



Nature Coast Aquatic Preserve Management Plan



Florida Department of Environmental Protection
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Mission Statement

The Office of Resilience and Coastal Protection's mission statement is: Conserving, protecting, restoring, and improving the resilience of Florida's coastal and aquatic resources for the benefit of people and the environment.

The four long-term goals of the Office of Resilience and Coastal Protection'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

Nature Coast Aquatic Preserve Management Plan

Lead Agency: Florida Department of Environmental Protection's (DEP) Office of Resilience and Coastal Protection (ORCP)

Common Name of Property: Nature Coast Aquatic Preserve

Location: Citrus Hernando, and Pasco counties, Florida

Acreage: 454,786 acres

Management Agency: DEP's ORCP

Designation: Aquatic Preserve

Unique Features: large expanses of seagrasses, mangrove islands, shell middens, shallow bathymetry

Archaeological/Historical Sites: Over 1300 archaeological and cultural sites in Citrus County alone. Many in need of rapid assessment and study of impacts from sea level rise and other environmental conditions.

FNAI Natural Communities	Acreage according to GIS
Hydric Hammock	N/A
Coastal Hydric Hammock	12 acres
Shell Mounds	N/A
Salt Marsh	9,608 acres
Salt Flat	N/A
Mangrove Swamp	121 acres
Consolidated Substrate	30 acres
Unconsolidated Substrate	2,906 acres
Mollusk Reef	127 acres
Octocoral Bed	N/A
Sponge Bed	N/A
Algal Bed	N/A
Seagrass Bed	355,537 acres
Aquatic Caves	N/A
Total Acreage:	454,786 acres

Management Needs: Seagrasses, water quality, and endangered species habitats.

Ecosystem Science: Project COAST, seagrass, fisheries, climate change impacts

Resource Management: Fisheries (scallops, blue crabs, stone crabs, oysters, etc.), endangered species (manatees, green sea turtles, Gulf sturgeon, etc.), and natural communities (sponges, seagrasses, mangroves, etc.).

Education and Outreach: Coordination with relevant programs from surrounding agencies (FWC, SWFWMD, Florida Sea Grant, etc.)

Public Use: Commercial and recreational fishing, boating, eco-tourism, and citizen science

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. Nature Coast Aquatic Preserve staff held a series of online public meetings and advisory committee meetings to gather input during the drafting of the plan. After completion of the draft, a public meeting and advisory committee meeting were held at Crystal River,

Florida, on May 24, 2022, and May 26, 2022 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.

Coastal Zone Management Issues:

The Nature Coast Aquatic Preserve (NCAP) was designated in the summer of 2020 adding over 450,000 acres of submerged public resources to Florida's Aquatic Preserve Program. The Nature Coast Aquatic Preserve spans three counties of Florida's Gulf of Mexico coastline. While historically these waters were not formally managed by a single entity, work has been done by local stakeholders and researchers to gain knowledge on the unique features this area has to offer. This plan serves to expand on these efforts and outlines ambitious goals for the years ahead to preserve these waters for future generations. The execution of this plan will guide managers to obtain a better understanding of the resources to ensure the preservation and protection of submerged communities and water resources that affect them. Special attention to intertidal communities and shifts in weather patterns will steer management decision making to promote coastal resilience of the Nature Coast Aquatic Preserve.

Through partnerships and science-based monitoring, comprehensive data collection will be used to draft impactful solutions and disseminate accurate data to the Nature Coast community on both the natural communities and human related activities impacting the NCAP. By working with a wide variety of influencers such as universities, subject matter experts, area stakeholders and the public, minimizing impacts to the resources while promoting sustainable use is a primary focus of this plan.

Through a series of meetings, a group of subject matter experts identified four primary management issues that will be addressed over the next ten years of this plan: Water Resources, Protection and Management of Submerged Resources, Climate Change and Human Dimensions. These issues prove to be interconnected; interpreting and managing them as such will aid in the success of maintaining and improving the almost pristine nature of this area.

Issue One: Water Resources

Goal One: Assess and define water quality and quantity monitoring needs.

Objective One: Identify existing water quality monitoring programs, catalog the parameters being recorded and identify essential data gaps within the NCAP and its contributing tributaries.

Objective Two: Identify and formulate options relating to historical programs and data gaps associated with water resources within the aquatic preserve boundaries and its contributing tributaries.

Goal Two: Expand strategic long-term continuous water quality monitoring efforts within NCAP to assist in the identification and future management of issues relating to the aquatic preserve's submerged resources.

Objective One: Establish a reliable baseline dataset to assess and monitor water quality within the Nature Coast Aquatic Preserve.

Goal Three: Ensure that NCAP waters meet or exceed water quality standards associated with their designated use as Class II and III waters, and that those that currently exceed the designated use are not degraded below their ambient condition pursuant to NCAP's status as an Outstanding Florida Water

Objective One: Identify trends, changes, and needs within the NCAP's waters.

Goal Four: Emphasize upland connections to NCAP's submerged resources.

Objective One: Identify influencing factors outside the aquatic preserve boundary contributing to resource degradation and provide support and collaboration to prevent degradation and improve conditions when possible.

Objective Two: Partner with nearby landowners to protect and improve conditions of the Nature Coast Aquatic Preserve.

Objective Three: Partner with government agencies and committees including but not limited to federal, state and local government agencies and stakeholders.

Issue Two: Protection and Management of Submerged Resources

Goal One: Assess historical and present condition of submerged resources to guide management decisions within the Nature Coast Aquatic Preserve.

Objective One: Identify and formulate monitoring programs to assess status and trends associated with submerged resources within NCAP.

Objective Two: Determine the status of intertidal natural resource communities within NCAP.

Objective Three: Identify current and potential future threats and impacts to the natural communities within NCAP.

Goal Two: To understand, protect and maintain existing seagrass resources, and restore and enhance degraded seagrass resources where these occur.

Objective One: Manage seagrass communities through research and monitoring, education and outreach, and collaborative mapping efforts with other state agencies to effectively protect and maintain this habitat as a valuable habitat throughout NCAP.

Goal Three: To understand, protect and maintain hardbottom (coral/sponge bed) resources.

Objective One: Protect and manage hardbottom communities to ensure long term survivorship and ecological functions continue within the NCAP.

Goal Four: Monitor the distribution and abundance of macroalgae within NCAP.

Objective One: Establish a baseline understanding of macroalgae components of the NCAP ecosystem.

Goal Five: Preserve the conditions of Nature Coast Aquatic Preserve's submerged resources.

Objective One: Work towards establishing minimum thresholds/monitoring criteria/benchmarks for NCAP's submerged resources in coordination with scientists and managers from other agencies and institutions.

Objective Two: Identify and protect submerged and intertidal cultural resources.

Goal Six: Provide scientific data and information on the current and projected status of submerged resources to Nature Coast communities, businesses, and officials to improve stewardship of the NCAP in decision-making for coastal development and conservation.

Objective One: Improve community understanding of submerged resources and factors that impact the Nature Coast Aquatic Preserve by improving data dissemination and accuracy.

Issue Three: Climate Change

Goal One: Ensure that the NCAP remains resilient to expected impacts from climate change, including tropicalization and climate-induced habitat migration.

Objective One: Track and predict climate factors such as sea level rise, increases in sea surface temperature, storm frequency and intensity and alterations in drought/flood cycles as they pertain to all NCAP's submerged and coastal resources.

Objective Two: Establish processes to track and predict climate-driven changes to all NCAP's submerged resources to guide adaptive management approaches.

Issue Four: Human Dimensions

Goal One: Identify the impacts of, remove, and reduce the presence of marine debris (litter, derelict vessels, ghost traps, aquaculture and discarded fishing gear) within the Aquatic Preserve.

Objective One: Identify implications to the natural resources of the various types of marine debris occurring within the Aquatic Preserve.

Objective Two: Remove marine debris from the resource by physical means.

Objective Three: Reduce marine debris at the source.

Objective Four: Promote community education regarding implications of marine debris in the Aquatic Preserve and of solutions/impactful debris reduction actions that can take.

Goal Two: Support community engagement to foster sustainable stewardship of NCAP's resources.

Objective One: Improve community understanding of the Nature Coast Aquatic Preserve's water quality and submerged and intertidal resources including factors that impact the Aquatic Preserve.

Objective Two: Engage with law enforcement to maintain and improve conditions of NCAP's water quality and submerged resources.

Objective Three: Improve community education regarding implications of climate change in the aquatic preserve and of adaptation/resilience efforts.

Goal Three: Promote diverse, sustainable use of the Nature Coast Aquatic Preserve's submerged natural resources.

Objective One: Anticipate impacts related to increased use and identify potential conflicts/impacts (environmental) like construction, pipelines, development and roadways, etc. and collaborate to mitigate or prevent habitat damage related to increased use/development.

Objective Two: Coordinate and support law enforcement to reduce or prevent impacts to natural and cultural resources.

Goal Four: Identify impacted areas, assess impact severity, and begin to implement reduction and restoration efforts relating to propeller damage, vessel grounding and anchoring related activities occurring to submerged resources within the Nature Coast Aquatic Preserve.

Objective One: Assess and identify areas of impact within the Aquatic Preserve.

Objective Two: Reduce physical damage (e.g., propeller scarring, anchor drags) to the NCAP's submerged resources.

ORCP approval date: August 31, 2022

ARC approval date: December 9, 2022

Final approval date: March 8, 2023

Acronym List

Abbreviation	Meaning
A.D.	Anno Domini
B.C.	Before Christ
BMAP	Basin Management Action Plan
cfs	Cubic feet per second
CSO	Citizen Support Organization
CWMA	Chassahowitzka Wildlife Management Area
DEP	Florida Department of Environmental Protection
DNR	Florida Department of Natural Resources
DOH	Florida Department of Health
F.A.C.	Florida Administrative Code
F.A.R.	Florida Administrative Register
FDACS	Florida Department of Agriculture and Consumer Services
FNAI	Florida Natural Areas Inventory
F.S.	Florida Statutes
FWC	Florida Fish and Wildlife Conservation Commission
FWRI	(FWC) Fish and Wildlife Research Institute
GIS	Geographic Information System
lb-N/yr	Pounds of nitrogen per year
MFLs	Minimum flows and levels
n.d.	No date
NCAP	Nature Coast Aquatic Preserve
NERR	National Estuarine Research Reserve
NRHP	National Register of Historic Places
NSILT	Nitrogen Source Inventory Loading Tool
NOAA	National Oceanic and Atmospheric Administration
NWR	National Wildlife Refuge
OFW	Outstanding Florida Water
ORCP	Office of Resilience and Coastal Protection
Project COAST	COastal ASsessment Team
SMMAP	St Martins Marsh Aquatic Preserve
SWFWMD	Southwest Florida Water Management District
TMDL	Total Maximum Daily Load
Trustees	Board of Trustees of the Internal Improvement Trust Fund
U.S.	United States
UF/IFAS	University of Florida Institute of Food and Agricultural Sciences
USF	University of South Florida
USFWS	U.S. Fish and Wildlife Service
WMA	Wildlife Management Area

