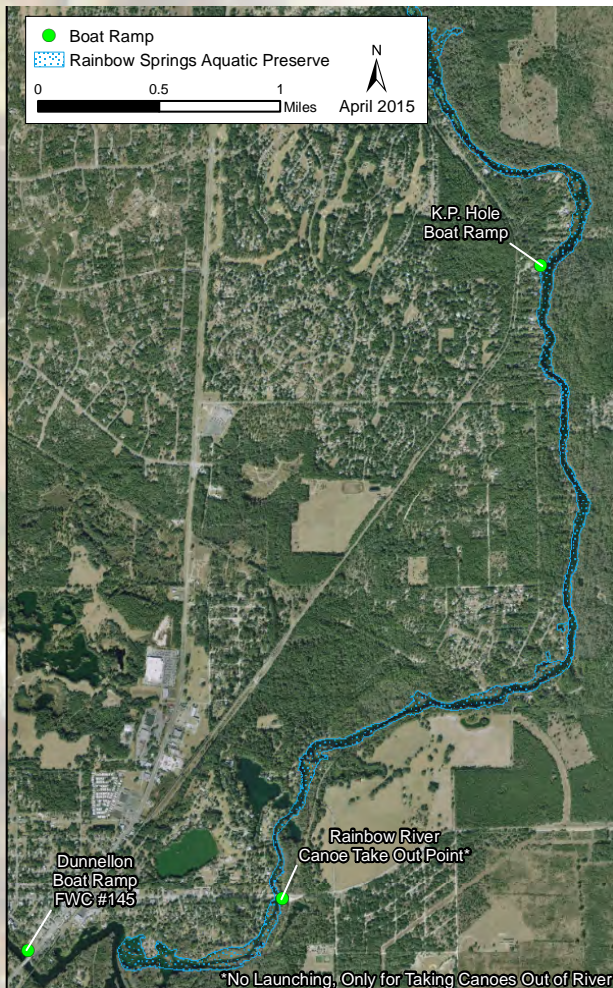
4.4.2 / Current Status of Public Use at Rainbow Springs Aquatic Preserve

RSAP encourages sustainable use of the natural resources while working to minimize adverse user impacts to the aquatic preserve. Public support and participation are extremely important to protecting the natural resources within RSAP. For a natural resource protection or conservation program to be successful it requires a user group buy in to the principles and goals of the program. Multiple user groups need to understand how the cumulative effects of their activities impact the aquatic preserve resources and competing user groups.

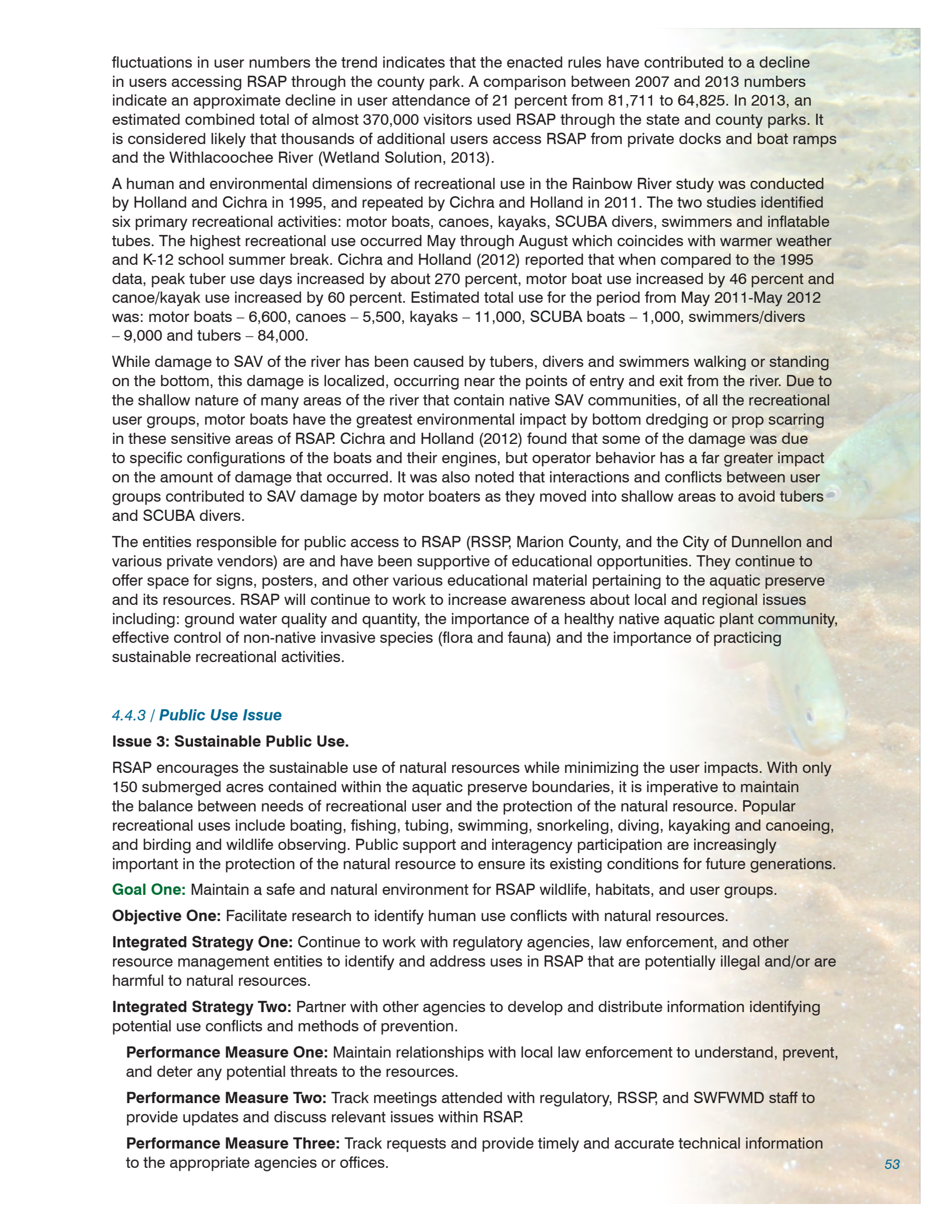
Within RSAP, there are four quantifiable main points of entry for public recreational use, three in RSAP and one at the county park (Map 19). Rainbow Springs State Park entry points consist of: 1) the main park entrance at the headspring which provide swimming, picnicking, hiking trails and canoeing and kayaking, 2) the campground entrance which provide camping, swimming, tubing, canoeing and kayaking and lastly the tubing facility (tubing only with a

shuttle to the entry point at the campground). Annual attendance figures for RSSP are available for the period between 1992 and 2013. For the period of 1992 through 2013 annual attendance figures have increased 2,094 percent from 13,869 to 304,252 (Wetland Solution, 2013).

The other main entry point that lies within RSAP is the K.P. Hole County Park operated by Marion County. The park provides tubing, canoeing, kayaking, paddle boarding, swimming as well as the only public boat ramp for recreational and commercial boating activities (SCUBA diving and snorkeling) within RSAP. Annual attendance figures for the K.P. Hole County Park are only available for the period 2001 thru 2013. K.P. Hole County Park reached a maximum attendance level of 81,711 in 2007 and due to a number of factors including public and RSAP concerns of over use of the resource, Marion County enacted new rules to try to reduce the number of users through their facility. While there are yearly



Map 19 / Public access points of Rainbow Springs Aquatic Preserve.



fluctuations in user numbers the trend indicates that the enacted rules have contributed to a decline in users accessing RSAP through the county park. A comparison between 2007 and 2013 numbers indicate an approximate decline in user attendance of 21 percent from 81,711 to 64,825. In 2013, an estimated combined total of almost 370,000 visitors used RSAP through the state and county parks. It is considered likely that thousands of additional users access RSAP from private docks and boat ramps and the Withlacoochee River (Wetland Solution, 2013).

A human and environmental dimensions of recreational use in the Rainbow River study was conducted by Holland and Cichra in 1995, and repeated by Cichra and Holland in 2011. The two studies identified six primary recreational activities: motor boats, canoes, kayaks, SCUBA divers, swimmers and inflatable tubes. The highest recreational use occurred May through August which coincides with warmer weather and K-12 school summer break. Cichra and Holland (2012) reported that when compared to the 1995 data, peak tuber use days increased by about 270 percent, motor boat use increased by 46 percent and canoe/kayak use increased by 60 percent. Estimated total use for the period from May 2011-May 2012 was: motor boats – 6,600, canoes – 5,500, kayaks – 11,000, SCUBA boats – 1,000, swimmers/divers – 9,000 and tubers – 84,000.

While damage to SAV of the river has been caused by tubers, divers and swimmers walking or standing on the bottom, this damage is localized, occurring near the points of entry and exit from the river. Due to the shallow nature of many areas of the river that contain native SAV communities, of all the recreational user groups, motor boats have the greatest environmental impact by bottom dredging or prop scarring in these sensitive areas of RSAP. Cichra and Holland (2012) found that some of the damage was due to specific configurations of the boats and their engines, but operator behavior has a far greater impact on the amount of damage that occurred. It was also noted that interactions and conflicts between user groups contributed to SAV damage by motor boaters as they moved into shallow areas to avoid tubers and SCUBA divers.

The entities responsible for public access to RSAP (RSSP, Marion County, and the City of Dunnellon and various private vendors) are and have been supportive of educational opportunities. They continue to offer space for signs, posters, and other various educational material pertaining to the aquatic preserve and its resources. RSAP will continue to work to increase awareness about local and regional issues including: ground water quality and quantity, the importance of a healthy native aquatic plant community, effective control of non-native invasive species (flora and fauna) and the importance of practicing sustainable recreational activities.

4.4.3 / **Public Use Issue**

Issue 3: Sustainable Public Use.

RSAP encourages the sustainable use of natural resources while minimizing the user impacts. With only 150 submerged acres contained within the aquatic preserve boundaries, it is imperative to maintain the balance between needs of recreational user and the protection of the natural resource. Popular recreational uses include boating, fishing, tubing, swimming, snorkeling, diving, kayaking and canoeing, and birding and wildlife observing. Public support and interagency participation are increasingly important in the protection of the natural resource to ensure its existing conditions for future generations.

Goal One: Maintain a safe and natural environment for RSAP wildlife, habitats, and user groups.

Objective One: Facilitate research to identify human use conflicts with natural resources.

Integrated Strategy One: Continue to work with regulatory agencies, law enforcement, and other resource management entities to identify and address uses in RSAP that are potentially illegal and/or are harmful to natural resources.

Integrated Strategy Two: Partner with other agencies to develop and distribute information identifying potential use conflicts and methods of prevention.

Performance Measure One: Maintain relationships with local law enforcement to understand, prevent, and deter any potential threats to the resources.

Performance Measure Two: Track meetings attended with regulatory, RSSP, and SWFWMD staff to provide updates and discuss relevant issues within RSAP.

Performance Measure Three: Track requests and provide timely and accurate technical information to the appropriate agencies or offices.

An underwater photograph showing a large, brownish fish with a prominent eye and a white patch on its side, swimming near a coral reef. The water is slightly hazy, and the lighting is soft, highlighting the textures of the fish and the coral.

Goal Two: Promote low-impact, sustainable recreational opportunities.

Objective One: Increase awareness of minimal impact use opportunities such as the use of appropriate water entrance locations, and proper resource use techniques associated with snorkeling, tubing, diving, boating, kayaking and canoeing.

Integrated Strategy One: Work with RSSP and FWC's Law Enforcement Division to ensure the proper use of entrance locations for RSAP, to discourage improper use and creation of unauthorized access points. This will also aid in the reduction of additional damage to the natural resources.

Integrated Strategy Two: Work with local resource agencies and vendors to improve education on the responsible use of the unique recreational opportunities within RSAP. Educational materials include kiosks and literature available to the public at various locations associated with RSAP.

Performance Measure One: Track literature provided to local guides and eco-tour operators, and at entry points to help educate and encourage responsible use of the resources within RSAP.

Performance Measure Two: Work with adjacent land managers and government agencies to promote expansion of non-consumptive activities (kayaking and nature viewing).



Kindergarten Days at Rainbow Springs State Park.

Part III

Additional Plans

Chapter Five

Administrative Plan

The success of the Rainbow Springs Aquatic Preserve's (RSAP) research, education and resource management programs depends on effective administrative strategies. The objectives of RSAP's administrative plan include:

1. To supervise and administer programs, and maintain facilities.
2. To comply with all legal rules, contracts, agreements and regulations.
3. To maintain all records needed for operating, budgeting, planning, and purchasing.
4. To communicate and coordinate with all entities involved in research, education, commercial, and recreational utilization or management of RSAP.

Staffing

The RSAP office currently has one full-time administrative position, the aquatic preserve manager (Selected Exempt Service), for managing both RSAP and Oklawaha River Aquatic Preserve (ORAP). This position is responsible for all activities concerning RSAP and ORAP. Between 2005 and 2009, RSAP staffing also included one ES I Other Personal Services (OPS) position which was cut due to a reduction in funding for the Florida Coastal Office (FCO). The aquatic preserves are located in quickly developing central Florida and will face growing challenges which will require effective and efficient management practices to protect and enhance the ecological integrity of the area.

The management goals identified in this plan for RSAP must be balanced with the management goals of ORAP.



Projected Staffing Needs

RSAP consists of 150 submerged acres encompassing the entire 5.7 mile long Rainbow River. Despite the limited acreage, the river is considered one of the most unique riverine systems in Florida due to its high output or discharge of ground water, high clarity, abundant wildlife and high visitation (370,000 visitors through public parks) (Wetland Solution, 2013).

Over the next ten years, indicators predict continued growth in Marion and surrounding counties in central Florida, which will continue to place extreme pressures on the natural resources of RSAP (University of Florida, 2013). New staffing and resources will be required to adequately manage RSAP and ORAP. On a daily basis, the RSAP staff must address increasing numbers of complex interrelated issues and due to staffing only the highest priority issues are addressed, leaving other medium to high priority issues unresolved. To adequately address these major issues at the local level, the following staffing needs are required.

Education and Outreach Specialist II (Full Time Equivalent [FTE]) – This full time position would organize and conduct natural and cultural history interpretative talks and education programs, perform speaking engagements promoting the preservation of RSAP and public awareness of the program’s objectives.

Environmental Specialist I (FTE) – This full time position would plan and implement resource monitoring activities including aquatic vegetation, water quality and restoration programs. The position would enter, analyze and interpret all data collected during monitoring and research activities.



Aquatic preserve office building.

Chapter Six

Facilities Plan

Facilities - The Rainbow Springs Aquatic Preserve (RSAP) field office is located in the Rainbow Springs State Park (RSSP) headsprings area at 19152 SW 81st Place Road, Dunnellon, Florida, 34432. The facility consists of a 780 square foot building constructed in 1937 as a tourist cabin and converted to office space after the attraction's closure. Currently, the bathroom area is used as laboratory space. A wooden 160 square foot storage shed is used for equipment and chemical storage. Vessel storage is located in the RSSP shop area which consists of 880 square foot of a commercial metal building constructed in the 1970s. Facilities are inadequate to meet the needs of RSAP due to age, health and size limitations. A double wide office and lab complex is necessary to be able to meet the goals and mission of the Florida Coastal Office.

Vehicles

2007 Ford F-150 4x4 Extended Cab Flex Fuel truck (72,000 miles as of September, 2015). The truck will need to be replaced within the next ten years. Additional vehicles will be needed as staff is added.

Vessels

1997 14 foot Tracker Sportsman Aluminum Jon Boat with a 2007 15 horsepower four stroke Mercury outboard engine. The boat and motor will need to be replaced within the next ten years. The boat is used to accomplish RSAP management goals such as herbicide treatments and aquatic plant surveys.

2003 17 foot Carolina Skiff boat with a 2010 75 horsepower four stroke outboard engine. The hull of the skiff is in need of repair and will require replacement within the next five to ten years. The boat is used to accomplish RSAP management goals such as water quality collection, herbicide treatments and aquatic plant surveys.

Two 2007 10 foot Riot Chaser Kayaks used for extreme shallow area sampling to meet the management goals of RSAP.

Upon the occasion of a hurricane or other major storm event, all vehicles and vessels of RSAP will be stored following the procedure outlined in the "Rainbow Springs Aquatic Preserve Hurricane/Catastrophic Event Plan" which is updated annually by staff.

List of Appendices

Appendix A / Legal Documents	60
A.1 / Aquatic Preserve Resolution	60
A.2 / Florida Statutes	61
A.3 / Florida Administrative Code	61
A.4 / Management Agreements.....	62
Memorandums of Understanding and Memorandums of Agreement.....	62
Appendix B / Resource Data	65
B.1 / Glossary of Terms	65
B.2 / References	66
B.3 / Species Lists	69
Documented Native Species	69
Potential Species	78
Listed Species.....	79
Invasive Non-native and/or Problem Species	80
B.4 / Arthropod Control Plans.....	81
Appendix C / Public Involvement	82
C.1 / Advisory Committee	82
List of Members and their Affiliations.....	82
Florida Administrative Register Posting.....	83
Meeting Summary	84
C.2 / Formal Public Meeting	87
Florida Administrative Register Posting.....	87
Advertisement Flyer	88
Newspaper Advertisement.....	89
Summary of the Formal Public Meeting.....	90
Appendix D / Goals, Objectives and Strategies	95
D.1 / Current Goals, Objectives and Strategies Budget Table	95
D.2 / Budget Summary Table.....	99
D.3 / Major Accomplishments Since the Approval of the Previous Plan.....	99
Appendix E / Other Requirements	101
E.1 / Acquisition and Restoration Council Management Plan Compliance Checklist	101
E.2 / Management Procedures for Archaeological and Historical Sites and Properties on State-Owned or Controlled Lands.....	107
E.3 / Letters of Compliance with County Comprehensive Plans	108
E.4 / Division of State Lands Management Plan Approval Letter	109

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 <http://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 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 <https://www.flrules.org/Default.asp>

Florida Administrative Code, Chapter 18-20: Florida Aquatic Preserves
<http://www.dep.state.fl.us/legal/Rules/shared/18-20.pdf>

Florida Administrative Code, Chapter 18-21: Sovereignty Submerged Lands Management
<http://www.dep.state.fl.us/legal/Rules/shared/18-21.pdf>

Florida Administrative Code, Chapter 62-302: Surface Water Quality Standards
(Rule designating Outstanding Florida Waters is at 62-302.700)
<http://www.dep.state.fl.us/legal/Rules/shared/62-302/62-302.pdf>

Memorandum

Florida Department of
Environmental Protection

April 29, 2005

TO: District Bureau Chiefs

FROM: Mike Bullock, Director *m.b.*
Florida Park Service

SUBJECT: Memorandum of Agreement

The enclosed Memorandum of Agreement secures the commitment of the Divisions of Recreation and Parks and Coastal and Aquatic Managed Areas to collaborate resources. This partnership will unify our similar missions to better protect Florida's natural resources while offering quality recreational opportunities.

Please review the document, which includes future steps for implementing the agreement, and share it with your staff. Employee cooperation will enhance the ability of both Divisions to improve resource management and protection.

Thank you for your support of this team effort. Its success will benefit both programs.

MB/jg
Enclosure



Jeb Bush
Governor

Department of Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Colleen M. Castille
Secretary

MEMORANDUM AGREEMENT BETWEEN DIVISION OF RECREATION & PARKS AND COASTAL & AQUATIC MANAGED AREAS

DRP and CAMA are programs with comparable missions: to protect and manage Florida's diverse natural resources and provide outdoor recreation. Ecosystems do not recognize divisional lines and organizational structure must not impede our mission to protect Florida's resources. Because of our similar missions and close proximity in the field, DRP and CAMA will collaborate on upland and submerged land management issues, as well as share manpower, facilities, vehicles, boats and other resources. DEP employees will work in teams and share resources, regardless from which Division or Office an employee or resource originates. If Parks or Aquatic Preserve staff needs assistance with resource management, events or programs, it is encouraged and expected that staff from each Office or Division will assist as time allows.

To promote an even greater spirit of cooperation among our two sister divisions, we are directing the DRP District Bureau Chiefs and the CAMA Environmental Administrators to foster inter-division employee cooperation. In the future, we will:

- * Hold two joint CAMA/FPS district staff meetings onsite where appropriate per year. FPS District Bureau Chiefs and CAMA Environmental Administrators shall attend these meetings. The respective directors must be notified of the meeting schedule. Additional meetings should be scheduled as needed.
- * On an annual basis, work together to identify and develop joint priority project plans that share efforts to protect and manage neighboring resources. Possibly a good time to perform this work would be at one of the meetings discussed in the previous paragraph.
- * Hold meetings where properties have changed hands so that the FPS can learn about CAMA experience with their properties and vice-versa. We encourage the exchange of information regarding managed lands wherever there is the opportunity.
- * Encourage joint participation in site management plans of both the FPS and CAMA.
- * Actively explore ways to share office space, equipment, tools and staff, where appropriate, to achieve a specific project or goals. (Examples might be: heavy equipment, staff for burning, staff for an event, administrative staff costs, etc...)
- * Seek to help the other division whenever possible, while not interfering with present work responsibilities.

Page Two

Please share this memorandum with your staff. DRP and CAMA's joint commitment to work together in the spirit of true cooperation to manage Florida's natural resources and provide quality outdoor recreation will enhance our accomplishments, benefiting both programs. The success of this partnership will be monitored on an ongoing basis.

Mike Bullock 4-27-05
(Date)

Mike Bullock
Director
Florida Park Service

Katherine Andrews 4-27-05
(Date)

Katherine Andrews
Director
Coastal and Aquatic Managed Areas

Bob Ballard 4/27/05
(Date)

Witness

Resource Data

B.1 / Glossary of Terms

References to these definitions can be found at the end of this list and in Appendix B.3.

aboriginal - the original biota of a geographical region. (Lincoln, Boxshall & Clark, 2003)

anaerobic - growing or occurring in the absence of molecular oxygen. (Lincoln et al., 2003)

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

chert - A variety of silica that lacks external evidence of crystal form. It is chalcedony (SiO₂) in a nodular or lens-like habit, formed in a sedimentary environment. (Allaby, 2005).

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 [FWS], 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)

hydric - pertaining to water; wet. (Lincoln et al., 2003)

infauna - the animal life within a sediment; epifauna. (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. (FWS, 2015)

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

mesic - pertaining to conditions of moderate moisture or water supply; used of organisms occupying moist habitats. (Lincoln et al., 2003)

mosaic - an organism comprising tissues of two or more genetic types; usually used with reference to plants. (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)

psammophyte - a plant growing or moving in unconsolidated sand. (Lincoln et al., 2003)

ruderal - pertaining to or living amongst rubbish or debris, or inhabiting disturbed sites. (Lincoln et al., 2003) (FNAI describes ruderal as areas impacted by development measures such as roadways, drainage ditches, navigational channels or are considered hydrological alterations.)

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. (FWS, 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. (FWS, 2015)

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

xeric - having very little moisture; tolerating or adapted to dry conditions. (Lincoln et al., 2003)

B.2 / References

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B.3 / Species Lists

B.3.1 / Documented Native Species

Common Name	Scientific Name	Status
<i>Legend: FT</i> =Federally & State-Designated Threatened; <i>FE</i> =Federally & State-Designated Endangered; <i>ST</i> =State-Designated Threatened; <i>SE</i> =State-Designated Endangered; <i>SSC</i> =State Species of Special Concern; <i>(S/A)</i> =listed due to similarity of appearance; <i>CE</i> =commercially exploited; <i>BGEPA</i> =Bald and Golden Eagle Protection Act		
Aquatic/Semi-Aquatic Species		
Aquatic Algae		
Aulacoseria	<i>Aluacoseria</i> sp.	
Chara	<i>Chara</i> sp.	
Cymbella	<i>Cymbella</i> sp.	
Gomphosphaeria	<i>Gomphosphaeria</i> sp.	
Lyngbya	<i>Lyngbya</i> sp.	
Microspora	<i>Microspora</i> sp.	
Oscillatoria	<i>Oscillatoria</i> sp.	
Plectonema	<i>Plectonema</i> sp.	
Spirogyra	<i>Spirogyra</i> sp.	
Synedra	<i>Synedra</i> sp.	
Submerged Vascular Plants		
Lemon bacopa	<i>Bacopa caroliniana</i>	
Coontail	<i>Ceratophyllum demersum</i>	
Water pennywort	<i>Hydrocotyle umbellata</i>	
Red ludwigia	<i>Ludwigia repens</i>	
Variable leaf milfoil	<i>Myriophyllum heterophyllum</i>	
Southern naiad	<i>Najas quadalupensis</i>	
Illinois pondweed	<i>Potamogeton illinoensis</i>	
Watercress	<i>Rorippa floridana</i>	
Strap-leaf sagittaria	<i>Sagittaria kurziana</i>	
Bladderwort	<i>Utricularia</i> sp.	
Tape grass, eel grass	<i>Vallisneria americana</i>	

Common Name	Scientific Name	Status
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Floating Attached Plants

Watershield	<i>Brasenia schreberi</i>	
Spatterdock	<i>Nuphar advena</i>	
Big floating heart	<i>Nymphoides aquatica</i>	
Yellow water lily	<i>Nymphaea mexicana</i>	
Fragrant water lily	<i>Nymphaea odorata</i>	

Floating Unattached Plants

Water fern	<i>Azolla caroliniana</i>	
Common duckweed	<i>Lemna</i> sp.	