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Chapter 1 / Introduction

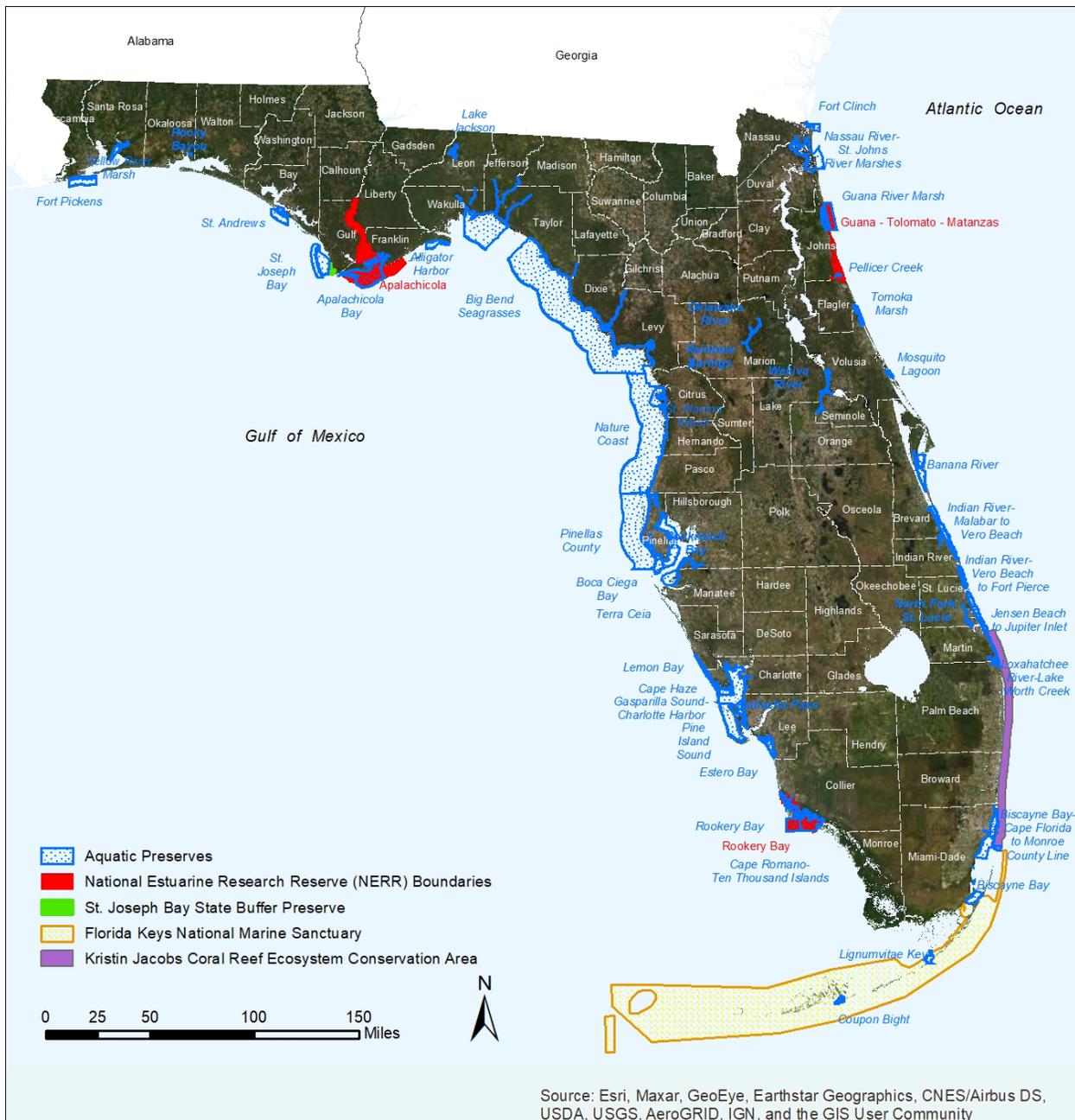
The Florida aquatic preserves are administered on behalf of the state by the Florida Department of Environmental Protection's (DEP) Office of Resilience and Coastal Protection (ORCP) as part of a network that includes 42 aquatic preserves, three National Estuarine Research Reserves (NERRs), a National Marine Sanctuary, Coral Reef Conservation Program, and the Kristin Jacobs Coral Reef Ecosystem Conservation Area (Map 1). This provides for a system of significant protections to ensure that our most popular and ecologically important underwater ecosystems are cared for in perpetuity. Each of these special places is managed with strategies based on local resources, issues and conditions.

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

Title to submerged lands not conveyed to private landowners is held by the Board of Trustees of the Internal Improvement Trust Fund (the Trustees). The Governor and Cabinet, sitting as the Trustees, act as guardians for the people of the state of Florida (§253.03, Florida Statutes [F.S.]) and regulate the use of these public lands. Through statute, the Trustees have the authority to adopt rules related to the management of sovereignty submerged lands (Florida Aquatic Preserve Act of 1975, §258.36, F.S.). A higher layer of protection is afforded to aquatic preserves including areas of sovereignty lands that have been "set aside forever as aquatic preserves or sanctuaries for the benefit of future generations" due to

“exceptional biological, aesthetic, and scientific value” (Florida Aquatic Preserve Act of 1975, §258.36, F.S.).

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



Map 1. Office of Resilience and Coastal Protection system.

1.1 / Management Plan Purpose and Scope

Florida's aquatic resources are at risk for both direct and indirect impacts of increasing development and recreational use, as well as resulting economic pressures, such as energy generation and increased fish and shellfish harvesting to serve and support the growing population. These potential impacts to 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 ORCP managers and staff, area stakeholders, and members of the general public. The statistical data, public comment, and cooperating agency information is then used to identify management issues and threats affecting the present and future integrity of the site, its boundaries, and adjacent areas. The information is used in the development and review of the management plan, which is examined for consistency with the statutory authority and intent of the Aquatic Preserve Program. Each management plan is evaluated periodically and revised as necessary to allow for strategic improvements. Intended to be used by site managers and other agencies or private groups involved with maintaining the natural integrity of these resources, the plan includes scientific information about the existing conditions of the site and the management strategies developed to respond to those conditions.

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

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

Each aquatic preserve management plan will identify unique local and regional issues and contain the goals, objectives, integrated strategies, and performance measures to address those issues. The plan will also identify the program and facility needs required to meet the goals, objectives, and strategies of the management plan. These components are key elements for achieving the resource protection mission of each aquatic preserve.

This is the first management plan for the Nature Coast Aquatic Preserve.

1.2 / Public Involvement

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

- meetings of public boards or commissions must be open to the public;

- reasonable notice of such meetings must be given; and
- minutes of the meetings must be recorded.

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



Chapter 2 / The Florida Department of Environmental Protection's Office of Resilience and Coastal Protection

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. 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. DEP is divided into three primary areas: Regulatory Programs, Land and Recreation, and Ecosystem Restoration. Florida's environmental priorities include restoring America's Everglades; improving air quality; restoring and protecting the water quality in our springs, lakes, rivers and coastal waters; conserving environmentally-sensitive lands; and providing citizens and visitors with recreational opportunities, now and in the future.

The Office of Resilience and Coastal Protection (ORCP) is the unit within the DEP that manages more than five million acres of submerged lands and select coastal uplands. This includes 42 aquatic preserves, three National Estuarine Research Reserves (NERRs), the Florida Keys National Marine Sanctuary as well as providing management support through the Florida Coastal Management Program, the Outer Continental Shelf Program, the Coral Reef Conservation Program, the Clean Boating Program, the Florida Resilient Coastlines Program, and the Beach Management Programs. The three NERRs, the Florida Keys National Marine Sanctuary, and the Coral Reef Conservation Program are managed in cooperation with the National Oceanic and Atmospheric Administration (NOAA).

ORCP 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.

ORCP is a strong supporter of the NERR system and its approach to coastal ecosystem management. 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 ORCP's ability to manage its sites as part of the larger statewide system.

The Florida Keys National Marine Sanctuary, established in 1990 by Congress, and confirmed by the Board of Trustees of the Internal Improvement Trust Fund, covers 2.3 million acres of state and federal submerged lands. The Florida Keys National Marine Sanctuary contains unique and nationally significant marine resources, including the southern portion of the Florida Reef Tract (the world's third largest barrier coral reef), extensive sea grass beds, mangrove-fringed islands and more than 6,000 species of marine life. ORCP leads state co-management efforts in the Sanctuary in partnership with the Florida Fish and Wildlife Conservation Commission and NOAA.

The Coral Reef Conservation Program coordinates research and monitoring, develops management strategies and promotes partnerships to protect the northern portion of the Florida Reef Tract along the southeast Florida coast, pursuant to the U.S. Coral Reef Task Force's National Action Plan. The Coral Reef Conservation Program also implements Florida's Local Action Strategy, the Southeast Florida Coral Reef Initiative. The program leads response, assessment and restoration efforts and jointly oversees enforcement efforts for non-permitted reef resource injuries (vessel groundings, anchor and cable drags, etc.) in southeast Florida pursuant to the Florida Coral Reef Protection Act (Section 403.93345, F.S.).

The Florida Coastal Management Program is based on a network of agencies implementing 24 statutes that protect and enhance the state's natural, cultural and economic coastal resources. The goal of the program is to coordinate local, state and federal government activities using existing laws to ensure that Florida's coast is as valuable to future generations as it is today. ORCP is responsible for directing the implementation of the statewide coastal management program. The Florida Coastal Management Program provides funding to promote the protection and effective management of Florida's coastal resources at the local level through the Coastal Partnership Initiative grant program.

The Outer Continental Shelf Program is responsible for coordinating the state's review, oversight, monitoring and response efforts related to activities that occur in federal waters on the Outer Continental Shelf to ensure consistency with state laws and policies and that these activities do not adversely affect state resources. Reviews are conducted under federal laws, including the Outer Continental Shelf Lands Act, Coastal Zone Management Act, National Environmental Policy Act, Deepwater Ports Act, Marine Protection, Research and Sanctuaries Act, Rivers and Harbors Act, Clean Air and Water Acts and the regulations that implement them.

The Clean Boating Program includes Clean Marina designations to bring awareness to marine facilities and boaters regarding environmentally friendly practices intended to protect and preserve Florida's natural environment. Marinas, boatyards and marine retailers receive clean designations by demonstrating a commitment to implementing and maintaining a host of best management practices. Via the Clean Boating Program, the Clean Vessel Act provides grants, with funding provided by the U.S. Fish and Wildlife Service, for construction and installation of sewage pumpout facilities and purchase of pumpout boats and educational programs for boaters.

The Florida Resilient Coastlines Program's mission is synergizing community resilience planning and natural resource protection tools and funding to prepare Florida's coastline for the effects of climate change, especially rising sea levels. This program is working to ensure Florida's coastal communities are resilient and prepared for the effects of rising sea levels, including coastal flooding, erosion, and ecosystem changes. The program is synergizing community resilience planning and natural resource

protection tools; providing funding and technical assistance to prepare Florida's coastal communities for sea level rise; and continuing to promote and ensure a coordinated approach to sea level rise planning among state, regional, and local agencies.

A healthy beach and dune system provide protection for upland development and critical infrastructure, preservation of critical wildlife habitat for threatened and endangered species, and a recreational space that drives the state's tourism industry and economy. In order to protect, preserve and manage Florida's valuable sandy beaches and coastal systems, the Legislature adopted the Florida Beach and Shore Preservation Act, Chapter 161, Florida Statutes, in 1964. The Act provides for the creation of a statewide, comprehensive beach management program that integrates coastal data acquisition, coastal engineering and geology, biological resource protection and analyses, funding initiatives and regulatory programs designed to protect Florida's coastal system both above and below the mean high-water line. This comprehensive approach allows DEP's Beach Management Programs to collaborate with coastal communities to address critical erosion caused by altered and managed inlets, imprudent construction, rising seas and storm impacts. DEP's Beach Management Programs consist of the following: Beach Field Services, Coastal Engineering and Geology Group, the Coastal Construction Control Line Program, the Beaches and Inlets Ports Program and the Beaches Funding Group.

2.2 / Management Authority

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

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

In 1967, the Florida Legislature passed the Randall Act (Chapter 67-393, Laws of Florida), which established procedures regulating previously unrestricted dredge and fill activities on state-owned submerged lands. That same year, the Legislature provided the statutory authority (§253.03, Florida Statutes [F.S.]) for the Trustees to exercise proprietary control over state-owned lands. Also in 1967, government focus on protecting Florida's productive water bodies from degradation due to development led the Trustees to establish a moratorium on the sale of submerged lands to private interests. An Interagency Advisory Committee was created to develop strategies for the protection and management of state-owned submerged lands.

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

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

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

other structures that are stricter than those of Chapter 18-21, F.A.C., which apply to all sovereignty lands in the state.

This plan complies 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 ORCP have proprietary authority to manage the sovereignty lands, the water column, spoil islands (which are merely deposits of sovereignty lands), and some of the natural islands and select coastal uplands to which the Trustees hold title.