Emergent Vegetation

Water hemlock	<i>Cicuta mexicana</i>	
Sawgrass	<i>Cladium jamaicense</i>	
Swamp lily	<i>Crinum americanum</i>	
Dollar weed	<i>Hydrocotyle</i> sp.	
Spider lily	<i>Hymenocallis</i> sp.	
Climbing hempvine	<i>Mikania scadens</i>	
Maidencane	<i>Panicum hemitomom</i>	
Egyptian paspalidium	<i>Paspalidium geminatum</i>	
Knot grass	<i>Paspallum</i> sp.	
Common reed	<i>Phragmites australis</i>	
Smartweed	<i>Polygonum</i> sp.	
Pickerel Weed	<i>Pontederia cordata</i>	
Beak rush	<i>Rhynchospra</i> sp.	
Duck Potato	<i>Sagittaria lancifolia</i>	
Common arrowhead	<i>Sagittaria latifolia</i>	
Soft-stem bulrush	<i>Scirpus validus</i>	
Clustered beak rush	<i>Thynchospora fascicularis</i>	
Cattail	<i>Typha</i> sp.	
Wild rice	<i>Zizania aquatica</i>	

Birds

Spotted sandpiper	<i>Actitis macularia</i>	
Wood duck	<i>Aix sponsa</i>	
Green-winged teal	<i>Anas crecca</i>	
Anhinga	<i>Anhinga anhinga</i>	
Limpkin	<i>Aramus guarauna</i>	SSC
Great egret	<i>Ardea alba</i>	
Great blue heron	<i>Ardea herodias</i>	
Great white heron	<i>Ardea herodias</i> (color morph)	
American bittern	<i>Botaurus lentiginosus</i>	
Green heron	<i>Butorides striatus</i>	
Little blue heron	<i>Egretta caerulea</i>	SSC
Snowy egret	<i>Egretta thula</i>	SSC
Tricolored heron	<i>Egretta tricolor</i>	SSC
White ibis	<i>Eudocimus albus</i>	SSC
American coot	<i>Fulica americana</i>	
Common moorhen	<i>Gallinula chloropus</i>	
Common loon	<i>Gavia immer</i>	
Ring-billed gull	<i>Larus delawarensis</i>	
Belted kingfisher	<i>Megaceryle alcyon</i>	

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Wood stork	<i>Mycteria americana</i>	FT
Yellow crowned night heron	<i>Nyctanassa violacea</i>	
Black crowned night heron	<i>Nycticorax nycticorax</i>	
Double-crested cormorant	<i>Phalacrocorax auritus</i>	
Pied-billed grebe	<i>Podilymbus podiceps</i>	
Sora rail	<i>Prozana carolina</i>	
Mammals		
River otter	<i>Lutra canadensis</i>	
Amphibians		
Florida cricket toad	<i>Acris gryllus dorsalis</i>	
Mole salamander	<i>Ambystoma talpoideum</i>	
Two-toed amphiuma	<i>Amphiuma means</i>	
Oak toad	<i>Bufo quercicus</i>	
Southern toad	<i>Bufo terrestris</i>	
Eastern narrow-mouthed toad	<i>Gastrophryne carolinensis</i>	
Cope's gray treefrog	<i>Hyla chrysoscelis</i>	
Green treefrog	<i>Hyla cinerea</i>	
Pinewoods treefrog	<i>Hyla femoralis</i>	
Barking treefrog	<i>Hyla gratiosa</i>	
Squirrel treefrog	<i>Hyla squirella</i>	
Little grass frog	<i>Limnaoedus ocularis</i>	
Southern leopard frog	<i>Lithobates sphenocephalus</i>	
Peninsula newt	<i>Notophthalmus viridescens</i>	
Slimy salamander	<i>Plethodon glutinosus</i>	
Southern chorus frog	<i>Pseudacris nigrita nigrita</i>	
Little grass frog	<i>Pseudacris ocularis</i>	
Gopher frog	<i>Rana areolata</i>	
Bull frog	<i>Rana catesbeiana</i>	
Pig frog	<i>Rana grylio</i>	
Eastern spadefoot toad	<i>Scaphiopus holbrookii</i>	
Lesser siren	<i>Siren intermedia</i>	
Fish		
Yellow bullhead catfish	<i>Ameiurus natalis</i>	
Brown bullhead catfish	<i>Ameiurus nebulosus</i>	
Bowfin	<i>Amia calva</i>	
Gizzard shad	<i>Dorosoma petenense</i>	
Blue Spotted Sunfish	<i>Enneacanthus gloriosus</i>	
Lake chubsucker	<i>Erimyzon sucetta</i>	
Chain pickerel	<i>Esox niger</i>	
Golden topminnow	<i>Fundulus chrysotus</i>	
Seminole killifish	<i>Fundulus seminolis</i>	
Eastern mosquitofish	<i>Gambusia holbrookii</i>	
Channel catfish	<i>Ictalurus punctatus</i>	
Brook silverside	<i>Labidesthes sicculus</i>	
Longnose gar	<i>Lepisosteus osseus</i>	
Florida spotted gar	<i>Lepisosteus platyrhincus</i>	
Redbreast sunfish	<i>Lepomis auritus</i>	
Warmouth	<i>Lepomis gulosus</i>	
Bluegill	<i>Lepomis macrochirus</i>	

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Redear sunfish	<i>Lepomis microlophus</i>	
Spotted sunfish	<i>Lepomis punctatus</i>	
Bluefin killifish	<i>Lucania goodei</i>	
Largemouth bass	<i>Micropterus salmoides</i>	
Golden shiner	<i>Notemigonus crysoleucas</i>	
Coastal shiner	<i>Notropis petersoni</i>	
Tadpole madtom	<i>Noturus gyrinus</i>	
Sailfin molly	<i>Poecilia latipinna</i>	
Atlantic needlefish	<i>Strongylura marina</i>	

Macroinvertebrates

Darner dragonflies	Ashnidae	
Pond damselflies	Coenagrionidae	
Water boatmen	Corixidae	
Predaceous diving beetle	Dytiscidae	
Water striders	Gerridae	
Giant water bug	<i>Lethocerus americanus</i>	
Skimmer dragonflies	Libellulidae	
Backswimmers	Notonectidae	
Grass shrimp	<i>Palaemonetes kadiakensis</i>	
Florida apple snail	<i>Pomacea paludosa</i>	
Crayfish	<i>Procambarus</i> sp.	
Water scorpion	<i>Ranatara linearis</i>	

Reptiles

American alligator	<i>Alligator mississippiensis</i>	FT(S/A)
Florida softshell turtle	<i>Apalone ferox</i>	
Florida snapping turtle	<i>Chelydra serpentina</i>	
Florida chicken turtle	<i>Deirochelys reticularia</i>	
Mud turtle	<i>Kinosternon subrubrum</i>	
Banded water snake	<i>Nerodia fasciata</i>	
Suwannee river cooter	<i>Pseudemys concinna suwanniensis</i>	SSC
Peninsula cooter	<i>Pseudemys floridana peninsularis</i>	
Florida redbelly turtle	<i>Pseudemys nelsoni</i>	
Loggerhead musk turtle	<i>Sternotherus minor</i>	
Common musk turtle	<i>Sternotherus odoratus</i>	

Wetland/Terrestrial Species

Plants

Red maple	<i>Acer rubrum</i>	
Golden polypody	<i>Acrostichum aureum</i>	
Hammock snakeroot	<i>Ageratina jucunda</i>	
Ragweed	<i>Ambrosia artemisiifolia</i>	
Peppervine	<i>Ampelopsis arborea</i>	
Fringed bluestar	<i>Amsonia ciliata</i>	
Splitbeard bluestem	<i>Andropogon ternarius</i>	
Broomsedge	<i>Andropogon virginicus</i>	
Wild sarsaparilla	<i>Aralia nudicaulis</i>	
Devil's walking stick	<i>Aralia spinosa</i>	
Greendragon	<i>Arisaema dracontium</i>	
Jack-in-the-pulpit	<i>Arisaema triphyllum</i>	
Wiregrass	<i>Aristida beyrichiana</i>	

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Florida cacalia	<i>Arnoglossum floridanum</i>	
Red chokeberry	<i>Aronia arbutifolia</i>	
Flag pawpaw	<i>Asimina incarna</i>	
Long-leafed pawpaw	<i>Asimina longifolia</i>	
Bigflower pawpaw	<i>Asimina obovata</i>	
Pawpaw	<i>Asimina</i> sp.	
Ebony spleenwort	<i>Asplenium platyneuron</i>	
Climbing aster	<i>Aster carolinianus</i>	
Yellow foxglove	<i>Aureolaria flava</i>	
Hairy foxglove	<i>Aureolaria pectinata</i>	
Groundsel bush	<i>Baccharis halimifolia</i>	
Yellow buttons	<i>Balduina angustifolia</i>	
Tarflower	<i>Befaria racemosa</i>	
Greeneyes	<i>Berlandiera subacaulis</i>	
Beggar-ticks	<i>Bidens alba</i>	
Bur marigold	<i>Bidens laevis</i>	
White beggar-ticks	<i>Bidens pilosa</i>	
Cross vine	<i>Bignonia capreolata</i>	
False nettle	<i>Boehmeria cylindrica</i>	
Beautyberry	<i>Callicarpa americana</i>	
Trumpet creeper	<i>Campsis radicans</i>	
Vanilla plant	<i>Carphephorus odoratissimus</i>	
Bluebeech	<i>Carpinus caroliniana</i>	
Pignut hickory	<i>Carya glabra</i>	
Littleleaf buckbrush	<i>Ceanothus microphyllus</i>	
Hackberry	<i>Celtis laevigata</i>	
Coinwort	<i>Centella asiatica</i>	
Buttonbush	<i>Cephalanthus occidentalis</i>	
Rosemary	<i>Ceratiola ericoides</i>	
Eastern redbud	<i>Cercis canadensis</i>	
Atlantic white cedar	<i>Chamaecyparis thyoides</i>	
Mexican tea	<i>Chenopodium ambrosioides</i>	
Thistle	<i>Cirsium horridulum</i>	
Tread softly	<i>Cnidocolus stimulosus</i>	
Roughleaf dogwood	<i>Cornus asperifolia</i>	
Flowering dogwood	<i>Cornus florida</i>	
Swamp dogwood	<i>Cornus foemina</i>	
Summer haw	<i>Crataegus flava</i>	
Rabbitbells	<i>Crotalaria rotundifolia</i>	
Silver croton	<i>Croton argyranthemus</i>	
Sedge	<i>Cyperus</i> sp.	
Swamp titi	<i>Cyrilla racemiflora</i>	
Summer farewell	<i>Dalea pinnata</i>	
Climbing hydrangea	<i>Decumaria barbara</i>	
Creeping beggarweed	<i>Desmodium incanum</i>	
Florida beggarweed	<i>Desmodium tortuosom</i>	
Persimmon	<i>Diospyros virginiana</i>	
Pink sundew	<i>Drosera capillaris</i>	
Spikerush	<i>Eleocharis</i> sp.	
Greenfly orchid	<i>Epidendrum conopseum</i>	
Daisy fleabane	<i>Erigeron strigosus</i>	
Wild buckwheat	<i>Erigonum tomentosum</i>	

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Tenangle pipewort	<i>Eriocaulon decangulare</i>	
Fragrant eryngo	<i>Eryngium aromaticum</i>	
Cherokee bean	<i>Erythrina herbacea</i>	
Strawberry bush	<i>Euonymus americanus</i>	
Dog fennel	<i>Eupatorium capillifolium</i>	
Yankeeweed	<i>Eupatorium compositifolium</i>	
Mohr's thoroughwort	<i>Eupatorium mohrii</i>	
Creeping morning glory	<i>Evolvulus sericeus</i>	
Eastern swampprivet	<i>Forestiera acuminata</i>	
Southern gaura	<i>Gaura angustifolia</i>	
Dwarf huckleberry	<i>Gaylussacia dumosa</i>	
Blue huckleberry	<i>Gaylussacia frondosa</i>	
Yellow jessamine	<i>Gelsemium sempervirens</i>	
Scrub hedge hyssop	<i>Gratiola hispida</i>	
Longhorn false reinorchid	<i>Habenaria quinqueseta</i>	
Rock-rose	<i>Helianthemum corybosum</i>	
Narrow-leaved sunflower	<i>Helianthus angustifolius</i>	
Stiff sunflower	<i>Helianthus radula</i>	
Camphorweed	<i>Heterotheca subaxillaris</i>	
St. Andrew's cross	<i>Hypericum hypericoides</i>	
Myrtle leaf St. John's wort	<i>Hypericum myrtifolium</i>	
Four petal St. John's wort	<i>Hypericum tetrapetalum</i>	
Yellow-star grass	<i>Hypoxis juncea</i>	
Dahoon holly	<i>Ilex cassine</i>	
Gallberry	<i>Ilex glabra</i>	
American holly	<i>Ilex opaca</i>	
Yaupon holly	<i>Ilex vomitoria</i>	
Star anise	<i>Illicium parviflorum</i>	
Morning glory	<i>Ipomoea trichocarpa</i>	
Virginia willow	<i>Itea virginica</i>	
Southern red cedar	<i>Juniperus silicicola</i>	
Sand bur	<i>Krameria lanceolata</i>	
Carolina redroot	<i>Lachnanthes carolina</i>	
Bog-buttons	<i>Lachnocaulon anceps</i>	
Poorman's pepper	<i>Lepidium virginicum</i>	
Hairy bush-clover	<i>Lespedeza hirta</i>	
Gopher apple	<i>Licania michauxii</i>	
Sweetgum	<i>Liquidambar styraciflua</i>	
Cardinal flower	<i>Lobelia cardinalis</i>	ST
Coral honeysuckle	<i>Lonicera sempervirens</i>	
Sky-blue lupine	<i>Lupinus diffusus</i>	
Roserush	<i>Lygodesmia aphylla</i>	
Staggerbush	<i>Lyonia ferruginea</i>	
Fetterbush	<i>Lyonia lucida</i>	
Ashe's magnolia	<i>Magnolia ashei</i>	
Southern magnolia	<i>Magnolia grandiflora</i>	
Sweetbay magnolia	<i>Magnolia virginiana</i>	
Wax myrtle	<i>Myrica cerifera</i>	
Golden Boston fern	<i>Nephrolepis exaltata</i>	
Cinnamon fern	<i>Osmunda cinnamomea</i>	CE
Royal fern	<i>Osmunda regalis</i>	
Panicum	<i>Panicum sp.</i>	

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Sand pine	<i>Pinus clausa</i>	
Slash pine	<i>Pinus elliottii</i>	
Longleaf pine	<i>Pinus palustris</i>	
Loblolly pine	<i>Pinus taeda</i>	
Resurrection fern	<i>Polypodium polypodioides</i>	
Black cherry	<i>Prunus serotina</i>	
Bracken fern	<i>Pteridium aquilinum</i>	
Laurel oak	<i>Quercus hemisphaerica</i>	
Bluejack oak	<i>Quercus incana</i>	
Scrub oak	<i>Quercus inopina</i>	
Blackjack oak	<i>Quercus marilandica</i>	
Live oak	<i>Quercus virginiana</i>	
Azalea	<i>Rhododendron</i> sp.	
Cabbage palm	<i>Sabal palmetto</i>	
Grassy arrowhead	<i>Sagittaria graminea</i>	
Saw palmetto	<i>Serenoa repens</i>	
Earleaf greenbrier	<i>Smilax auriculata</i>	
Saw greenbrier	<i>Smilax bona-nox</i>	
Cat greenbrier	<i>Smilax glauca</i>	
Laurel greenbrier	<i>Smilax laurifolia</i>	
Smutgrass	<i>Sporobolus indicus</i>	
Pineywoods dropseed	<i>Sporobolus junceus</i>	
Yellow hatpins	<i>Syngonanthus flavidulus</i>	
Pond cypress	<i>Taxodium ascendens</i>	
Bald cypress	<i>Taxodium distichum</i>	
Bartram's airplant	<i>Tillandsia bartramii</i>	
Ballmoss	<i>Tillandsia recurvata</i>	
Spanish moss	<i>Tillandsia usneoides</i>	
Poison ivy	<i>Toxicodendron radicans radicans</i>	
American elm	<i>Ulmus americana</i>	
Netted chain fern	<i>Woodwardia areolata</i>	
Virginia chain fern	<i>Woodwardia virginica</i>	
Weak-leaf yucca	<i>Yucca flaccida</i>	
Coontie	<i>Zamia pumila</i>	

Birds

Cooper's hawk	<i>Accipiter cooperii</i>	
Sharp-shinned hawk	<i>Accipiter striatus</i>	
Red-winged blackbird	<i>Agelaius phoeniceus</i>	
Bachman's sparrow	<i>Aimophila aestivalis</i>	
Ruby-throated hummingbird	<i>Archilochus colubris</i>	
Tufted titmouse	<i>Baeolophus bicolor</i>	
Cedar waxwing	<i>Bombycilla cedrorum</i>	
Great horned owl	<i>Bubo virginianus</i>	
Red-tailed hawk	<i>Buteo jamaicensis</i>	
Red-shouldered hawk	<i>Buteo lineatus</i>	
Chuck-wills-widow	<i>Caprimulgus carolinensis</i>	
Whip-poor-will	<i>Caprimulgus vociferous</i>	
Northern cardinal	<i>Cardinalis cardinalis</i>	
American goldfinch	<i>Carduelis tristis</i>	
House finch	<i>Carpodacus mexicanus</i>	
Turkey vulture	<i>Cathartes aura</i>	

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Hermit thrush	<i>Catharus gattatus</i>	
Brown creeper	<i>Certhia americana</i>	
Chimney swift	<i>Chaetura pelagica</i>	
Killdeer	<i>Charadrius vociferous</i>	
Common night hawk	<i>Chordeiles minor</i>	
Marsh wren	<i>Cistothorus palustris</i>	
Black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>	
Northern flicker	<i>Colaptes auratus</i>	
Northern bobwhite	<i>Colinus virginianus</i>	
Rock dove	<i>Columba livia</i>	
Common ground-dove	<i>Columbina passerine</i>	
Eastern wood-pewee	<i>Contopus virens</i>	
Black vulture	<i>Coragyps atratus</i>	
American crow	<i>Corvus cryptoleucus</i>	
Fish crow	<i>Covus ossifragus</i>	
Blue grosbeak	<i>Cuiraca caerulea</i>	
Blue jay	<i>Cyanocitta cristata</i>	
Black-throated blue warbler	<i>Dendroica caerulescens</i>	
Yellow-rumped warbler	<i>Dendroica coronate</i>	
Prairie warbler	<i>Dendroica discolor</i>	
Yellow-throated warbler	<i>Dendroica dominica</i>	
Blackburnian warbler	<i>Dendroica fusca</i>	
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>	
Pileated woodpecker	<i>Dryocopus pileatus</i>	
Grey catbird	<i>Dumetella carolinensis</i>	
Swallow-tailed Kite	<i>Elanoides forficatus</i>	
Acadian flycatcher	<i>Empidonax vireescens</i>	
Merlin	<i>Falco colmbarius</i>	
Peregrine falcon	<i>Falco peregrinus</i>	
American kestrel	<i>Falco sparverius</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>Hiurndo rustica</i>	
Wood thrush	<i>Hylocichla mustelina</i>	
Mississippi kite	<i>Ictinia mississippiensis</i>	
Loggerhead shrike	<i>Lanius ludovicianus</i>	
Herring gull	<i>Larus argentatus</i>	
Red-bellied woodpecker	<i>Melanerpes carolinus</i>	
Red-headed woodpecker	<i>Melanerpes erthrocephalus</i>	
Wild turkey	<i>Meleagris gollopavo</i>	
Song sparrow	<i>Melospiza melodia</i>	
Northern mockingbird	<i>Mimus polyglottos</i>	
Black-and-white warbler	<i>Mniotilta varia</i>	
Brown-headed cowbird	<i>Molothrus ater</i>	
Great crested flycatcher	<i>Myiarchus crinitus</i>	
Eastern screech owl	<i>Otus asio</i>	
Osprey	<i>Pandion haliaetus</i>	
Northern parula	<i>Parula americana</i>	

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House sparrow	<i>Passer domesticus</i>	
Savannah sparrow	<i>Passerculus sandwichensis</i>	
Painting bunting	<i>Passerina ciris</i>	
Indigo bunting	<i>Passerina cyanea</i>	
Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>	
Downy woodpecker	<i>Picoides pubescens</i>	
Hairy woodpecker	<i>Picoides villosus</i>	
Rufous-sided towhee	<i>Pipilo erythrophthalmus</i>	
Carolina chickadee	<i>Poecile carolinensis</i>	
Blue-grey gnatcatcher	<i>Polioptila caerulea</i>	
Purple martin	<i>Progne subis</i>	
Prothonotary warbler	<i>Prontonotaria citrea</i>	
Boat-tailed grackle	<i>Quiscalus major</i>	
Common grackle	<i>Quiscalus quiscula</i>	
Ruby-crowned kinglet	<i>Regulus calendula</i>	
Golden-crowned kinglet	<i>Regulus satrapa</i>	
Eastern phoebe	<i>Sayornis phoebe</i>	
Ovenbird	<i>Seiurus aurocapillus</i>	
Louisiana waterthrush	<i>Seiurus motacilla</i>	
American Redstart	<i>Setophaga ruticilla</i>	
Eastern bluebird	<i>Sialia sialis</i>	
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	
Chipping sparrow	<i>Spizella passerina</i>	
Field sparrow	<i>Spizella pusilla</i>	
Rough winged swallow	<i>Stelgidopteryx serripennis</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>	
Eastern kingbird	<i>Tryannus tryannus</i>	
American robin	<i>Turdus migratorius</i>	
Orange-crowned warbler	<i>Vermivora celata</i>	
Golden-winged warbler	<i>Vermivora chrysoptera</i>	
Tennessee warbler	<i>Vermivora peregrine</i>	
Yellow-throated vireo	<i>Vireo flavifrons</i>	
White-eyed vireo	<i>Vireo griseus</i>	
Red-eyed vireo	<i>Vireo olivaceus</i>	
Blue-headed vireo	<i>Vireo solitaries</i>	
Hooded warbler	<i>Wilsonia citrina</i>	
White winged-dove	<i>Zenaida asiatica</i>	
Mourning dove	<i>Zenaida macroura</i>	
Mammals		
Virginia opossum	<i>Didelphis virginiana</i>	
Bobcat	<i>Felis rufus</i>	
Southeastern pocket gopher	<i>Geomys pinetis</i>	
Striped skunk	<i>Mephitis mephitis</i>	
White-tailed deer	<i>Odocoileus virginianus</i>	
Florida mouse	<i>Podomys floridanus</i>	SSC
Raccoon	<i>Procyon lotor</i>	
Eastern mole	<i>Scalopus aquaticus</i>	

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Grey squirrel	<i>Sciurus carolinensis</i>	
Sherman's fox squirrel	<i>Sciurus niger shermani</i>	SSC
Eastern cotton tail rabbit	<i>Sylvilagus floridanus</i>	
Grey fox	<i>Urocyon cinereoargenteus</i>	

B.3.2 / Potential Species

This list includes species that are within current distribution range of, or immediately adjacent to Rainbow Springs Aquatic Preserve, but have not been documented.