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

2.3 / Statutory Authority

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

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

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

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

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

2.4 / Administrative Rules

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

Originally codified in 1982, Chapter 18-21, F.A.C., is meant "to aid in fulfilling the trust and fiduciary responsibilities of the Board of Trustees of the Internal Improvement Trust Fund for the administration, management and disposition of sovereignty lands; to ensure maximum benefit and use of sovereignty lands for all the citizens of Florida; to manage, protect and enhance sovereignty lands so that the public may continue to enjoy traditional uses including, but not limited to, navigation, fishing and swimming; to manage and provide maximum protection for all sovereignty lands, especially those important to public drinking water supply, shellfish harvesting, public recreation, and fish and wildlife propagation and management; to insure that all public and private activities on sovereignty lands which generate revenues or exclude traditional public uses provide just compensation for such privileges; and to aid in the implementation of the State Lands Management Plan."

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

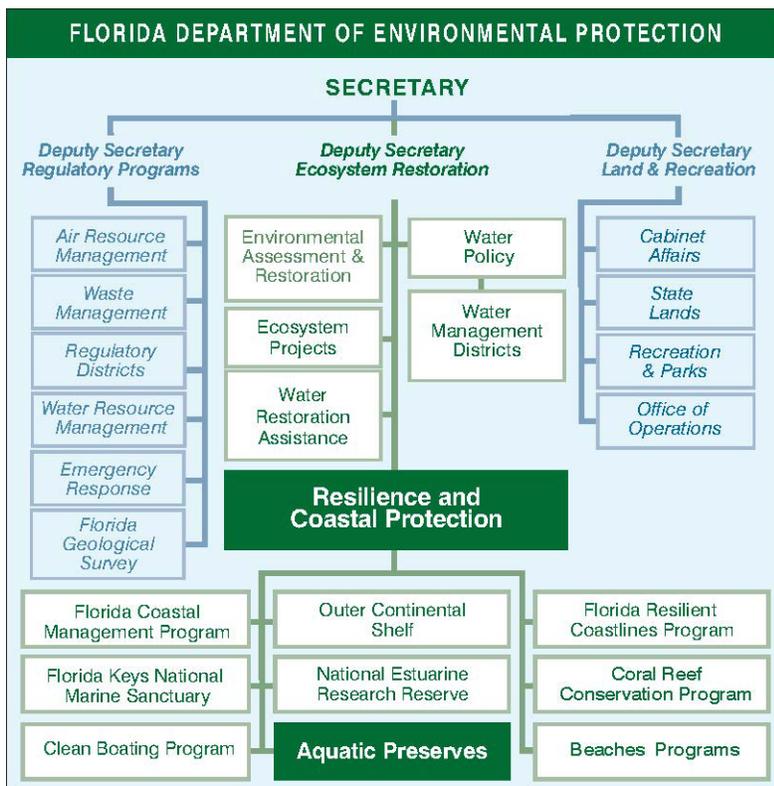
Chapters 18-18 and 18-20, F.A.C., apply standards and criteria for activities in the aquatic preserves that are stricter than those of Chapter 18-21. Chapter 18-18 is specific to the Biscayne Bay Aquatic Preserve and is more extensively described in that site's management plan. Chapter 18-20 is applicable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

Chapter 18-20, F.A.C., expands on the definition of "public interest" by outlining a balancing test that is to be used to determine whether benefits exceed costs in the evaluation of requests for sale, lease, or transfer of interest of sovereignty lands within an aquatic preserve. The rule also provides for the analysis of the cumulative impacts of a request in the context of prior, existing, and pending uses within the

aquatic preserve, including both direct and indirect effects. The rule directs management plans and resource inventories to be developed for every aquatic preserve. Further, the rule provides provisions specific to certain aquatic preserves and indicates the means by which the Trustees can establish new or expand existing aquatic preserves.

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

Figure 1. State management structure.





Chapter 3 / Nature Coast Aquatic Preserve

3.1 / Historical Background

Archaeological evidence from the northern Gulf Coast of the Florida Peninsula suggests that humans have inhabited the area for the past 12,000 years. Indigenous people in the region are believed to have lived in small temporary camps located nearby river crossings and other strategic sites to easily access small game and plants. Around the year 7500 B.C., the ways early humans accessed resources began to change. The environment shifted toward a warmer, wetter climate, and there is less evidence of human use of megafauna — such as the Pleistocene horse and mammoth. Sea level was lower on the Gulf Coast compared to Florida’s modern-day coastline, revealing a wide coastal plain. As the environment became wetter after 7500 B.C., exposed land area declined, reducing the abundance of interior grasslands while increasing the likelihood of upland hardwood hammocks (Norman et al., 2018a).

Between 7500 and 5000 B.C (known as the Early Archaic Period), the climate shifted toward drier conditions, and human populations in the Florida peninsula began to increase. Oyster middens — mounds of discarded oyster shells previously used as a waste dumping ground by early civilizations — from this period have been frequently found offshore and along the Gulf Coast. During this period, human settlement sizes increased, and a greater variety of tool types were made, suggesting differences in tool use between different cultural groups (Norman et al., 2018a). Tools and jewelry made by early indigenous people from shells found in the Crystal River region have been discovered across the country, suggesting that the area was an important trade and distribution hub (personal communication, Jeff Moates, February 2, 2021). As the climate shifted again toward wetter conditions after 4000 B.C.,

former pine forests were displaced by oaks and hickory trees in the plains and upland interior (Norman et al., 2018a).

The Late Archaic (3000-500 B.C.) brought the presence of fired ceramics, especially for projectile points, to the area. During this period, early humans consistently occupied coastal areas and relied on coastal resources like oyster, coquina, and small fishes. Reliance on marine resources became even greater from 500 B.C. to 1700 A.D., when fishing, hunting and gathering practices became more common. Sea level rose intermittently during this period, covering areas of the coastal plain and changing the cultural landscape. This shift may have led to an increased focus on food production. Ceremonial practices such as temple and burial mound building have been found during this period as well (Norman et al., 2018a).

Historians have marked prehistoric cultural shifts by categorizing them as periods such as the Deptford Period (500 B.C.-500 A.D.) and the Safety Harbor Period (A.D. 1200-1600). The links of these early humans to current indigenous communities is not always clear (personal communication, Jeff Moates, February 2, 2021), however by the 18th century, evidence of the Seminole tribe occupying inland portions of the region is apparent. Though some evidence suggests Seminole occupation near the Gulf Coast, the extent of their use of the area is not well understood (Norman et al., 2018a).

By the 1830s, farm-based settlements and pioneers entered the region, producing crops such as corn, sorghum, and sugar cane. Native hardwoods were felled for lumber, pinesap, and turpentine. Pencil manufacturing was also a major industry in the area — both Crystal River and Cedar Key harvested large cedars for pencil manufacturing. Aerial photographs from the 1940s show obvious evidence of land clearing, primarily documenting the removal of large pine trees (Norman et al., 2018a).

In 1843, Hernando County was created from the southern portion of Alachua County, as well as portions of Hillsborough and Mosquito Counties. The county's name changed to Benton in 1844 and then back to Hernando in 1850 (Historic Hernando Preservation Society, n.d.). In 1887, lands from the Hernando Territory were divided into Citrus, Hernando, and Pasco Counties. In Citrus, the county seat was originally the town of Mannfield. By 1891, Inverness became the county seat. Phosphate was discovered on the east side of Citrus County in 1889 and a mining industry grew there until 1913. The railroad extended to the town of Crystal River in 1888, making the county more accessible to tourists and sport fishermen from the north (City of Crystal River, n.d. a). Pasco County was named after U.S. Senator Samuel Pasco. The county's first census was undertaken in 1890, accounting for 3,872 white people, 376 black people, and one Native American resident. Between 1889 and 1925, the six municipalities of Pasco County were established (Pasco County Genealogical Society, 1994).

Hernando County supported a thriving bootlegger industry during the Prohibition Era. The dense forests, winding inlets of the West Central Florida coastline, and proximity to Cuba and the West Indies, made this region well suited to the illegal trade of liquor. State authorities were known to work alongside rumrunners, with only a small number of federal authorities enforcing prohibition laws (Cofer, 1979). The names of natural landmarks in Hernando County still allude to the area's rumrunner roots, such as Beacon Rock, Lantern Rack, and Drunkard's Rest, a marsh island along the coast where Cuban fishing boats would hide (Cofer, 1979).

Major modifications to the landscape, such as the construction of the Inglis Lock and Dam in 1909, have occurred in more recent years. This project created the now popular 3,400-acre Lake Rousseau. Construction of the Cross Florida Barge Canal project began in 1964, which included modification of the Lower Withlacoochee River with the addition of the Inglis Lock; a bypass channel constructed to reconnect the final 9 miles of the Withlacoochee River. Construction was halted on the canal in 1971 and current flow control only occurs to the Lower Withlacoochee River during periods of high flow, due to proximity to Lake Rousseau and the canal's construction. Additionally, the Lower Withlacoochee River has experienced dredge related activity further altering the rivers natural composition. The Crystal River Energy Complex, which opened in 1966 with a coal-fueled power station, is another major industry in the area. The station previously included a nuclear unit that relied on intake and discharge canals that pumped water from the Gulf for cooling. The nuclear unit has now been discontinued, and the complex is currently operated by Duke Energy (personal communication, Enrique Latimer, April 5, 2021). Other

regional industries include mining operations, cattle ranching, silviculture, and commercial fishing (Norman et al., 2018a).

Today, the Nature Coast region is heralded as an interface between the urban areas of South Florida and the undeveloped natural areas of the Big Bend region. Ecotourism is a major economic driver, with recreational opportunities like kayaking, boating, fishing, scalloping, snorkeling, birding, and hiking.

3.2 / General Description

International/National/State/Regional Significance

The Nature Coast Aquatic Preserve (NCAP) supports approximately 450,000 acres of submerged lands, including abundant seagrass meadows and many other important coastal ecosystems such as saltmarsh, sponge beds, oyster reefs, mangrove islands, marine springs, and hard bottom habitats. A variety of wildlife rely on these ecosystems, including endangered and threatened species such as manatees, green sea turtles, and the Gulf sturgeon. The shallow topography of the region combined with the estuarine conditions make the region a haven for a variety of juvenile marine species (Gandy et al., 2011; Manson et al., 2005). The karstic geology and spring-fed rivers of this region are important and unique influencers in the ecosystems, hydrology, and wildlife that characterize the Springs Coast and the NCAP area.