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Aquatic/Semi-Aquatic Species		
Plants		
Dwarf sagittaria	<i>Sagittaria subulata</i>	
Birds		
Florida scrub-jay	<i>Aphelocoma coerulescens</i>	FT
Mammals		
Round-tailed muskrat	<i>Neofiber alleni</i>	
Fish		
Gulf sturgeon	<i>Acipenser oxyrinchus desotoi</i>	FT
Wetland/Terrestrial Species		
Plants		
Incised groove-bur	<i>Agrimonia incisia</i>	ST
Wagner's spleenwort	<i>Asplenium heteroresiliens</i>	
Ruffled spleenwort	<i>Asplenium plenum</i>	
Curtiss' spleenwort	<i>Asplenium x curtissii</i>	
Many-flowered grass-pink	<i>Calopogon multiflorus</i>	ST
Florida crabgrass	<i>Digitaria floridana</i>	
Non-crested eulophila	<i>Eulophia ecristata</i>	ST
Godfrey's swampprivet	<i>Foresteria godfreyi</i>	SE
Corkwood	<i>Leitneria floridana</i>	ST
Pondspice	<i>Listea aestivalis</i>	
Florida spiny-pod	<i>Matelea floridana</i>	SE
Pygmy pipes	<i>Monotropis reynoldsiae</i>	SE
Celestial lily	<i>Nemastylis floridana</i>	SE
Florida beargrass	<i>Nolina atopocarpa</i>	ST
Pinewood dainties	<i>Phyllanthus liebmannianus</i> var. <i>platylepis</i>	SE
Florida mountain mint	<i>Pycnanthemum floridanum</i>	ST
Florida pinkroot	<i>Spigelia loganioides</i>	SE
Poison oak	<i>Toxicodendron pubescens</i>	
Mammals		
Southern short-tailed shrew	<i>Blarina carolinensis</i>	
Coyote	<i>Canis latrans</i>	
Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>	
Least shrew	<i>Cryptotis parva</i>	
Southern flying squirrel	<i>Glaucomys volans</i>	
Red bat	<i>Lasiurus borealis</i>	

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Florida long-tailed weasel	<i>Mustela frenata peninsulæ</i>	
Southeastern bat	<i>Myotis austroriparius</i>	
Eastern woodrat	<i>Neotoma floridana</i>	
Evening bat	<i>Nycticeius humeralis</i>	
Golden mouse	<i>Ochrotomys nuttalli</i>	
Marsh rice rat	<i>Oryzomys palustris</i>	
Cotton mouse	<i>Peromyscus gossypinus</i>	
Oldfield mouse	<i>Peromyscus polionotus</i>	
Eastern pipistrelle	<i>Pipistrellus subflavus</i>	
Norway rat	<i>Rattus norvegicus</i>	
Black rat	<i>Rattus rattus</i>	
Eastern harvest mouse	<i>Reithrodontomys humulis</i>	
Hispid cotton rat	<i>Sigmodon hispidus</i>	
Southeastern shrew	<i>Sorex longirostris</i>	
Marsh rabbit	<i>Sylvilagus palustris</i>	
Mexican free-tailed bat	<i>Tadarida brasiliensis</i>	
Florida black bear	<i>Ursus americanus floridanus</i>	
Red fox	<i>Vulpes vulpes</i>	
Sherman's fox squirrel	<i>Sciurus niger shermani</i>	SSC
Reptiles		
Canebrake rattlesnake	<i>Crotalus horridus</i>	
Gopher tortoise	<i>Gopherus polyphemus</i>	ST
Southern hognose snake	<i>Heterodon simus</i>	
Short-tailed snake	<i>Stilosoma extenuatum</i>	ST

B.3.3 / Listed Species

This list includes species that are within current distribution range of, or immediately adjacent to Rainbow Springs Aquatic Preserve, but may have not been documented.

Common Name	Scientific Name	Status
<i>Legend: FT</i> =Federally & State-Designated Threatened; <i>FE</i> =Federally & State-Designated Endangered; <i>ST</i> =State-Designated Threatened; <i>SE</i> =State-Designated Endangered; <i>SSC</i> =State Species of Special Concern; <i>(S/A)</i> =listed due to similarity of appearance; <i>CE</i> =commercially exploited		
Plants		
Cinnamon fern	<i>Osmunda cinnamomea</i>	CE
Cardinal flower	<i>Lobelia cardinalis</i>	ST
Reptiles		
American alligator	<i>Alligator mississippiensis</i>	FT(S/A)
Suwannee river cooter	<i>Pseudemys concinna suwanniensis</i>	SSC
Birds		
Limpkin	<i>Aramus guarauna</i>	SSC
Little blue heron	<i>Egretta caerulea</i>	SSC
Snowy egret	<i>Egretta thula</i>	SSC
Tricolored heron	<i>Egretta tricolor</i>	SSC
White ibis	<i>Eudocimus albus</i>	SSC
Florida sandhill crane	<i>Grus canadensis pratensis</i>	ST
Wood stork	<i>Mycteria americana</i>	FT
Mammals		
Florida mouse	<i>Podomys floridanus</i>	SSC
Sherman's fox squirrel	<i>Sciurus niger shermani</i>	SSC

B.3.4 / Invasive Non-native and/or Problem Species

Species Name	Common Name	Plants (FLEPPC* Category) Others (Invasive Status)
<p>*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).</p>		
Plants		
Alligator weed	<i>Alternanthera philoxeroides</i>	II
Wild taro	<i>Colocasia esculenta</i>	I
Beckett's water trumpet	<i>Cryptocoryne beckettii</i>	
Undulate cryptocoryne	<i>Cryptocoryne undulate</i>	
Cryptocoryne	<i>Cryptocoryne wendtii</i>	
Umbrella flat sedge	<i>Cyperus involuocratus</i>	II
Papyrus	<i>Cyperus papyrus</i>	
Water hyacinth	<i>Eichhornia crassipes</i>	I
Hydrilla	<i>Hydrilla verticillata</i>	I
Lyngbya	<i>Lyngbya</i> sp.	
Eurasian water milfoil	<i>Myriophyllum spicatum</i>	II
Torpedo grass	<i>Panicum repens</i>	I
Water lettuce	<i>Pistia stratiotes</i>	I
Elephant's ear	<i>Xanthosoma sagittifolium</i>	II
Fish		
Sailfin catfish	<i>Pterygoplichthys</i> sp.	
Reptiles		
Red-eared slider	<i>Trachemys scripta elegans</i>	
Wetland/Terrestrial Species		
Plants		
Mimosa	<i>Albizia julibrissin</i>	I
Coral ardisia	<i>Ardisia crenata</i>	I
Wax begonia	<i>Begonia cucullata</i>	II
Paper mulberry	<i>Broussonetia papyrifera</i>	II
Coffee senna	<i>Cassia occidentalis</i>	
European fan palm	<i>Chamaerops humilis</i>	
Camphor tree	<i>Cinnamomum camphora</i>	I
Coleus	<i>Coleus pumilus</i>	
Pampas grass	<i>Cortaderia selloana</i>	
Showy rattlebox	<i>Crotalaria spectabilis</i>	
Bermuda grass	<i>Cynodon dactylon</i>	
Air potato	<i>Dioscorea bulbifera</i>	I
Silver thorn	<i>Elaeagnus pungens</i>	II
Centipede grass	<i>Eremochloa ophiuroides</i>	
Cogon grass	<i>Imperata cylindrica</i>	I
Crape myrtle	<i>Lagerstronemia indica</i>	
Lantana	<i>Lantana camara</i>	I
Border grass	<i>Liriope muscari</i>	
Japanese honeysuckle	<i>Lonicia japonica</i>	I
Japanese climbing fern	<i>Lygodium japonicum</i>	I
Chinaberry	<i>Melia azedarach</i>	II
Tuberous sword fern	<i>Nephrolepis cordifolia</i>	I
Skunk vine	<i>Paederia foetida</i>	I

Species Name	Common Name	Plants (FLEPPC* Category) Others (Invasive Status)
<p>*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).</p>		
Ladder brake	<i>Pteris vittata</i>	II
Chinese tallow tree	<i>Sapium sebiferum</i>	I
Birds		
Cattle egret	<i>Bubulcus ibis</i>	
Eurasian collared-dove	<i>Streptopelia decaocto</i>	
European starling	<i>Sturnus vulgaris</i>	
Mammals		
Nine-banded armadillo	<i>Dasypus novemcinctus</i>	
House mouse	<i>Mus musculus</i>	
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. A plan has never been proposed for Rainbow Springs Aquatic Preserve.

Public Involvement

C.1 / Advisory Committee

C.1.1 / List of members and their affiliations

The following Appendices contain information about the advisory committee meeting which was held in order to obtain input from the Rainbow Springs Aquatic Preserve Management Plan Advisory Committee regarding the draft management plan.

(259.032(10)(b), F.S., for uplands requires advisory groups include, at a minimum:

- 1) representatives of the lead land managing agency,
- 2) co-managing entities,
- 3) local private property owners,
- 4) the appropriate soil and water conservation district,
- 5) a local conservation organization, and
- 6) a local elected official.

Member	Affiliation
Jeff Sowards	FDEP, Florida Coastal Office, Rainbow Springs Aquatic Preserve manager (lead managing agency)
Nathan Whitt	Mayor City of Dunnellon, Owner, Rainbow River Canoe and Kayak (local elected official)
Fred Ward	Chairman, Marion Soil and Water Conservation District (Soil and Water Conservation District)
Mark R. Abrizenski	Assistant Manager, Rainbow Springs State Park (RSSP) (co-managing entity)
Terry Hansen	FDEP Division of Environmental Assessment and Restoration (v)
Burt Eno	President, Rainbow River Conservation Inc., Village of Rainbow Springs Property Owners Assoc. (local conservation organization and a property owners association that own a common area on the upper river used for recreation)
Dr. Ellen Rudolph	Rainbow River property owner (local private property owner)
Richard Owen	Florida Park Service, District 2 Biologist (co-managing entity)
Greg Wiley	Operations Manager, Marion County Parks and Recreation (co-managing entity)
John Kunzer	Florida Fish & Wildlife Conservation Commission, Regional Biologist, Invasive Plant Management (co-managing entity)
Sky Notestein	Southwest Florida Water Management District, Senior Environmental Scientist (co-managing entity)
John Brainard	Education Co-chair, Rainbow River Conservation Inc., RSSP volunteer (local conservation organization)
Charles Cichra	University of Florida, Fisheries and Aquatic Sciences (Academic Research)

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, December 9, 2015, 9:00 a.m. – 4:00 p.m.

PLACE: Dunnellon Public Library, 20351 Robinson Road, Dunnellon, FL 34431

GENERAL SUBJECT MATTER TO BE CONSIDERED:

The Rainbow Springs Aquatic Preserve Management Plan Advisory Committee will meet to discuss comments received at the public meeting - scheduled for December 8, 2015, and separately noticed - and possible revisions to the draft Rainbow Springs Aquatic Preserve Management Plan. The draft plan is available for viewing or download at www.dep.state.fl.us/coastal/sites/rainbow/plan.htm.

A copy of the agenda may be obtained by contacting: Aquatic Preserve Manager, Jeff Sowards, by email: Jeff.Sowards@dep.state.fl.us or by phone: (352)465-8565.

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: Jeff Sowards at (352)465-8565. 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

The Drug Policy Advisory Council announces a telephone conference call to which all persons are invited.

DATE AND TIME: Friday, November 13, 2015, 10:00 a.m. – 11:00 a.m., ET

PLACE: Telephone conference: dial 1(888)670-3525, enter passcode: 164 869 6226 when prompted

GENERAL SUBJECT MATTER TO BE CONSIDERED:

Established in section 397.33, Florida Statutes, the Drug Policy Advisory Council reviews and analyzes the impacts of substance abuse in the State and makes recommendations for the implementation of a state drug control strategy.

A copy of the agenda may be obtained by contacting: Rebecca Poston at (850)245-4444, extension 3700 or Rebecca.Poston@flhealth.gov.

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 2 days before the workshop/meeting by contacting: Rebecca Poston at the contact information 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 HEALTH**Board of Psychology**

The Board of Psychology announces a public meeting to which all persons are invited.

DATE AND TIME: Notice of Change: Please note that the Full Board Quorum Meeting scheduled to convene on November 20, 2015 will now take place immediately after a meeting of the Board's Credentials Committee on November 20, 2015, 8:00 a.m., ET or soon thereafter.

PLACE: Conference call: 1(888)670-3525; when prompted, insert participant code: 7811783909 followed by the # sign to join the meeting

GENERAL SUBJECT MATTER TO BE CONSIDERED:

Credentials Committee Meeting and Board Quorum Meeting. A copy of the agenda may be obtained by contacting: The Board of Psychology, 4052 Bald Cypress Way, Bin C05, Tallahassee, FL 32399-3255, by calling the board office at (850)245-4373, ext. 3482 or by visiting our website: www.floridaspsychology.gov.

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: The Department of Health at (850)245-4444, ext. 3418. 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.

DEPARTMENT OF HEALTH**Division of Environmental Health**

The Department of Health announces a public meeting to which all persons are invited.

DATE AND TIME: November 23, 2013, 3:00 p.m.

PLACE: Conference call, toll-free: 1(888)670-3525; to obtain the participant passcode contact Mr. Ursin, contact information listed below

GENERAL SUBJECT MATTER TO BE CONSIDERED:

This meeting will be for evaluating a Lifeguarding and Swimming Instructor training program proposed to be considered as equivalent with paragraph 64E-9.008(1)(a), Florida Administrative Code. The advisory group will provide an assessment of the program to the department.

A copy of the agenda may be obtained by contacting: Mr. Ursin, contact information is listed below.



Florida Department of Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Jonathan P. Steverson
Secretary

Rainbow Springs Aquatic Preserve
Management Plan Advisory Committee Meeting Summary
December 9, 2015, 9:00 a.m. – noon
Dunnellon Public Library, 19152 SW 81st Place Road, Dunnellon, Florida

Advisory Attendees: Gregfish Wiley, Nathan Whitt, Charles Ryan, Mark Abrizenski, Chuck Cichra, Sky Notestein, Jon Brainard, Terry Hansen, Rick Owen, Burt Eno, Ellen Rudolph, Fred Ward, Jeff Sowards.
Other attendees: Charles Ryan, Bill Vibbert.
Staff: Jenna Harper, Penny Isom, Earl Pearson.