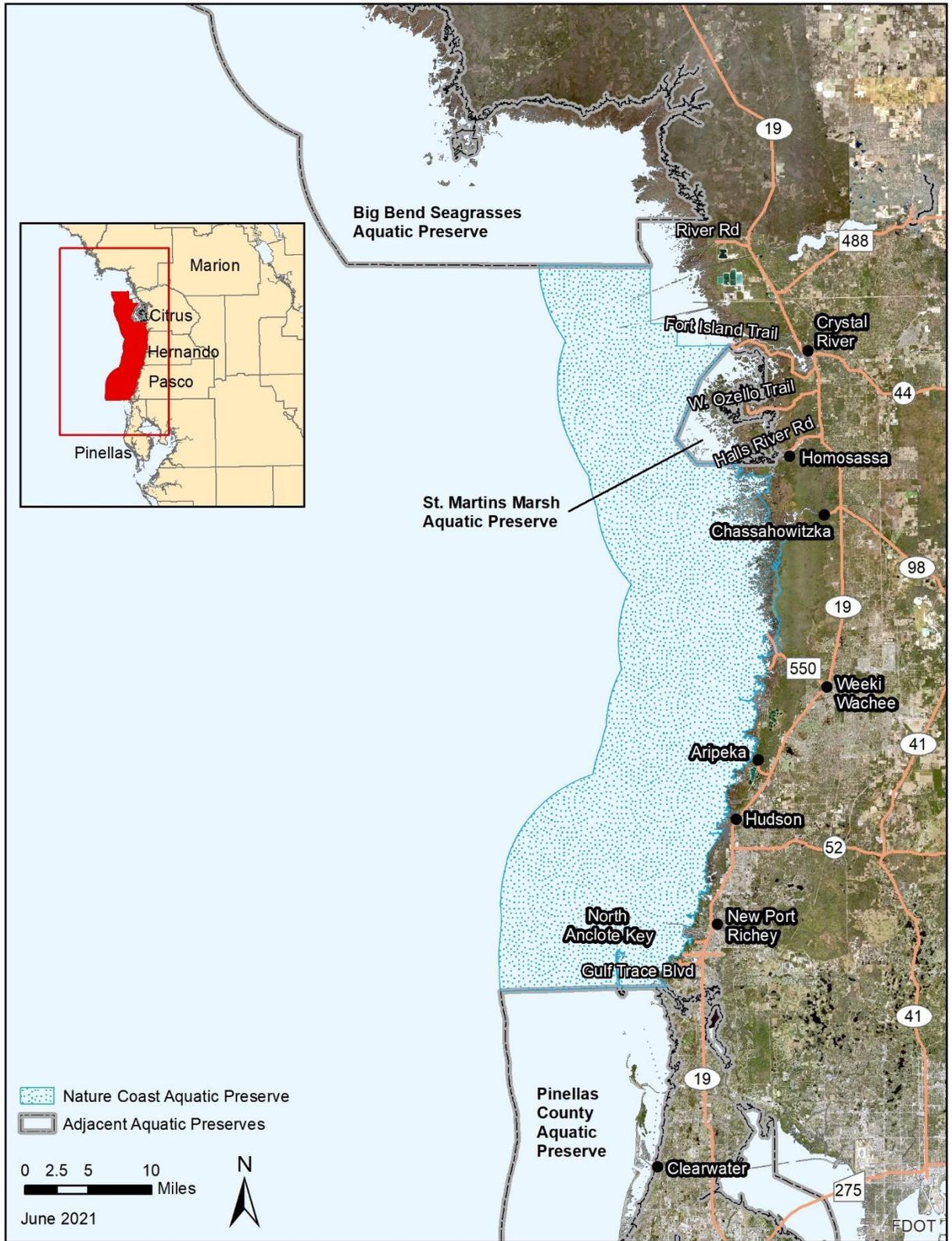
The Florida manatee is a major international draw for tourists and wildlife viewers in the NCAP. The city of Crystal River is commonly referred to as the Manatee Capital of the World. Manatees utilize the warmer spring fed waters of Citrus County, particularly Kings Bay in Crystal River, during winter months when Gulf waters slip below 20°C (SMMAP, 2017). Kings Bay forms the headwaters of Crystal River in Citrus County and hosts the largest number of Florida manatees at a natural warm-water site. During flyover surveys in the winter of 2020, over 750 manatees were viewed in the Crystal River vicinity with more than 550 manatees observed in Kings Bay. (USFWS, n.d. b). The annual average rate of increase of manatees in Kings Bay over the past 30 years was 7% or 4.81 animals each year (Sattelberger et al., 2017). Though Kings Bay is not included within the boundaries of the NCAP, manatees that rely on wintertime refugia interact with natural resources contained within the NCAP, especially seagrass.

An abundance of seagrass makes the NCAP particularly significant, especially as global seagrass abundance decreases by 1.5% each year (Binns, 2019). Seagrass meadows are ranked the third-most valuable ecosystems globally, after estuaries and wetlands (Reynolds et al., 2018). One acre of seagrass can support nearly 40,000 fish and 50 million small invertebrates (Reynolds et al., 2018). Seagrasses also help to prevent erosion, reducing wave action and stabilizing sediments by 20% (Spalding et al., 2016). They are an important factor in climate mitigation strategies as one acre of seagrass can sequester more than 1,200 pounds of carbon every year (McLeod et al., 2011).

Fishing, boating, and ecotourism industries in the area rely on these aquatic habitats. Recreationally important sport fish, such as gag grouper, spotted seatrout, snook, redfish, tarpon, and gray snapper rely on the estuaries of the NCAP throughout their lifecycles. Benthic animals like stone crabs, blue crabs, bay scallops, sponges, and oysters are also prevalent in the area, as are forage species like pinfish and shrimp. Commercial fisheries that depend on the NCAP's seagrass generate more than \$12 million annually (FWC, 1999 - 2022). Coastal tourism and recreation in the NCAP generate more than \$250 million per year, supporting nearly 8,000 jobs and 500 businesses (NOAA, n.d. d). Recreational scalloping alone has contributed nearly \$2 million in both Citrus and Hernando counties each year since 2003 (Blassy, 2018).

Location/Boundaries

The NCAP is located off the coast of Citrus, Hernando, and Pasco counties on the Gulf Coast of the Florida Peninsula. The aquatic preserve encompasses over 450,000 acres of submerged lands. Crystal River borders the aquatic preserve to the north, and the Anclote River borders the southern boundary. The eastern boundary of the preserve runs along the mean high-water line in all three counties. In Citrus



Map 2. Nature Coast Aquatic Preserve.

County, the northeastern boundary of the preserve turns farther offshore, bordering St. Martins Marsh Aquatic Preserve (SMMAP) as well as marine areas adjacent to industrial facilities. The western boundary of the NCAP is defined by the extent of state-owned submerged lands in the Gulf of Mexico (nine nautical miles offshore). The northern and southern boundaries are defined by adjacent aquatic preserves: the Big Bend Seagrasses Aquatic Preserve to the north and the Pinellas County Aquatic Preserve to the south. The St. Martins Marsh and Big Bend Seagrasses Aquatic Preserves are managed alongside the NCAP but are separate preserves with their own distinct boundaries and management plans. Monitoring, research, and other field operations for the NCAP are coordinated through a collaboration with the University of Florida Institute of Food and Agricultural Science (UF/IFAS) Nature Coast Biological Station and UF/IFAS Soil, Water and Ecosystem Sciences Department. Management of the preserve is undertaken through the DEP Office of Resilience and Coastal Protection in Tallahassee.

3.3 / Resource Description

Surrounding Population Data and Future Projected Changes

Florida is the third most populous state in the United States, with over 21.5 million people. The state's population is expected to grow to 26 million people by 2040. Between April 2019 and April 2020, the state's population grew by 387,479 residents (1.83%). Between April 2018 and April 2019, it grew 368,021 residents (1.77%). Population growth is expected to slow to 1.38% in 2021. Future population growth is forecast to remain at about this level of annual growth until 2025. Tourism brings millions of visitors to the state each year: 130 million people visited from 2018-2019 and 108 million from 2019-2020, a decreased number because of the COVID-19 pandemic (Florida Legislature, 2020).

The Florida 2070 Project forecasts land and water use trends based on current data, predicting a future based on current trends and an alternative future with more compact development and increased conservation. In the Florida 2070 report, Central Florida is described as facing "the perfect storm" of expansive development and increased population growth. Based on current trends, overall water demand is expected to increase by 55% and would increase by 33% in the alternative scenario. Water use related to development is forecasted to increase by 112% in the trend scenario and 62% in the alternative scenario. Agricultural water demand is projected to decline by 31% in the trend and 12% in the alternative scenario (Florida 2070, 2017).

Citrus County

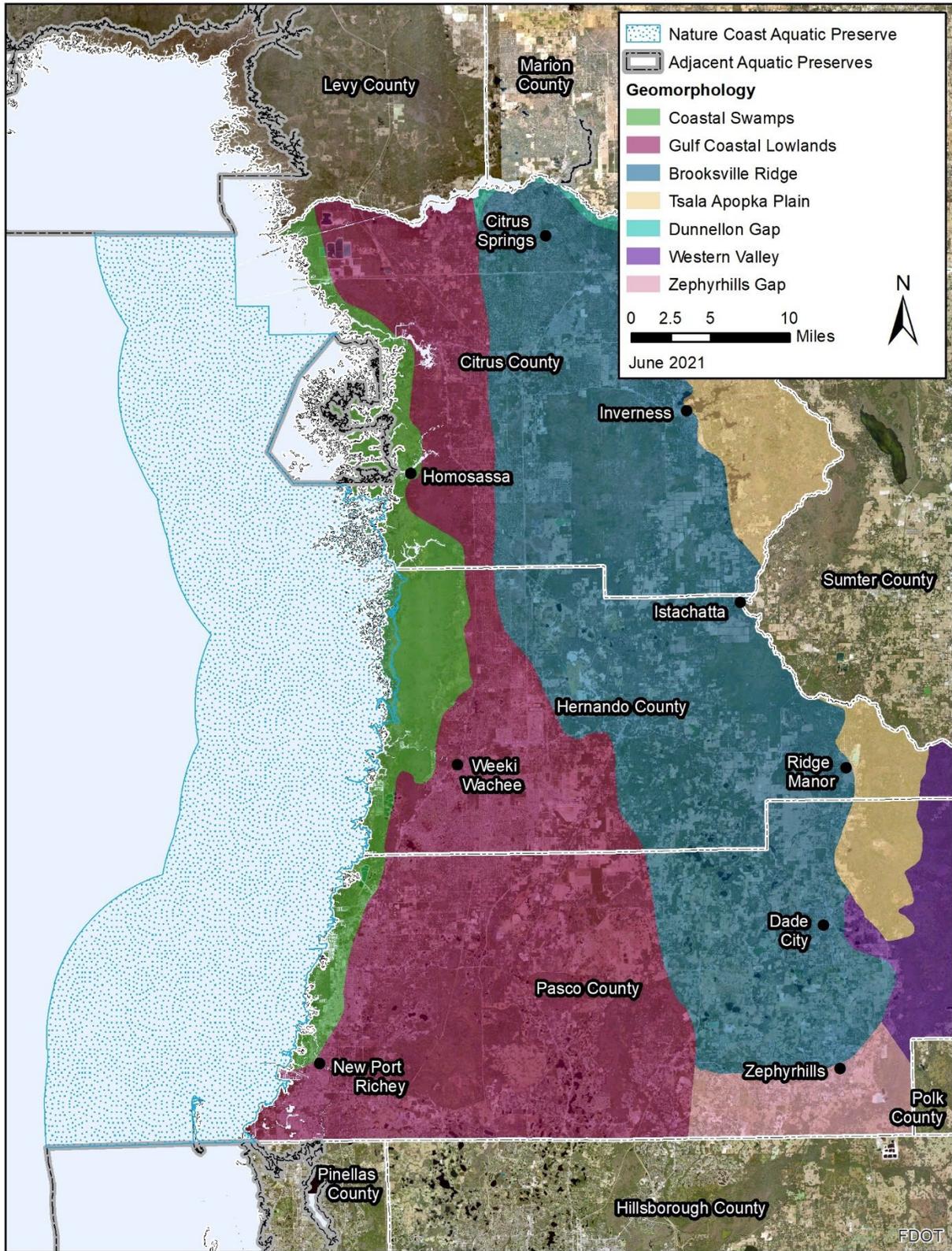
Citrus County is Florida's 33rd most populous county, with 0.7% of Florida's population residing there. In 2020, Citrus County's population estimate was 149,383 people. Based on this estimate, 157,062 are forecasted to live in the county by 2025 and 177,346 by 2045. The largest number of people are employed by education and health services (22.3%) in the county, then trade, transportation, and utilities (21.8%), leisure and hospitality (14%), and government (13.5%) (Florida Legislature, 2021a). In the Crystal River area, land use of the watershed has turned toward large-scale urbanization in the past 70 years. Other spring systems show about a range of 24-37% coverage from urban and residential land uses (Yarbro & Carlson, 2018).

Hernando County

Hernando County is Florida's 27th most populous county, with 0.9% of Florida's population. In 2020, the population estimate for the county was 192,186. By 2025, it is estimated that 206,124 people will live there. By 2045, 244,387 people will call Hernando County home. Trade, transportation, and utilities employ the largest number of people in the county (22.3%), followed by education and health services (20.6%), leisure and hospitality (13.6%), government (12.9%), and professional and business services (11.1%) (Florida Legislature, 2021b).

Pasco County

Pasco County is Florida's 12th most populous county, providing homes to 2.5% of Florida's population (Florida Legislature, 2021c). The population of Pasco County grew from 525,643 to 539,630 people



Map 3. Geomorphology of the Nature Coast Aquatic Preserve.

(2.66%) from 2017 to 2018 (Pasco County, N.D.). By 2025, it is estimated that 586,071 people will live in the county. By 2045, 710,997 people are predicted to live there — 2.6% of Florida’s estimated population. Trade, transportation, and utilities account for 22.5% of employment in the county, educational and health services account for 20.5%, government is 14%, and leisure and hospitality are at 13.4% (Florida Legislature, 2021c)

Topography and Geomorphology

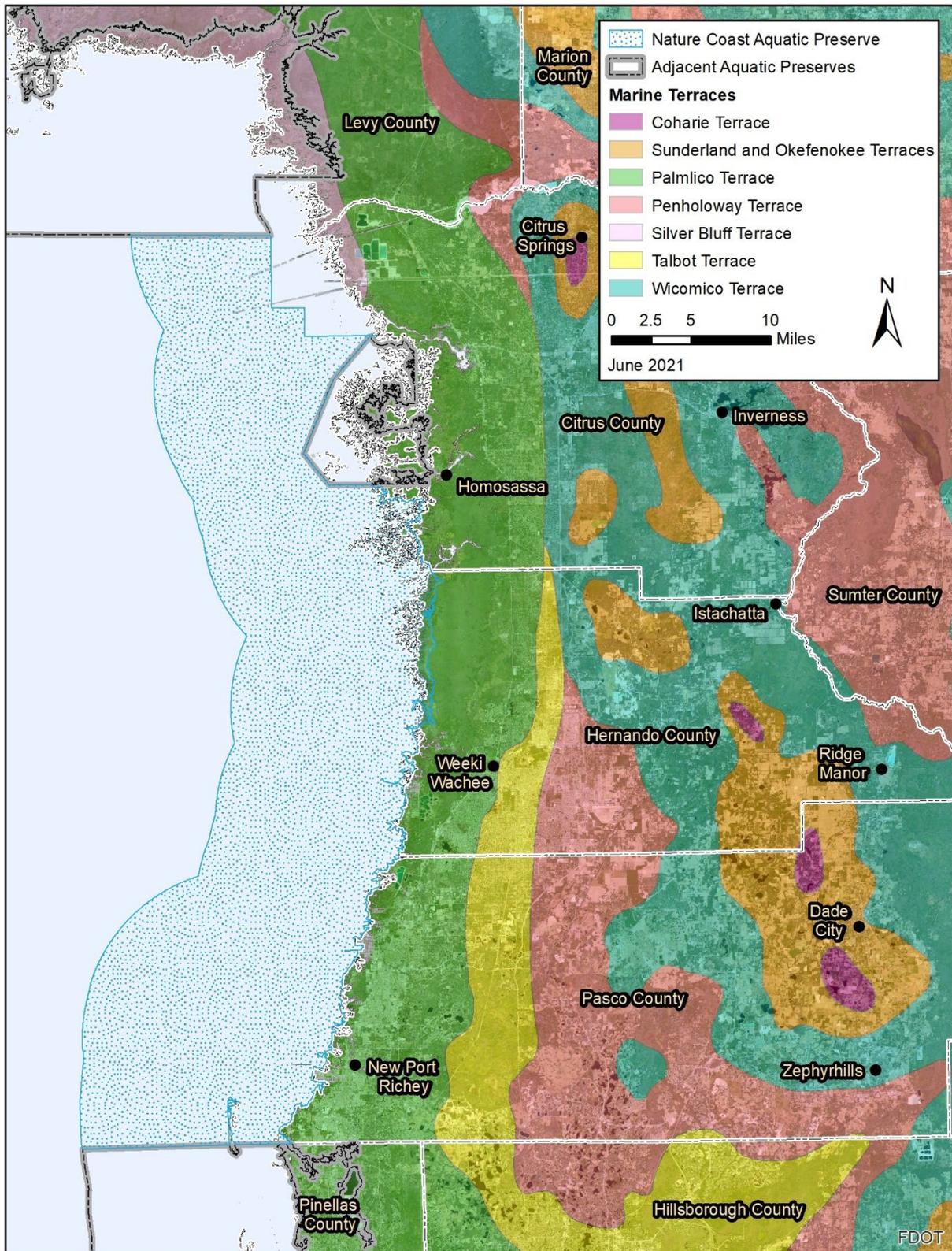
The five main topographic features of the counties surrounding the NCAP are the Tsala Apopka Plain, the Brooksville Ridges, the Gulf Coast Lowlands, the Western Valley, and the Zephyrhills Gap. All these features fall outside of the NCAP boundaries except the Gulf Coast Lowlands — the NCAP includes submerged portions of this feature (White, 1970). The Gulf Coastal Lowlands are described as a low, flat seaward sloping plain extending westward and coastward from the Central Highlands. The Gulf Coastal Lowlands are located on the Pamlico Terrace. The land surface is characterized as flat and sandy with a surface slope of two to three feet per mile. This slope continues down the submarine plain offshore for more than 20 miles (Rupert, 1987). The Gulf Coastal Lowlands and the associated submarine plain are underlain by the soluble marine Ocala Group limestone of the Eocene. Dissolution of the area’s limestone has developed various karstic morphologies. These morphologies include depressions, fissures, sinks, and caverns that give a more complex structure to an otherwise flat landscape (DEP, 2017).

The west-central coastline of Florida is considered a sediment-starved, low-wave-energy and tide-dominated coastline. This region is considered morphologically complex because it contains both wave-dominated and tide-dominated coastal features, which are typically widely separated. It is also unusual because the sediment of the region is rich in carbonate components, likely from mollusk shells (Hine et al., 2003). The lands surrounding the NCAP have a small slope and low elevation. These lands have historically seen extensive shoreline fluctuations, brought on by even modest sea level fluctuations in the Gulf of Mexico. Marine terraces of the area provide a general depiction of major sea level fluctuations (DEP, 2017). Four marine terraces make up Citrus, Hernando, and Pasco Counties: the Pamlico Terrace, Penholoway Terrace, Talbot Terrace, and Wicomico Terrace.

An analysis of aerial photographs and sediment samples from the northern islands of west-central Florida, which make up the southern edge of the NCAP, revealed that sand movement has been dictated by the presence or absence of seagrass beds in the region. A large seagrass bed near Anclote Key disappeared between 1957 and 1967, resulting in a sudden transport of sand along Anclote Key. During this period, the island saw a 30% increase in length. Though the reason for the seagrass die-off is not conclusive, possible reasons include storm damage, pathogen infection, water quality decline due to human development, and overgrazing by sea urchins (Hine et al., 1987).

The section of the Gulf Coastal Lowlands along the western edge of Citrus County are the Coastal Swamps. The Coastal Swamp area is defined as the full extent of freshwater swamps and salt marshes along the coast (Puri & Vernon, 1964; White, 1970). The coastline itself is part of the Coastal Marsh Belt subprovince (Puri & Vernon, 1964) and is described as a low-energy system with a net sand deficiency (Price, 1954; Tanner, 1960). Elevation in the Coastal Swamps is generally lower than 10 feet above sea level (Spencer, 1984). This area is described as a drowned karst coastline as the various marshes and underlying sediment layers cover the karstic features in the submerged limestone (DEP, 2017).

The waterways surrounding the NCAP provide for more intricate features given the close interaction between surface and groundwater systems. This tight interaction has helped to form many of the karstic features in the area. The seven major rivers that influence the waters of NCAP are the Withlacoochee, Crystal, Homosassa, Chassahowitzka, Weeki Wachee, Pithlachascotee, and Anclote. Many of these rivers discharge waters derived, in large part, from groundwater-fed springs.



Map 4. Marine terraces of the Nature Coast Aquatic Preserve.



Geology

The Florida Platform is a geologic formation that separates the Gulf of Mexico from the Atlantic Ocean, comprising the Florida Peninsula, which represents about half the size of the Florida Platform (Upchurch, 2014). The karst terrain that makes up Florida creates conditions favorable for sinkholes, which are common throughout the state. The primary cause of sinkholes is dissolving underground limestone due to acidic water that reacts with organic matter and becomes more acidic as it dissolves carbon dioxide. The acidic water breaks down limestone, leading to the formation of cavities. The number of sinkholes within the state has increased since the 1970s because of increased demand on the Florida aquifer system due to population growth and the occurrence of droughts. In a study of three South Florida counties (Pasco, Hillsborough, and Pinellas), Pasco County was found to have a relatively high danger from sinkholes to property owners. The large karst platforms in the area were deemed responsible for the increased risk in the area (Scheidt et al., 2005).

Citrus County is located within the Avon Park Formation, which is characterized by several types of limestone and dolomite that lie beneath the Upper Eocene Ocala Limestone and above the Lower Eocene Oldsmar Formation (Scott et al., 2014). Citrus County belongs within the Ocala Karst District, an area characterized as a dry landscape with little surface water that leads to a breakup of limestone and other similar strata in the area. Karst features seen within Citrus County include sinkholes, conical hills, caverns, pinnacles, and fractures. Springs are part of the karst landscape. First magnitude springs, or springs that have a mean discharge of more than 100 cubic feet per second, are located within the Kings Bay, Homosassa, and Chassahowitzka springs groups (Upchurch, 2014). Nearly half of Citrus County is composed of Ocala Limestone. The Hawthorn Group makes up another 21% of the county, an undifferentiated geologic unit that occurs at the southern end of the Ocala Platform and reaches southward to Pasco County (USGS, n.d.).

A quarter of Hernando County is made up of the Hawthorn Group. The sediments of this unit are light olive gray to blue gray in unweathered sections and reddish brown in weathered areas. Hard rock phosphate deposits are found on the eastern edge of the Brooksville Ridge. Another quarter of the county is covered by Suwannee Limestone, which can be found on the northwestern, northeastern, and southwestern portions of the Ocala Platform. This area is composed of white to cream colored limestone containing fossils of mollusks, corals, foraminifers, and echinoids. Ocala Limestone composes about 14% of the county and is made up of pure limestone and dolostones. This feature has extensive karst features, sometimes exhibiting tens of feet of relief. This area is permeable and is characterized by multiple streams and springs that flow in and out of the permeable rock. Other major geologic features in the county include beach ridges and dunes, which are composed of siliciclastics, organics, and freshwater carbonates (USGS, n.d.).

Like Hernando County, Pasco County is primarily composed of the Hawthorn Group, Suwannee Limestone, Ocala Limestone, and beach ridges and dunes. A small portion of the county (2%) includes the Tampa Member of the Arcadia Formation, an area composed of white to yellowish gray mudstone, wackestone, and packstone that commonly includes fossils of mollusks and corals. Sand and clay beds are also characteristic of this area (USGS, n.d.).

Minerals

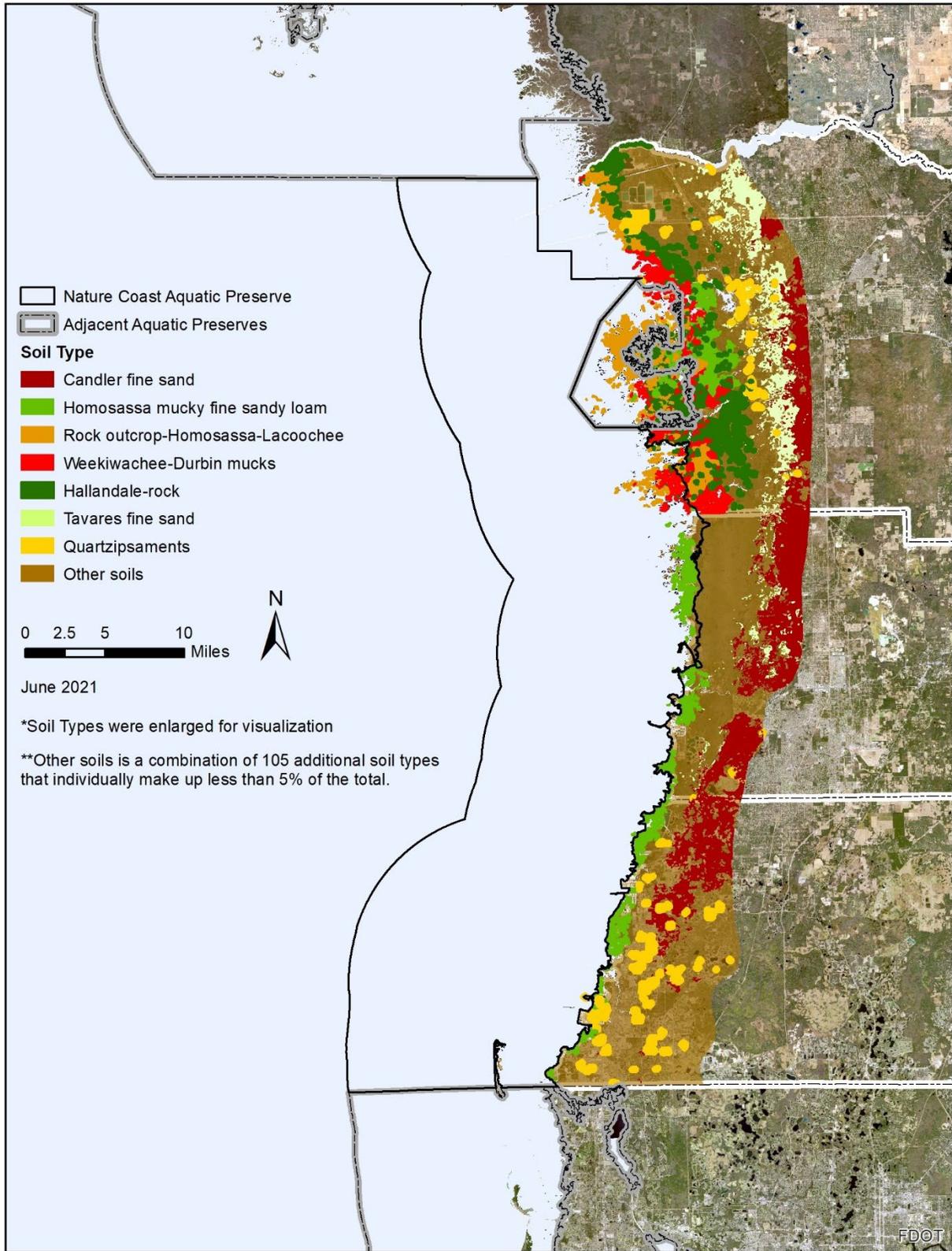
While there are no mining operations immediately within the NCAP boundaries, historically there have been four mineral resources mined in the uplands of Citrus County: stone, sand, clay, and phosphate. Stone mining in Citrus County focuses on limestone and dolomite (DEP, 2017). Stone mining occurs in the northwestern portion of Citrus County, just south of the town of Inglis, as well as the Lecanto area due east of Crystal River. Formations from which limestone is extracted include late Middle Eocene age Avon Park Limestone, late Eocene Ocala Group Limestone, and the Oligocene Suwannee Limestone. The primary uses of limestone are road base, fertilizer, soil conditioner, rip rap, and concrete and asphalt aggregate (Spencer, 1984).