Penny welcomed everyone and introductions were done around the room. A brief recap of last night's public meeting was given with the comments from each station read aloud by the recorder (Jenna- Issue 1, Penny- Issue 2, and Earl- Issue 3.). The written comments received to date were also read. Afterward Jeff explained his area of responsibility and his constraints.

The floor was open to discussion regarding the identified issues and any other issues. Where applicable, the discussions have been summarized and categorized below under the three issues (water quality, wildlife protection and habitat restoration, and sustainable public use). When the discussion overlapped categories, it was placed where it seemed to fit best.

Water quality (WQ):

Septic tank removal in the watershed should be supported. Much progress has been made on septic tank removal within the city limits of Dunnellon. Homeowners will be able to hook up to the new force main almost free of charge thanks to Southwest Florida Water Management District (SWFWMD) funding. If Rainbow River Ranch parcel is developed, it will have to tie into sewer main.

WQ recommendations should be forwarded to the Division of Environmental Assessment and Restoration (DEAR) and SWFWMD to support the Surface Water Improvement and Management (SWIM) Plan and the Basin Management Action Plan (BMAP). Jeff explained that he collects the data and disseminates it to SWFWMD and other agencies to use in their respective processes (BMAP, Total Maximum Daily Loads [TMDLs], etc.). SWFWMD houses the data.

Brief discussion about Lake Rousseau and the invasive plants. Lake Rousseau has a separate management plan. Can't (and don't want to) get rid of all the invasive aquatic plants because they provide food and cover for wildlife. The invasive issue in Lake Rousseau is partly due to what's occurring upstream, in Rainbow River (high nutrients, invasive plant drift). \$1.3 million has been spent for invasive removal in Rainbow River. The possibility/feasibility of doing a drawdown in Lake Rousseau to improve the lake is being considered.

Florida Fish and Wildlife Conservation Commission (FWC) monitors buildup after herbicide treatments. Herbicides that are used on the Rainbow River break down into carbon, and there is no residual buildup.

Fertilizers were discussed briefly. Fertilizers with less nitrogen and are slow release is better. There are several things in place to help reduce the use of fertilizers such as Marion County's fertilizer ordinance, commercial fertilizer application trainings, and the Florida Friendly Yards program which encourages landscaping that requires little to no fertilizers.

Reuse is the key. It reduces the draw from the aquifer. Educate farmers about cost share and other programs available to them for reuse efforts.

Wildlife protection and habitat restoration:

Land acquisition near springshed should be a priority, and is identified in the SWIM Plan. The Rainbow River Corridor Florida Forever project was approved by the Acquisition and Restoration Council.

Can never eradicate invasive aquatic vegetation, can only control it; invasives are only present out to about 20-25 feet. Need to protect the native species in the main channel of Rainbow River. Hydrilla is basically under control/maintained.

Limiting boat motor size will not protect aquatic vegetation; user behavior is key; people respond to tickets; FWC should be authorized to ticket boaters for freshwater vegetation (specifically *Vallisneria americana* and *Sagittaria kurziana*) destruction from boat propellers, but start with warnings first.

Large fish (especially bass) are rarely seen in Rainbow River. There is no historical study with specific numbers to compare to the present. Restricting fishing to catch and release only and no live bait use would allow fish populations to increase in size and number. Possibly only restrict in certain zones. Don't allow possession of fish on the river.

Sustainable public use:

Concern of illegitimate commercial operations at KP Hole. Starting January 1, 2016, Marion County will require commercial vendors to get permits at the county access sites. There will be a fee per passenger and restrictions for use and number of people. Enforcement will occur at access points. The county may want to adopt what's being done at Crystal River, which issues a placard to be placed on the boat with information to

identify the permittee. Suggested requiring that vendors have clients watch an educational video before entering Rainbow River.

Someone inquired about putting docents on the river.

Division of Recreation and Parks averages 261 people per day that the park is open. They educate public while on the tram ride. The max at KP Hole is 300 people per day. The 300 doesn't include those getting shuttled in (not requiring to park).

It was mentioned that restricting daily activity on the river would be a good idea and that they think the aquatic preserve should do it. Dr. Cichra had collected data on use and is detailed in Holland and Cichra (1994) and Cichra and Holland (2012) reports. There was a discussion about carrying capacity and how aesthetics, wildlife and other factors should be used to determine carrying capacity. The decision will have to come from higher up. Myakka established a carrying capacity based on ecology and user experience. The new SWIM plan will include recreation impacts. The issue of balancing personal use, personal experience, and environmental impacts are being dealt with across the country. The culture on Rainbow River will change slowly. Look into changing the language in 18-20 (Florida Aquatic Preserves rule), Florida Administrative Code. Banning disposable containers and establishing minimum wake rules by Marion County have had a big effect.

Advisory Committee Recommendations:

- Add aquatic preserve staff;
- Need a staff person dedicated to education;
- When 18-20, F.A.C., is opened, add penalties for submerged aquatic vegetation (*Vallisneria americana* and *Sagittaria kurziana*) damage;
- Cross train law enforcement officers with jurisdiction on Rainbow River (county, city, state officers);
- Have an FWC officer dedicated to Rainbow River;
- Support acquisition of the Rainbow River Corridor Florida Forever project;
- Initiate catch and release of all fish on Rainbow and no use of live bait;
- Initiate usage zones (for tubing, scuba diving, etc.) on Rainbow River.

Penny explained the next steps in the management plan process: revisions will be made to the plan before it goes to the Acquisition and Restoration Council for a public meeting in Tallahassee. The plan will go to the Governor and Cabinet for final approval. Comments can still be submitted on or before December 22. The advisory committee members were thanked for their time and input.

Meeting was adjourned around noon.

Cichra, C.E. & Holland, S.M. (2012). Rainbow River Environmental Study. Final Report to Florida Department of Natural Resources, Division of Recreation and Parks. Dunnellon, FL.

Holland, S.M. & Cichra, C.E. (1994). Human and environmental dimensions of the recreational use of Blue Run and Rainbow Springs State Park. Final Report to Florida Department of Natural Resources, Division of Recreation and Parks. Dunnellon, FL.

C.2 / Formal Public Meeting

The following Appendices contain information about the Formal Public Meeting which was held in order to obtain input from the public about the Aquatic Preserve Draft Management Plan.

C.2.1 / Florida Administrative Register Posting

Florida Administrative Register

Volume 41, Number 217, November 6, 2015

For more information, you may contact: Dana M. Watson, at (850)412-3784.

DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION

Board of Cosmetology

The Board of Cosmetology announces a telephone conference call to which all persons are invited.

DATE AND TIME: November 20, 2015, 3:30 p.m.

PLACE: Conference number: 1(888)670-3525, participant code: 7335214083

GENERAL SUBJECT MATTER TO BE CONSIDERED: General board business.

A copy of the agenda may be obtained by contacting: Board of Cosmetology, 1940 N. Monroe Street, Tallahassee, Florida 32399, (850)487-1395.

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 Cosmetology, 1940 N. Monroe Street, Tallahassee, Florida 32399, (850)487-1395. 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 Cosmetology, 1940 N. Monroe Street, Tallahassee, Florida 32399, (850)487-1395.

DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION

Florida Mobile Home Relocation Corporation

The Florida Mobile Home Relocation Corporation announces a public meeting to which all persons are invited.

DATE AND TIME: Wednesday, December 2, 2015, 11:00 a.m.

PLACE: Telephone conference: 1(888)909-7654, enter pass code: 128126 when prompted

GENERAL SUBJECT MATTER TO BE CONSIDERED:

The Board will address official business of the Florida Mobile Home Relocation Corporation which will include, among other matters, a review of mobile home owner applications for compensation for relocation and/or abandonment due to change in land use and such other business as may come before the Board. A schedule for future meetings will be determined.

A copy of the agenda may be obtained by contacting: Vicky Krentz at 1(888)862-7010.

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: Vicky Krentz at 1(888)862-7010. 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: Vicky Krentz, Executive Director, FMHRC, PO Box 7848, Clearwater, FL 33758, 1(888)862-7010, vicky@fmhrc.org.

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, December 8, 2015, 6:00 p.m. – 7:30 p.m.

PLACE: Dunnellon Public Library, 20351 Robinson Road, Dunnellon, FL 34431

GENERAL SUBJECT MATTER TO BE CONSIDERED: A draft Rainbow Springs Aquatic Preserve Management Plan has been prepared by the Florida Coastal Office. The draft plan is available for viewing or download at www.dep.state.fl.us/coastal/sites/rainbow/plan.htm. The Florida Coastal Office seeks public comment on the draft. Members of the Rainbow Springs Aquatic Preserve Management Plan Advisory Committee have also been invited to attend, listen to comments, and may provide or respond to comments.

A copy of the agenda may be obtained by contacting: Aquatic Preserve Manager, Jeff Sowards, by email: Jeff.Sowards@dep.state.fl.us or by phone: (352)465-8565.

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: Jeff Sowards at (352)465-8565. 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



Rainbow Springs Aquatic Preserve Public Meeting

**Tuesday, December 8, 2015
6:00 pm - 7:30 pm**

Dunnellon Public Library
20351 Robinson Road
Dunnellon, FL 34431

To view the draft plan, please visit:
www.dep.state.fl.us/coastal/sites/rainbow/plan.htm

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 Rainbow Springs Aquatic Preserve management plan.

Meeting objectives:

1. Review purpose and process for revising the Rainbow Springs 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 Jeff Sowards, (352)465-6585, Jeff.Sowards@dep.state.fl.us or visit our website at www.dep.state.fl.us/coastal/sites/rainbow/plan.htm 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 December 22, 2015.

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 Jeff Sowards at (352) 465-6585 or Jeff.Sowards@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. NA11NOS4190073-CM227. 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 2015..



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Misc. Notices

Misc. Notices

**448-1203 RIV
PUBLIC NOTICE**

The Florida Department of Environmental Protection, Florida Coastal Office announces a public meeting to receive comments on the Rainbow Springs Aquatic Preserve draft management plan. The meetings will be held in Marion County on December 8, 2015, 6:00-7:30 p.m. at the Dunnellon Public Library, 20351 Robinson Road Dunnellon, FL 34431. A copy of the draft plan is posted at www.dep.state.fl.us/coastal/sites/rainbow/plan.htm. For the agenda, contact the Aquatic Preserve Manager, Jeff Sowards by e-mail: Jeff.Sowards@dep.state.fl.us, by phone (352)465-8565.

If special accommodation is required for participation contact the manager 48 hours in advance. 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).

Published November 26 & December 3, 2015.

16 ~ Riverland News, Thursday, December 3, 2015

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**448-1203 RIV
PUBLIC NOTICE**

The Florida Department of Environmental Protection, Florida Coastal Office announces a public meeting to receive comments on the Rainbow Springs Aquatic Preserve draft management plan. The meetings will be held in Marion County on December 8, 2015, 6:00-7:30 p.m. at the Dunnellon Public Library, 20351 Robinson Road Dunnellon, FL 34431. A copy of the draft plan is posted at www.dep.state.fl.us/coastal/sites/rainbow/plan.htm. For the agenda, contact the Aquatic Preserve Manager, Jeff Sowards by e-mail: Jeff.Sowards@dep.state.fl.us, by phone (352)465-8565.

If special accommodation is required for participation contact the manager 48 hours in advance. 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).

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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

Jonathan P. Steverson
Secretary

Rainbow Springs Aquatic Preserve
Draft Management Plan Public Meeting Summary
December 8, 2015, 6:00 – 7:30 p.m.

Dunnellon Public Library, 19152 SW 81st Place Road, Dunnellon, Florida

Attendees (28): Terry Sullivan, Greg Wiley, Charles Ryan, Mark Abrizenski, Chuck Cichra, Curt Bowen, Joan Bowen, Terry Rapp, Sky Notestein, Jon Brainard, Kathy Bent, Terry Hansen, Judy Capone, Rick Owen, Sandra Sowards, Paul Marraffino, Burt Eno, Susan Jones, Dennis Jones, Jack Hebert, Dr. Ellen Rudolph, Dan Molter, Bill Vibbert, Fred Ward, Jerry Rogers, Jamie Letendre, Mary Merenda, Lesley Collins.

Staff: Jeff Sowards, Jenna Harper, Penny Isom, Earl Pearson.

Penny welcomed everyone, gave a brief introduction about the purpose of the meeting, and introduced aquatic preserve and Tallahassee staff.

Jeff gave a PowerPoint presentation about Rainbow Springs Aquatic Preserve, its challenges, and work being conducted.