Sand and clay mining occurs in the central portion of Citrus County just east of Homosassa Springs. The mined sand deposits of Citrus County are largely limited to the Brooksville Ridge, as deposits in the Gulf Coastal Lowlands are too fine grained for economic feasibility. The sands of the Brooksville Ridge range in age from Miocene to Holocene and are a poorly sorted mix of fine to medium grain quartz. Phosphate was the major mineral mined in the area until it reached levels of economic infeasibility in 1966. The origin of phosphate in the area is believed to come from phosphoric acid in water that replaced the carbonate of limestone to form calcium phosphate, otherwise known as hard rock phosphate. Phosphatic clays were discarded as waste materials from the height of the industry and were often left in previously mined pits. These clays have been processed in recent years for use as animal feed and direct application fertilizer (Spencer, 1984).

Soils

The four main soil complexes of significance in NCAP are Homosassa Mucky Fine Sandy Loam, Rock Outcrop-Homosassa-Lacoochee, Weekiwachee-Durbin Mucks, and Hallandale-Rock Outcrop.

The Homosassa Mucky Fine Sandy Loam complex is the most common soil complex in NCAP and is found in tidal marshes where it experiences daily tidal flooding. The complex is marked by its high water capacity near the soil surface and medium capacity in lower layers, as well as its slightly acidic to mildly alkaline pH (USDA, 1988). The surface layer of the soil is a dark gray mucky fine sandy loam, measuring about 10 inches thick. This layer is followed by another eight inches of dark grayish brown mucky fine sandy loam. This is underlain by a grayish brown loamy fine sand which runs about 31 inches deep and is followed by four inches of soft limestone bedrock and a hard limestone bedrock (USDA, 1988).



Map 5. Soils of the Nature Coast Aquatic Preserve.

The Rock Outcrop-Homosassa-Lacoochee Complex and Weekiwachee-Durbin Mucks are also well represented. Found in tidal marshes and some offshore islands, most of the soil in the Rock Outcrop-Homosassa-Lacoochee Complex is flooded with island soil during extreme high tides and storm tides (USDA, 1988). The primary component of this complex are the rock outcrops which are largely flat surfaces pitted with solution holes. The second major component of the complex is Homosassa soil. The surface of the Homosassa soil is black, murky fine sandy loam which is about five inches thick. The next layer is a dark grayish brown fine sand which runs to about 21 inches deep and is underlain by a hard limestone bedrock. The third major component of this complex is Lacoochee soil, which has a light gray fine sandy loam surface layer of about five inches in thickness. This is underlain by a grayish brown fine loamy sand to a depth of about eight inches followed by a yellowish brown fine loamy sand, which is approximately 21 inches deep. The bottom layers consist of a soft white limestone bedrock, measuring at a depth of about 21 inches, and hard white limestone bedrock underneath. The water capacity for the Homosassa and Lacoochee soils ranges from high to moderate with decreasing depth (USDA, 1988).

The Weekiwachee-Durbin Mucks are characterized by their well decomposed soils, which contain sulfur, as well as a high capacity for water and moderately rapid permeability. The complex is found in salt marshes and is flooded on average of twice daily by high tides (USDA, 1988). There are two main soil types in the complex: Weekiwachee and Durbin. Weekiwachee soil is the dominant component of the complex and is often found adjacent to mineral soils or rock outcroppings. The surface layer of this soil is a black muck that is about 34 inches thick. This is underlain by about four inches of gray fine sand, followed by a layer of soft white limestone bedrock, running about 41 inches deep. Underneath is a hard limestone bedrock. Durbin soil is exposed to open water and has a surface layer of dark gray muck, about seven inches thick. This is underlain by a black muck which runs about 80 inches deep (USDA, 1988).

The Hallandale-Rock Outcrop Complex is the fourth most common soil complex in NCAP. The complex is marked by its high water table, moderate to moderately slow permeability, and strongly acidic to mildly alkaline surface and medium acidic to moderately alkaline underlying layers (USDA, 1988). The major component of this complex is Hallandale soil and is found along the coastline, adjacent to fresh and saltwater swamps. The soil is also found on some offshore islands. The surface layer of this soil is a black fine sand that is two inches thick and is followed by a grayish brown fine sand, which runs to about six inches in depth. The underlying layer is a yellowish-brown fine sand which runs about 10 inches deep, followed by a hard limestone bedrock. The rock outcrop of this complex is randomly scattered but can measure up to 50 feet long (USDA, 1988).

A small amount of quartzipsamments can also be found in the NCAP. Quartzipsamments are commonly found near urban lands but can occur throughout the area (USDA, 1988). The soil is characterized by its variable but generally rapid permeability and its generally low water capacity. The surface layer is a mottled brownish yellow and pale brown fine sand which runs about 54 inches in thickness, followed by a layer of thick dark grey fine sand and a brownish yellow fine sand, running 80 inches deep (USDA, 1988).

Hydrology and Watershed

The hydrology and watershed of the NCAP area is regulated by several state-led programs. Basin Management Action Plans (BMAP) have been established by DEP for the Crystal River/Kings Bay Basin, Homosassa/Chassahowitzka Basin, and Weeki Wachee Basin. The SWFWMD establishes minimum flows and levels (MFLs) for spring and river systems to protect systems from significant harm caused by ground and surface water withdrawals. MFLs have been established for the Anclote, Chassahowitzka, Crystal, Homosassa, Pithlachascotee, Weeki Wachee rivers. Minimum flows and levels are currently being established for the Withlacoochee River. Reports can be accessed through the SWFWMD website.

Surface Water

The NCAP is a complex system of inlet bays, salt marshes, tidal creeks, and rivers that form an expansive estuarine system along the coast of Citrus, Hernando, and Pasco counties. The seven major

ivers that influence the waters of the NCAP are the Withlacoochee, Crystal, Homosassa, Chassahowitzka, Weeki Wachee, Pithlachascotee, and Anclote. These rivers are incorporated into two main watersheds and four sub-basins that impact the NCAP. The main watersheds are the Withlacoochee River and Springs Coast, and the sub-basins include the Crystal River, Homosassa River, Hillsborough River, and Tampa Bay/Anclote River watersheds. Portions of these watersheds drain into local estuaries and bays before flowing into the Gulf of Mexico.

An analysis of annual hydroclimate data from eight rivers in the Big Bend area found that flow changes across all rivers were associated with changes in precipitation and groundwater level. Increased drought and groundwater withdrawal will likely lead to further flow reductions. Significant negative trends were seen in Suwannee, Lower Withlacoochee, and Rainbow Rivers. This research suggests a need for improved regional modeling in the Big Bend area to account for decreases in discharges and growing water consumption (Glodzik, 2018).

Ground Water

The karst geology of west central Florida plays an important role in the hydrological framework of the area. The ground water system of west central Florida is composed of three units: the Surficial Aquifer System, the Intermediate Aquifer System, and the Floridan Aquifer System. The primary aquifer system for the NCAP is the Floridan System, with small portions of the Surficial Aquifer System found in the Brooksville Ridge, and the Intermediate Aquifer System being almost absent (SWFWMD, 2001a).

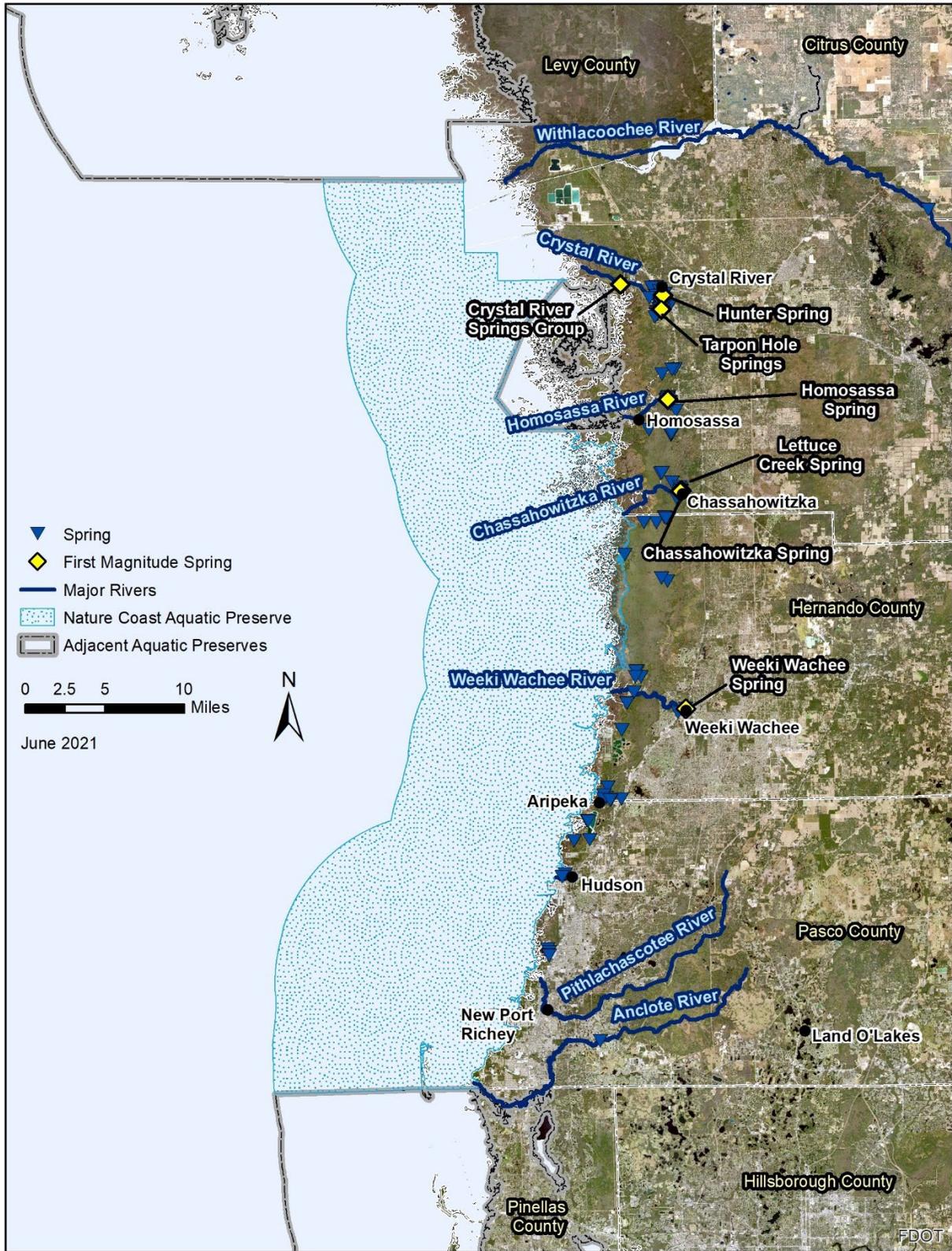
The Surficial Aquifer System is the uppermost aquifer system. The aquifer is unconfined and composed primarily of clay and unconsolidated sands. The Surficial Aquifer System is found mostly in the Brooksville Ridge as this province still possesses the Hawthorn Group clay layer. This layer, given its low permeability, slows the movement of water into the Floridan Aquifer System and acts as the base of the Surficial Aquifer System and the upper confining layer of the Floridan Aquifer System.

The Floridan Aquifer System is the principal aquifer system of the NCAP. The aquifer is further divided into the Upper Floridan Aquifer and Lower Floridan Aquifer. The Upper Floridan Aquifer contains potable water used for direct consumption as well as agriculture and industrial purposes. The thickness of the Upper Floridan Aquifer varies from 600 to 1,800 feet. Throughout much of the Springs Coast and Withlacoochee watersheds, the Upper Floridan Aquifer is present at or near the land surface (SWFWMD, 2001a; SWFWMD, 2001b). The Middle Confining Unit of west-central Florida is that of dolomite and dolomitic limestone in the Avon Park Formation. The unit has a low permeability that acts as a confining unit for the bottom of the Upper Floridan Aquifer (Miller, 1986). The Lower Floridan Aquifer lies below the Middle Confining Unit and extends down to Paleocene and Cretaceous formations, containing largely non potable water (Miller, 1986).

Groundwater recharge in Citrus, Hernando, and Pasco counties varies across geomorphic providences. The Gulf Coastal Lowlands province and Coastal Swamps sub-province are categorized as none to moderate recharge (Stewart, 1980; Copeland, et al., 1991), with rates ranging from a net loss of nine inches per year to a gain of 12 inches per year. Recharge rates are generally higher in the Tsala Apopka Plain, which is classified as low to moderate (Copeland et al., 1991), with rates ranging from 10 to 25 inches per 21 year (SWFWMD, 2015). The Brooksville Ridge is classified as moderate to high, with annual recharge rates range from 14 to 22 inches per year. The high recharge rate of the province is tied to the combination of the province's abundant karst features, generally well drained surface, deep water table, and lack of permanent surface waters (streams, wetlands, creeks, etc.) (SWFWMD, 2000)

Freshwater Springs

Four first magnitude springs can be found in the NCAP region, supplying more than 800 million gallons of freshwater a day. These spring groups are Crystal River/Kings Bay, Homosassa, Chassahowitzka, and Weeki Wachee. These spring systems are at risk of nitrogen enrichment, particularly from various non-point sources including agriculture, residential and urban landscapes, and septic systems. Increased nitrogen concentrations have been linked to ecological degradation such as the stimulation of algal growth in aquatic systems and estuaries (Yarbro & Carlson, 2018).



Map 6. Springs of the Nature Coast Aquatic Preserve.

Withlacoochee River Drainage Basin

The Withlacoochee River is a coastal river that begins in the Green Swamp of northern Polk County, flowing northwest 157 miles to Withlacoochee Bay and the Gulf of Mexico. The river is one of only two that flows north in the state of Florida. The river's flow is derived from runoff, seepage, and springs discharge. The Withlacoochee Bay drainage area covers approximately 2,067 square miles and includes portions of Levy, Citrus, Sumter, Marion, Hernando, Pasco, Polk, and Lake counties. The major tributaries to the Withlacoochee River include Gator Creek, Little Withlacoochee River, Jumper Creek, Gum Creek, Pond Creek, Grass Creek, Mattress Drain, Cumbee Drain, Cross Creek, Devils Creek, Gum Slough, Rainbow River, Turner Creek, and Bell Branch. The river also receives flow from Lake Panasoffkee and the Tsala-Apopka Lake Complex. Little Jones Creek and Shady Brook discharge into Lake Panasoffkee and the outlet river on Lake Panasoffkee discharges into the South Withlacoochee.

The Withlacoochee River discharges at the mouth of the river in Yankeetown and the western portion of the Cross Florida Barge Canal, an important hydrologic alteration of the river that changed the pattern of outflow. Lake Rousseau, an impoundment 11 miles upstream formed in 1909 by the original Inglis Lock and Dam, provides flow to the Lower Withlacoochee River and Barge Canal which both discharge into the Gulf of Mexico. The current operating schedule allows flows around 1,400 cubic feet per second (cfs) to go through the bypass canal to the Lower Withlacoochee River. Outflows above 1,540 cfs are discharged through the Inglis Dam to the barge canal (Amy H Remley Foundation, 2010). . The Withlacoochee Bay is a large and shallow estuary at the mouth of the Withlacoochee River with an area of 81 square miles (DeHaven, 2004). It has an average depth of 7.35 feet, ranging from about 3 feet in the bay to approximately 20 feet within the barge canal. Outside of the canal, the bay itself reaches a max depth of about 10 feet. Tides are semidiurnal with two unequal high and low tides daily and an average tide height of 3.6 feet. The basin opens to the southwest and mixing occurs with tidal exchange and near shore currents resulting in exchange of more than 50% of the bay's volume twice daily. The average salinity of the bay is 19 parts per thousand (ppt) and the temperature averages 23°C (DEP, 2017).

Crystal River Drainage Basin

The Crystal River Drainage Basin spans approximately 69 square miles, encompassing the Crystal River, Kings Bay, and the City of Crystal River. The eastern portion of the watershed is internally drained, limiting the surface water discharge into the Crystal River. Crystal River begins in Kings Bay and runs northwest through the town of Crystal River before terminating in Crystal Bay, spanning about seven miles in total length. Kings Bay includes a complex of 70 springs, which supply the river with fresh water from the Floridan Aquifer System. The surface area of the bay is approximately 600 acres with a combined spring discharge of about 450cfs, making the Crystal River Springs Group one of the largest springs systems in the state (SWFWMD, 2015). The most notable springs in the Crystal River/Kings Bay Springs Group include: Black Springs, Catfish Corner Spring, Hunters Spring, Idiot's Delight Spring, Jurassic Spring, Kings Bay Spring #1, King Spring, Little Hidden Spring, Little Spring, Millers Creek Spring, Manatee Sanctuary Spring Tarpon Hole Spring, and Three Sisters Springs among others (FGS, 2004).

In the Crystal River/Kings Bay area, onsite sewage treatment and disposal systems represent 42% of the estimated nitrogen loading to groundwater, agriculture (including farm fertilizer and livestock waste) 17%, and urban turfgrass fertilizer 15% of the total loading to groundwater based on DEP's analysis conducted using the Nitrogen Source Inventory Loading Tool. The total load reduction required to meet the Total Maximum Daily Loads (TMDLs) at the spring vents is 274,000 pounds of nitrogen per year (lb-N/yr). To measure progress towards achieving the necessary load reduction, DEP has established the following milestones: 1) initial reduction of 82,200 lb-N/yr (30%) within 5 years, 2) an additional 137,000 lb-N/yr (50%) within 10 years, 3) the remaining 54,800 lb-N/yr (20 %) within 15 years, and 4) a total of 274,000 lb-N/yr within 20 years (DEP, 2018b).

Homosassa River Drainage Basin

The Homosassa River Drainage Basin spans approximately 56 square miles and encompasses the Homosassa River and the town of Homosassa Springs. The Homosassa River is headed by the Homosassa Springs Group and continues approximately six miles west before terminating in Homosassa Bay. The most notable springs in the Homosassa Springs Group include: Abdoney Springs, Alligator Spring, Banana Spring, Bear Spring, Belcher Spring, Bluebird Springs, Blue Hole Spring, Hidden River Springs, Homosassa Spring #1, Homosassa Spring #2, Homosassa Spring #3, Trotter Main Spring, and Trotter Spring #1 among others (FGS, 2004). The Halls River Springs also supply the Halls River, a tributary of the Homosassa River (FGS, 2004).

In the Homosassa/Chassahowitzka area, agricultural sources in the BMAP area (farm fertilizer and livestock waste) represent 39% of the nitrogen loading to groundwater, urban turfgrass fertilizer (UTF) represents 22%, and onsite sewage treatment and disposal systems account for 16% of the total loading to groundwater based on the DEP analysis conducted using the Nitrogen Source Inventory Loading Tool. The total load reduction required to meet the TMDLs at the spring vents is 272,833 pounds of nitrogen per year (lb-N/yr) – 157,132 lb-N/yr in Homosassa and 115,701 lb-N/yr in Chassahowitzka. To measure progress towards achieving the necessary load reduction, DEP has established the following milestones: 1) initial reduction of 81,850 lb-N/yr (30 %) within 5 years, 2) an additional 136,417 lb-N/yr (50 %) within 10 years, 3) the remaining 54,567 lb-N/yr (20%) within 15 years, and 4) for a total of 272,833 lb-N/yr within 20 years (DEP 2018c).