After the presentation, Penny explained the commenting process. The room was set up so there were three stations, one for each of the three issues identified in the management plan. Attendees were assigned to one of three groups. Each group started at one of the issues stations. Staff gave each group a little background on the issue and recorded comments the public had pertinent to each issue (listed below). The groups rotated every 15 minutes so each group had an opportunity to comment at each station.

Issue one: Water quality.

- Eliminate septic tanks
- Enforcement- what are penalties? Enforcers? Polluters (agriculture) and users (no regulations)
- Land acquisition key for protection (turtle nesting endorsement)
- Rainbow River Restoration Action Plan (endorsement)
- Endorse new SWIM plan
- Evaluate sediment quality (consider localized removal)
- Permitting process inadequate/compliance
- Address sources (agriculture vs residents) separately

- What is in it for homeowners and stakeholders to make changes in their behaviors?
- Partners with Water Works to translate science / BMAP --> stakeholders
- Number of users- contribution to water quality/clarity changes
- Primary spring protection area
- Continue and expand educational programs that include messages relating to water quality (instruments to demonstrate water quality changes)

Issue two: Wildlife protection and habitat restoration.

- Issues with wildlife due to 24 hour access on river
- Make people more aware that it's an aquatic preserve
- Permission of motorized vessels on waterway
- Minimize wildlife disturbance by having speed restrictions (already has non-motorized zone)
- Limit motor size
- Acquire undeveloped land adjacent to the aquatic preserve
- No authority to administer the carrying capacity
- Have defined vegetative buffers (for development and fertilizer use)
- Limit to electric motors
- More use of special zoning
- Catch and release (in zones)
- Scuba diving (in zones) and limit number of days
- Limit outboard motor shaft length
- Land acquisition
- Cross train enforcement agencies
- Concerned about sediment (too much)
- Establish carrying capacity limits
- Rake *Lyngbya* out so natives can populate
- Write specific policies in 18-20, Florida Administrative Code, for Rainbow Springs Aquatic Preserve
- Enforce poaching penalties (especially on turtle removal)
- Make sure fishing line is not left on river
- Educate users on how to report destruction to resources (i.e. what documentation is needed for law enforcement to take action)
- Give citizens ability to report crimes/destruction
- Educate users about wildlife (native and invasive) and how they relate to one another and the importance to the environment (do at the point of entry and make a requirement)

Issue three: Sustainable public use.

- Suggest starting with motor boat damage (as cited in the Cichra and Holland report) as causing the most damage (use prop guards, electric motors)- K Taubert
- Limit tubers at any one given time- T Rapp
- Look at Itchetucknee State Park- T Hanson
- Look into pollution caused by 2-cycle motors vs 4-cycle motors- C Bowen
- Needs more enforcement- K Taubert
- With the no wake rule, a gas motor isn't needed; encourage boaters to replace with electric- K Taubert
- More signage at boat or tuber launches (or other education), especially state park with paddlers- T Rapp
- Need to demonstrate positive consequences of proper behavior to the users (property owners, businesses, individuals)- K Taubert
- Identify effects of loss of submerged aquatic vegetation with wildlife impacts- T Hanson and K Taubert
- Diving classes are not low impact (destroy eel grass when divers stand on them) (Devil's Elbow)- L Collins
- To promote low impact, reduce numbers; can't have 11,000 users in a weekend- L Collins
- Regulate user groups- Dr. E Rudolph
- Multiple entities using the river, but they may be in conflict (too many cooks in the soup); nobody can wrap their head around the whole problem- F Ward
- Other areas have brought the groups together, or regulated (Crystal River)- Dr. E Rudolph
- Sustainable public use means limiting the number of people per day- P Marraffino
 - Only tubers over July 4 because it was too crowded
 - Take days off
- Plan needs something about enforcement- four state agencies need to coordinate and train- B Vippert
- Enforceable capacity- D Jones
- Establish carrying capacity- B Vippert
- One too many tubing operations- B Vippert
- Establish permitting process for commercial operations- J Hebert
- Boat ramp should close when KP Hole closes- D Jones
- Make greater use of spatial zoning for scuba diving, catch and release fishing- B Vippert
- Management plan language is way too fluffy- S Jones
- Disagree with last sentence of Goal 2, Performance Measure 2- S Jones
- Use visitor experience surveys- B Vippert
- Have tubing days or diving days or boating days- temporal zoning- B Jones and B Vippert
- Support 1.1.1- B Jones

3 of 5

- Drones and fast model boats can be a hazard
- Publish list of rules by 18-20, Florida Administrative Code- B Vippert
- Need rules of the river for ecotours- J Hebert
- Specific rules to Rainbow River in 18-20 Florida Administrative Code, most are for saltwater systems- B Vippert
- More people on diving boats for safety- usually only one, even when there are 30 divers- Jones
- Don't like last half of last sentence of Goal 2, Performance Measure 2, it's obnoxious- B Vippert

After the comments were received, the group reconvened and Penny explained the next steps in the management plan process: an advisory committee meeting, Acquisition and Restoration Council meeting (a public meeting in Tallahassee), and Governor and Cabinet meeting. The public was reminded that comments could still be submitted on or before December 22. They were thanked for taking time out of their busy schedules to attend and provide valuable feedback.

Meeting was adjourned.


Below are written comments received at the end of the meeting:

Kathryn Taubert (Sierra Club – Tri-County Working Group)- Best plant community around KP Hole. Question- why?

Dennis and Susan Jones (property owners)- Management plan need enforcement provisions. Commercial operators need to be permitted and limited (zones/times days). Septic tanks should be eliminated in Springs Basin. Start with riverfront properties. Water permits should be more difficult to acquire. Water use of commercial entities should be monitored and if use exceeds permit- then penalties.

Lesley Collins- #1 To me, the greatest detriment to the Rainbow River is the extreme over usage by people- too many people. They come from all over the country and world here. They have no knowledge it is an aquatic preserve- no knowledge it has a no-wake boating rule- no idea what an aquatic preserve means or how to behave accordingly.

You can blame the farms of the aquatic basin but how do you weigh the human waste and suntan lotion dumped into the Rainbow River by every tuber, every diver, every swimmer who spends their day on the river? There are no restrooms along the route. What does the water clarity look like after 11,000 people have used and abused the river on July 4th weekend? Multiply that over and over again for the days- every day from April 1st thru Nov. 30th.



It all boils down to overuse of the Rainbow River by hordes of people who could care less after their day of fun in the sun here!

#2 Limiting the horsepower of outboards to 10 h.p. would do a lot to get the abusive dive classes off this river. They are quite destructive to the river bottoms.

Bill Vibbert (RRC)- Suggestions:

1. Endorse Rainbow River Corridor Project for acquisition. Habitat for turtles;
2. Limits on tubing, especially state park operations;
3. Additional use of "spatial zoning" for tubing, scuba;
4. Establish "catch and release" "no live bait" zone from 1700' line to KP Hole;
5. Limit outboard motor shaft length to 20";
6. Establish coordinated enforcement, cross training, full time summer weekends;
7. Revise 18-20 to include Rainbow River specific rules;
8. Consider "visitor experience" in plan;
9. Publish Rainbow River specific rules e.g. archaeology rules.

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 and does not include 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 red font indicate funding not available at this time.

Goals, Objectives & Integrated Strategies	Mgmt. Program	Implementation Date (Planned)	Length of Initiative	Est. Avg. Yearly Cost	Funding Source	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25
Issue 1: Water Quality															
Goal 1: Further develop and improve the strategic long-term water quality monitoring program within RSAP that will assist with identifying and addressing issues pertaining to the natural resource.															
Objective 1: Analyze and interpret the status and trends of RSAP’s water quality throughout the aquatic preserve to identify potential impacts to natural resources and provide quality scientific data and recommendations to address such issues.															
Strategy 1: Maintain a strategic long-term water quality monitoring program that includes both biotic and abiotic parameters to compile and analyze data to evaluate water quality status and trends. This will be achieved through monthly field data collection by RSAP staff to supplement quarterly efforts being made by SWFWMD. RSAP will be collecting parameters measured by YSI equipment (including time, temperature, specific conductivity, pH, salinity, dissolved oxygen, and depth) as well as water clarity measurements.	Eco-system Science	2003	ongoing	\$7,900	F, S	\$7,000	\$8,000	\$15,000	\$6,000	\$6,000	\$5,000	\$10,000	\$7,000	\$7,000	\$8,000
Strategy 2: Continue to coordinate and collaborate with various entities that collect water quality data within the aquatic preserve to inform managers and the general public about water quality conditions. Staff maintains a fair amount of historic water quality monitoring data, but additional historic data is available through DEP, SWFWMD, and other entities.	Eco-system Science	2003	ongoing	\$1,590	F	\$1,400	\$1,400	\$1,400	\$1,600	\$1,600	\$1,600	\$1,700	\$1,700	\$1,700	\$1,800
Objective 2: Identify specific and emerging water quality issues related to nutrients, pollution, and environmental contaminants and coordinate with other agencies to develop appropriate response strategies to these issues.															
Strategy 1: Support implementation of the TMDL and BMAP programs for RSAP, whose goal is to reduce nutrient loads in degraded water bodies, as determined by DEP criteria, throughout the state of Florida.	Eco-system Science	2012	ongoing	\$210	F	\$500	\$300	\$150	\$150	\$500	\$100	\$100	\$100	\$100	\$100

Goals, Objectives & Integrated Strategies	Mgmt. Program	Implementation Date (Planned)	Length of Initiative	Est. Avg. Yearly Cost	Funding Source	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25
Strategy 2: Staff will increase awareness of specific and emerging water quality issues related to nutrient, pollution and environmental contaminants through environmental outreach by attending various local workshops and public meetings.	Eco-system Science	2003	ongoing	\$1,000	F	\$500	\$500	\$750	\$750	\$1,000	\$1,000	\$1,000	\$1,000	1,\$500	\$2,000
Goal 2: Protect flow regimes of the Rainbow River system.															
Objective 1: Support planned implementation of the Minimum Flows and Levels (MFLs) of the Rainbow River.															
Strategy 1: Collaborate with SWFWMD and interested stakeholders to review and comment on issues related to the implementation of the MFLs and proposal of future MFLs.	Eco-system Science	2010	ongoing	\$100	F	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100
Strategy 2: Staff will assist in the collection of pertinent field data, as well as provide additional existing data, associated with the MFL process.	Eco-system Science	2010	ongoing	\$1,500	F	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500
Issue 2: Wildlife Protection and Habitat Restoration															
Goal 1: Improve conditions for native flora and fauna.															
Objective 1: Monitor and assess the impacts of non-native and/or invasive flora located within RSAP.															
Strategy 1: Evaluate submerged and emergent aquatic vegetation compositions within the aquatic preserve, including the interaction between native and exotic and/or invasive species, and restore native species where feasible. Staff will also continue the RSAP partnership with SWFWMD on the Rainbow River Vegetation Evaluation which occurs at least every five years.	Resource Mgmt.	1996	ongoing	\$895	F, S	\$750	\$750	\$750	\$750	\$750	\$1,000	\$1,000	\$1,000	\$1,100	\$1,100
Strategy 2: Staff will continue to survey for exotic and/or invasive flora species, and develop treatment schedules to prevent further infestations and reduce current population sizes. This includes an existing partnership with FWC Invasive Plant Management Section and SWFWMD.	Resource Mgmt.	2003	ongoing	\$1,560	F, S	\$1,200	\$1,200	\$1,200	\$1,500	\$1,500	\$1,500	\$1,750	\$1,750	\$2,000	\$2,000
Strategy 3: Increase public awareness through various educational outlets (literature, attend public meetings, etc.) relating to exotic vegetation and the importance of eradication within the aquatic preserve.	Resource Mgmt.	2003	ongoing	\$950	F	\$700	\$750	\$750	\$800	\$800	\$900	\$900	\$1,200	\$1,200	\$1,500
Strategy 4: Continue to coordinate with FWC IPMS to control exotic vegetation. Where appropriate, this partnership will replant treatment areas with suitable, native vegetation.	Resource Mgmt.	2003	ongoing	\$4,900	F, S	\$2,500	\$3,000	\$3,500	\$3,500	\$4,000	\$4,500	\$6,500	\$7,000	\$7,000	\$7,500

Goals, Objectives & Integrated Strategies	Mgmt. Program	Implementation Date (Planned)	Length of Initiative	Est. Avg. Yearly Cost	Funding Source	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25
Strategy 5: RSAP staff will continue to review, and perform site visitations, for FWC's invasive aquatic plant removal permit requests as they arise.	Resource Mgmt.	2003	ongoing	\$298	F	\$250	\$250	\$250	\$275	\$275	\$300	\$300	\$325	\$350	\$400
Strategy 6: RSAP staff will assess and implement restoration projects as they arise. Staff will continue to propagate transplant specimens for this purpose.	Resource Mgmt.	2000	ongoing	\$2,120	F	\$1,200	\$1,200	\$3,000	\$1,200	\$1,200	\$1,700	\$1,700	\$5,000	\$2,500	\$2,500
Objective 2: Monitor and assess wildlife populations located within RSAP.															
Strategy 1: Establish long-term monitoring sites for sailfin catfish and other non-native and/or invasive fish species. These sites will be established in conjunction with existing water monitoring stations and assessments will be performed monthly.	Resource Mgmt.	2005	ongoing	\$620	F	\$500	\$500	\$500	\$500	\$600	\$650	\$700	\$700	\$750	\$800
Strategy 2: Increase public awareness through various educational outlets (literature, attend public meetings, etc.) relating to non-native and/or invasive wildlife species and the importance of eradication within RSAP.	Resource Mgmt.	2005	ongoing	\$510	F	\$250	\$300	\$400	\$400	\$500	\$500	\$650	\$650	\$700	\$750
Strategy 3: Staff will continue the partnership with Rainbow River Conservation, Inc. in the monitoring and maintenance of 50 wood duck nesting boxes located at various points throughout RSAP.	Resource Mgmt.	2004	ongoing	\$275	F, O	\$200	\$200	\$250	\$250	\$250	\$275	\$300	\$300	\$350	\$375
Strategy 4: Continue partnership with Eckerd College in the study of aquatic turtle dynamics within RSAP.	Resource Mgmt.	2003	ongoing	\$253	F	\$200	\$200	\$200	\$225	\$225	\$250	\$250	\$300	\$325	\$350
Strategy 5: Continue to monitor nuisance alligator removal in RSAP through the targeted harvest area permit.	Resource Mgmt.	2013	ongoing	\$198	F	\$100	\$100	\$125	\$200	\$200	\$225	\$225	\$250	\$250	\$300
Issue 3: Sustainable Public Use															
Goal 1: Maintain a safe and natural environment for RSAP wildlife, habitats and user groups.															
Objective 1: Facilitate research to identify human use conflicts with natural resources.															
Strategy 1: Continue to work with regulatory agencies, law enforcement, and other resource management entities to identify and address uses in RSAP that are potentially illegal and/or are harmful to natural resources.	Public Use	2003	ongoing	\$298	F	\$250	\$250	\$250	\$275	\$300	\$300	\$325	\$325	\$350	\$350
Strategy 2: Partner with other agencies to develop and distribute information identifying potential use conflicts and methods of prevention.	Education & Outreach	2003	ongoing	\$373	F	\$150	\$175	\$300	\$300	\$500	\$500	\$400	\$400	\$500	\$500

Goals, Objectives & Integrated Strategies	Mgmt. Program	Implementation Date (Planned)	Length of Initiative	Est. Avg. Yearly Cost	Funding Source	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25
Goal 2: Promote low-impact, sustainable recreational opportunities.															
Objective 1: Increase awareness of minimal impact use opportunities such as the use of appropriate water entrance locations, and proper resource use techniques associated with snorkeling, tubing, diving, boating, kayaking and canoeing.															
Strategy 1: Work with Rainbow Springs State Park and FWC's Law Enforcement Division to ensure the proper use of entrance locations for RSAP, to discourage improper use and creation of unauthorized access points. This will also aid in the reduction of additional damage to the natural resource.	Public Use	2003	ongoing	\$143	F, S	\$100	\$100	\$100	\$125	\$125	\$125	\$150	\$200	\$200	\$200
Strategy 2: Work with local resource agencies and vendors to improve educated use of the unique recreational opportunities within RSAP. Educational materials include kiosks and literature available to the public at various locations associated with RSAP.	Education & Outreach	2005	ongoing	\$1,320	F, O	\$500	\$750	\$750	\$1,000	\$1,500	\$2,500	\$1,200	\$1,500	\$1,500	\$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.

	Ecosystem Science	Resource Management	Education & Outreach	Public Use	Annual Total
2015-2016	\$11,000	\$7,850	\$650	\$350	\$19,850
2016-2017	\$11,800	\$8,450	\$925	\$350	\$21,525
2017-2018	\$18,900	\$10,925	\$1,050	\$350	\$31,225
2018-2019	\$10,100	\$9,600	\$1,300	\$400	\$21,400
2019-2020	\$10,700	\$10,300	\$2,000	\$425	\$23,425
2020-2021	\$9,300	\$11,800	\$3,000	\$425	\$24,525
2021-2022	\$14,400	\$14,275	\$1,600	\$475	\$30,750
2022-2023	\$11,400	\$18,475	\$1,900	\$525	\$32,300
2023-2024	\$10,400	\$16,525	\$2,000	\$550	\$29,475
2024-2025	\$13,500	\$17,575	\$2,500	\$550	\$34,125
Ten Year Totals	\$121,500	\$125,775	\$16,925	\$4,400	

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

There has never been an approved management plan for the Rainbow Springs Aquatic Preserve. A draft plan was created in 1991 but never approved by the appropriate entity.

- **1986:** Rainbow River became Rainbow Springs Aquatic Preserve (RSAP) under Florida Statute 258.35-.46 for the purpose of maintaining the headspring and river run in an essentially natural conditions.
- **1987:** Rainbow River designated an Outstanding Florida Water (OFW) under Florida Statute 403.061 (27) because it is an area worthy of special protection due to its natural attributes.
- **1993-1994:** RSAP coordinated with the Florida Park Service and University of Florida (UF) to produce the first recreation and environmental impact study for the Rainbow River.
- **1999-2000:** RSAP completed the RSAP 2000 Vegetation Mapping and Change Analysis Report.
- **2002:** RSAP coordinated with the SWFWMD to institute an extensive water quality monitoring program for the Rainbow River.
- **2003:** RSAP received an Outstanding Community Service Award from the Dunnellon Middle School Community, Academics and Technology Studies program.
- **2003-2004:** RSAP became a member of the Marion County Springs Festival steering committee. The committee received the Rural Community Assistance National Action Award from the U.S. Forest Service.
- **2004:** RSAP coordinated with RSSP to reduce the impact of recreational swimming activities to the headspring by reducing the area of impact of the designated swimming area by 2,800 square feet and planting submerged aquatic vegetation in the affected area.
- **2005:** RSAP coordinated with RSSP to create a vessel exclusion zone along 100 feet of a highly eroded shoreline area at the state park campground. RSAP instituted restoration protocol using emergent aquatic vegetation propagated at the aquatic preserve greenhouse facility.
- **2005:** RSAP instituted a treatment regime for hydrilla in the aquatic preserve in coordination with Florida Fish and Wildlife Commission (FWC) Invasive Plant Management Section (IPMS) and Southwest Florida Water Management District that resulted in 63 percent decline in hydrilla coverage.
- **2006:** RSAP developed site specific brochures, field guides, and informational posters for the aquatic preserve. Posters are located in kiosks throughout the aquatic preserve and brochures are distributed throughout Marion County.
- **2006-2008:** RSAP instituted a successful eradication program of the non-native sailfin catfish.
- **2008-2011:** RSAP documented the introduction of the non-native plant Eurasian water milfoil in the Rainbow River and coordinated a removal program with FWC IPMS. The plants were removed by hand over the three year period.
- **2012:** RSAP was designated (G/45) as part of the Great Florida Birding and Wildlife Trail.
- **2012-2017:** RSAP coordinated with the FWC State Nuisance Alligator Program to designate the aquatic preserve as a Targeted Harvest Area allowing the aquatic preserve input and final approval for alligator removal.
- **2013:** RSAP manager received a Department of Environmental Protection employee "Star Award."

- **2014-2015:** RSAP and the Florida Coastal Office coordinated to create RSAP Facebook social media page to highlight events and educate the public on aquatic preserve resources issues. The page has grown to approximately four thousand followers.
- **2015:** RSAP co-authored with the UF Tropical Aquaculture Laboratory a paper highlighting the management techniques of the eradication of the sailfin catfish from the Rainbow River. The paper was published in the journal *Management of Biological Invasions*.

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. 11-12
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. 11
6.	An assessment as to whether the property, or any portion, should be declared surplus. <i>Provide Information regarding assessment and analysis in the plan, and provide corresponding map.</i>	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. <i>Please clearly indicate parcels on a map.</i>	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. 29
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. 15-16, 25-28
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. 10
12.	A description of past and existing uses, including any unauthorized uses of the property.	18-2.018 & 18-2.021	p. 16, 23-25
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, 31-53
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. 34-42, 44-48, 52-53
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. 52-53
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. 15-16, 31-53
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)	p. 52-53

*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. <i>Include the advisory group members and their affiliations, as well as the date and location of the advisory group meeting.</i>	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. <i>Include a copy of each County's advertisements and announcements (meeting minutes will suffice to indicate an announcement) in the management plan.</i>	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. <i>Include manager's replies to the team's findings and recommendations.</i>		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.		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. <i>Use brief descriptions and include USDA maps when available.</i>	18-2.021	p. 14-15
33.	Insert FNAI based natural community maps when available.	ARC consensus	p. 17
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
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. 17-21
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. 14-15
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. 17-21, App. B.4
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. 17-21, App. B.4
40.	The identification or resources on the property that are listed in the Natural Areas Inventory. <i>Include letter from FNAI or consultant where appropriate.</i>	18-2.021	p. 17-20
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. 23-25, 31-53, 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. 17-20, 23-25, 31-53
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. <i>Include fire management plans - they can be in plan body or an appendix.</i>	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. <i>See footnote.</i>	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. 21, 31-53
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. <i>See footnote.</i>	253.034(5)	p. 21-23, App. B.3.4
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. 21-23, 44-46, 49
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. <i>If yes, provide a list of the appropriate managing agencies that have been notified of the proposed plan.</i>	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, 15-16
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. 17-19

**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. <i>See footnote.</i>	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. <i>Include maps of all cultural resources except Native American sites, unless such sites are major points of interest that are open to public visitation.</i>	18-2.018, 18-2.021 & per DHR's request	Ex. Sum, p. 23-25
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. 23-25
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. <i>See footnote.</i>	253.034(5)	p. 57
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. 55-57, 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
59-D.	Related activities (see requirement for #42-D).	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-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. 50-53, App. D.1
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. 31-53
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
Tallahassee, Florida 32399-3000

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Jonathan P. Steverson
Secretary

Marion County Planning Department
2710 East Silver Springs Boulevard
Ocala, Florida 34470

Dear Planning Department:

Attached is a copy of the draft Rainbow Springs Aquatic Preserve Management Plan. The plan was developed with input from the public and the Rainbow Springs Aquatic Preserve Management Plan Advisory Group. It is anticipated to be reviewed and approved by the Acquisition and Restoration Council at the June 17, 2016 meeting in Tallahassee. We respectfully request, within 30 days of receipt of this letter, your review of the Aquatic Preserve plan for its compliance with the Marion County Comprehensive Plan. Please reply to the physical address (or e-mail address) below regarding whether the 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)245-2098 or Penny.Isom@dep.state.fl.us.

Sincerely,

A handwritten signature in black ink, appearing to read "Penny Isom".

Penny Isom
Planning Manger
Florida Department of Environmental Protection
Florida Coastal Office
3900 Commonwealth Blvd., MS 235
Tallahassee, FL 32399-3000

Penny.Isom@dep.state.fl.us

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Rick Scott
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Carlos Lopez-Cantera
Lt. Governor

Jonathan P. Steverson
Secretary

June 20, 2016

Ms. Penny Isom
Planning Manager
Florida Coastal Office
Florida Department of Environmental Protection
3900 Commonwealth Boulevard, MS 235
Tallahassee, Florida 32399-3000

RE: Rainbow Springs Aquatic Preserve Management Plan

Dear Ms. Isom:

On **June 17, 2016**, the Acquisition and Restoration Council recommended approval of the **Rainbow Springs Aquatic Preserve** management plan. Therefore, the Division of State Lands, Office of Environmental Services, acting as agent for the Board of Trustees of the Internal Improvement Trust Fund, hereby approves the **Rainbow Springs Aquatic Preserve** management plan. The next management plan update is due June 17, 2026.

Approval of this land management plan does not waive the authority or jurisdiction of any governmental entity that may have an interest in this project. Implementation of any upland activities proposed by this management plan may require a permit or other authorization from federal and state agencies having regulatory jurisdiction over those particular activities. Pursuant to the conditions of your lease, please forward copies of all permits to this office upon issuance.

Sincerely,

A handwritten signature in cursive script that reads "Joseph Wilson".

Joseph Wilson, Chief
Office of Environmental Services
Division of State Lands



Rainbow Springs Aquatic Preserve Management Plan

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