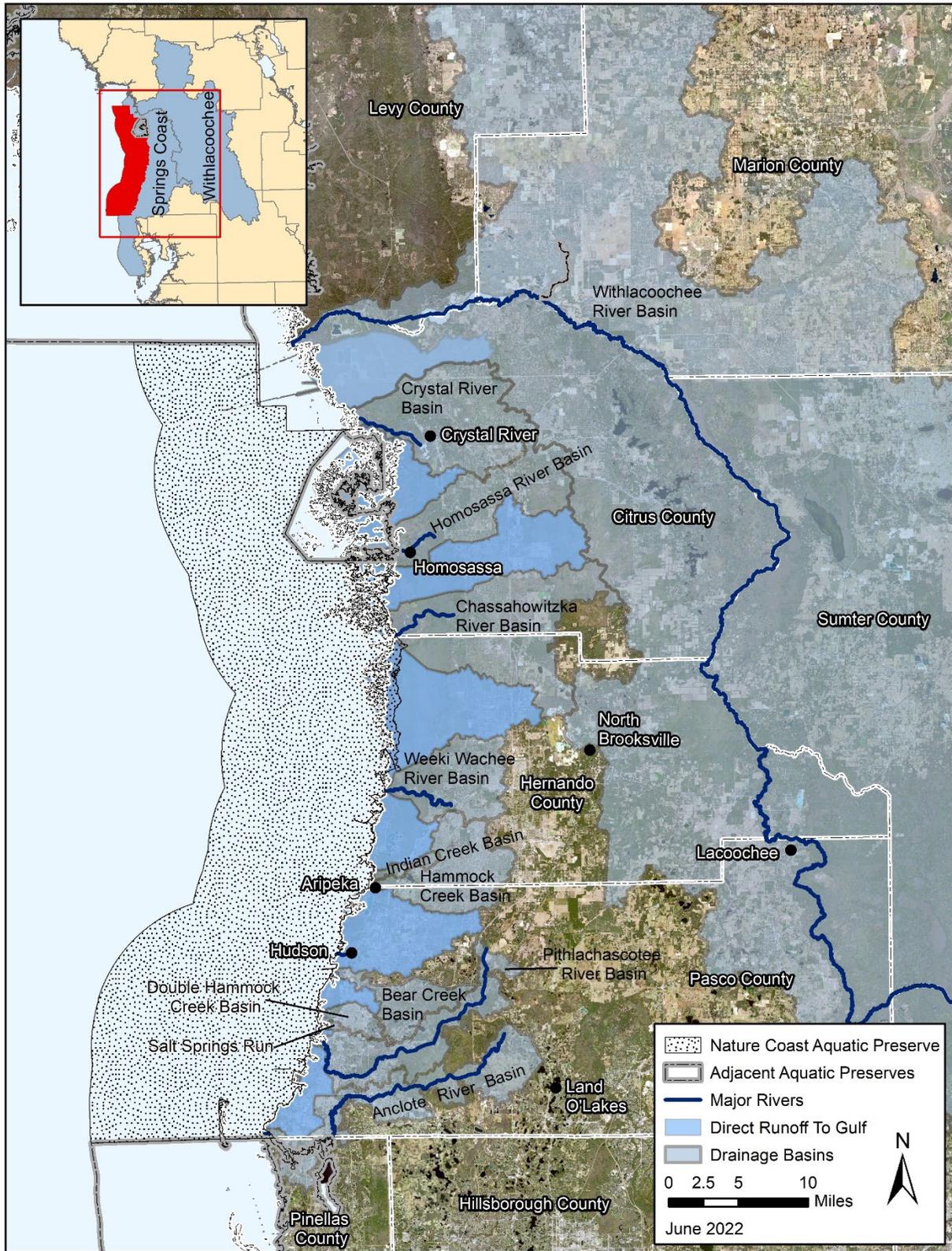
Chassahowitzka River Drainage Basin

The Chassahowitzka springshed, which contributes groundwater to the Chassahowitzka Springs, is approximately 190 square miles of upland forests, urbanization, agricultural, and wetland forests. This springshed covers portions of Citrus and Hernando counties. Chassahowitzka Springs is made up of a dozen springs that form the headwaters for the Chassahowitzka River, which flows 5.6 miles from the headsprings to the Gulf of Mexico at Chassahowitzka Bay in Citrus and Hernando Counties of Florida. The Chassahowitzka River is a designated Outstanding Florida Water. The lower half of the river is part of the more than 31,000-acre Chassahowitzka National Wildlife Refuge. The Chassahowitzka River is considered one of the most ecologically healthy rivers in west-central Florida. Most of the river is dominated by submerged aquatic vegetation and is surrounded by undeveloped land. The tidal river is in good condition with a submerged aquatic vegetation community that can fluctuate in response to salinity changes, (SWFWMD, 2018b).

Weeki Wachee River Drainage Basin

The Weeki Wachee springshed, which contributes groundwater to Weeki Wachee Springs, is approximately 260 square miles of urbanized areas, agricultural lands, and forested uplands. This springshed covers portions of Hernando and Pasco counties. Weeki Wachee Springs are the headwaters of the Weeki Wachee River, which flows 7.4 miles from the headspring to the Gulf of Mexico at Bayport in Hernando County, Florida. The lower section of the river has been dredged and channelized with canals for riverfront homes and businesses. The slightly brackish canals and lower portion of the river are tidally influenced by the Gulf of Mexico. Weeki Wachee Springs has an elaborate underwater cave system that reaches a depth of more than 400 feet (SWFWMD, 2018e).

In the Weeki Wachee region, onsite sewage treatment and disposal systems represent 30% of the nitrogen loading to groundwater, agriculture (including farm fertilizer and livestock waste) 27%, and urban turfgrass fertilizer 22 % of the total loading to groundwater based on the DEP analysis conducted using the Nitrogen Source Inventory Loading Tool (NSILT). The total load reduction required to meet the TMDLs at the vents is 195,200 pounds of nitrogen per year (lb-N/yr). To measure progress towards achieving the necessary load reduction, DEP has established the following milestones: 1) initial reduction of 58,560 lb-N/yr (30%) within 5 years, 2) an additional 97,600 lb-N/yr (50%) within 10 years, 3) the remaining 39,040 lb-N/yr (20 %) within 15 years, and 4) for a total of 195,200 lb-N/yr within 20 years (DEP, 2018e).



Map 7. Drainage basins of the Nature Coast Aquatic Preserve.

Double Hammock Creek Drainage Basin

The Double Hammock watershed in western Pasco County is approximately 13 square miles in size. It is a relatively flat, highly urbanized area and features many closed-basin systems. The watershed is generally aligned from southeast to northwest and is bounded by US 19 to the west, Port Richey and Lower Coastal Watersheds to the south, and Bear Creek/Pithlachascotee River Watershed to the north and east. The central portion of the watershed is drained by a network of storm sewers and ditches, which convey water to a single large ditch which passes under U.S. Highway 19 immediately north of Regency Park Boulevard. The ditch continues west under Scenic Drive and empties into a large freshwater wetland system, which overflows to Double Hammock Creek. Double Hammock Creek is a tidal creek that discharges to the Gulf of Mexico approximately 1.5 miles north of the mouth of the Pithlachascotee River. A similar system discharges to Salt Springs Run, which is a tidal creek located south of Double Hammock Creek. Drainage from the northern and southern portions of the study area is through various storm sewers, roadside swales, and out fall ditches which convey stormwater runoff directly to the coastal wetlands (Pasco County, n.d. c).

Bear Creek/Pithlachascotee River Drainage Basin

The Bear Creek portion of the watershed is in western Pasco County, north and west of the Pithlachascotee River. Except for the Beacon Woods Outfall Canal, the entire watershed lies east of US 19. This portion of the watershed has sub-basins. The first two basins are Bear Creek and Buckhorn Creek, which are considered Open Basins as they have an outfall via the Bear Creek and the Beacon Woods Outfall Canal to the Gulf of Mexico. The remaining basins are Frierson Lakes, Moon Lake, and Rocky Sink/Boggy Creek. These basins are considered Closed Basins as they have no outfall and depend on the water percolating into the soils or evaporation. The Pithlachascotee River portion of the watershed begins from its headwaters in northern Pasco and southern Hernando Counties to its point of discharge to the Gulf of Mexico. This portion of the watershed is divided into three parts, referred to as upper, middle, and lower basins. The upper basin extends downstream from the basin boundary to Crews Lake outlet; the middle part, or basin, extends downstream from Crews Lake outlet to Five Mile Creek; and the lower basin, from Five Mile Creek to the Gulf of Mexico (Pasco County, n.d. a).

Tampa Bay/Anclote River Drainage Basin

The Anclote River Watershed encompasses over 120 square miles. The lower and westernmost portion of this watershed lies within Pinellas County. The Anclote River originates in south-central Pasco County, near US 41 and north of State Road 54. The river flows to the west where it traverses the Jay B. Starkey Wilderness Park before crossing under Starkey Boulevard and flowing through the residential areas of Seven Springs, Elfers, and Holiday in Pasco County. The river then enters Pinellas County just west of East Fern Lake Road where the main channel becomes tidally influenced. In Pinellas County, the river flows by Salt Lake, Tarpon, and Kreamer Bayous before discharging to the northernmost portion of Saint Joseph Sound (Atkins, 2017).

Climate

The NCAP is in a sub-tropical area with high mean annual temperatures and precipitation. The three counties that make up the preserve show moderate variation in average temperature and rainfall.

In Citrus County, the average monthly temperature ranged from 56 to 80 degrees Fahrenheit in 2020. The maximum temperature was recorded in July at 90.6 degrees. The minimum temperature was recorded in January at 42.6 degrees. Average precipitation varied throughout the year. In 2020, monthly precipitation ranged from 2.69 inches in February to 8.69 inches in July. In Hernando County, average temperature ranged from 57.5 to 81.3 degrees. The maximum temperature for 2020 was recorded at 90.9 degrees in August, and the minimum was 44.3 degrees in January. Average monthly precipitation ranged from 2.18 inches in April to 9.41 inches in July. In Pasco County, the average monthly temperature ranged from 58.5 to 83.6 degrees Fahrenheit in 2020. The maximum temperature for 2020 was 92.3 degrees in August and the minimum was 52.3 degrees in January. Annual monthly



precipitation ranged from 1.76 inches in November to 9.93 inches in August (NOAA, 2021).

El Niño and La Niña are large scale climate interactions that are linked to periodic changes in sea surface temperatures and precipitation. El Niño leads to wetter and colder conditions along the Gulf, while La Niña results in the opposite effect in the Gulf. During the months of June through November, extreme weather events such as hurricanes and tropical storms can also have a pronounced effect on weather. Florida is a region that is highly prone to hurricane threats (DEP, 2017). The 2020 hurricane season was deemed the most active in history with a total of 29 tropical storms and hurricanes in the Atlantic Basin (Randall & Ballard, 2020).

Natural Communities

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

Natural communities present in NCAP are described below. A primary goal of the NCAP management plan is to assess the current condition of these natural communities and their associated resources, with particular focus on aquatic (submerged) resources. Their status will be updated in future management plans.

Hydric Hammock

(Synonyms: wet hammock, Gulf hammock) Hydric hammock is an evergreen and/or palm closed-canopy forest where palms and ferns are commonly found in moist soils and occur in low, flat, wet sites. Limestone is often found near the surface of the soil. High soil moisture is maintained throughout the year due to rainfall accumulation and periodic flooding from rivers, springs, and seepage on poorly drained soils. The canopy generally consists of swamp laurel oak (*Quercus laurifolia*) and live oak (*Q. virginiana*). Cabbage palm (*Sabal palmetto*), American elm (*Ulmus americana*), sweetbay (*Magnolia virginiana*), red cedar (*Juniperus virginiana*), red maple (*Acer rubrum*), sugarberry (*Celtis laevigata*), sweetgum (*Liquidambar styraciflua*), and water oak (*Q. nigra*) are also commonly found. The open understory is composed of numerous small trees and shrubs, including American hornbeam (*Carpinus caroliniana*), swamp dogwood (*Cornus foemina*), small-leaf viburnum (*Viburnum obovatum*), common persimmon (*Diospyros virginiana*), swamp bay (*Persea palustris*), wax myrtle (*Myrica cerifera*), dwarf palmetto (*Sabal minor*), American beautyberry (*Callicarpa americana*), and needle palm (*Rhapidophyllum hystrix*). Vines are also typically found, with species such as eastern poison ivy (*Toxicodendron radicans*), peppervine (*Ampelopsis arborea*), rattan vine (*Berchemia scandens*), trumpet creeper (*Campsis radicans*), climbing hydrangea (*Decumaria barbara*), yellow jessamine (*Gelsemium sempervirens*), greenbriers (*Smilax spp.*), summer grape (*Vitis aestivalis*), and muscadine (*Vitis rotundifolia*). Graminoids and ferns are frequent and diverse; typical species are sedges (*Carex spp.*), woodoats (*Chasmanthium spp.*), smooth elephants foot (*Elephantopus nudatus*), Carolina scalystem (*Elytraria caroliniensis*), woodsgrass (*Oplismenus hirtellus*), maiden ferns (*Thelypteris spp.*), cinnamon fern (*Osmunda cinnamomea*), royal fern (*Osmunda regalis var. spectabilis*), toothed midsorus fern (*Blechnum serrulatum*), netted chain fern (*Woodwardia areolata*), and Virginia chain fern (*Woodwardia virginica*) (FNAI, 2010). Specific data on the location and abundance of hydric hammocks throughout the preserve is not currently available, but acreage and location information will be added to the management plan as data is collected and analyzed. Though no acreage of hydric hammock occurs within the immediate boundaries of the aquatic preserve, this community is present on adjacent lands, thus is connected to the submerged resources.

Variation: Coastal Hydric Hammock

Areas of hammock immediately bordering salt marsh or other coastal areas. Species composition is limited by salinity. Predominant species are cabbage palm, live oak, and red cedar. In the NCAP, coastal hydric hammocks, or maritime hammocks, cover just over 12 acres within Anclote Key Preserve State Park.

Shell Mounds

(Synonyms: midden, Indian mound, tropical hammock, maritime hammock, coastal hammock.) Shell mounds are small hills elevated entirely by mollusk shells that were discarded by Native Americans several centuries ago. These mounds support a diverse hardwood, closed-canopy forest with the rich calcareous soil composed of shell fragments. If hammock vegetation is not available, a sparse shrubby community has been known to develop. Shell mounds tend to host tropical plant species, which are in constant flux. It is natural for species to be eliminated by freezes and re-colonized via bird dispersal. Typical plants include gumbo-limbo (*Bursera simaruba*), cabbage palm, false mastic (*Sideroxylon foetidissimum*), red cedar, snowberry (*Chiococca alba*), live oak, Florida swampprivet (*Forestiera segregata*), coral bean (*Erythrina herbacea*), marlberry (*Ardisia escallonioides*), saffron plum (*Sideroxylon celastrinum*), smallflower mock buckthorn (*Sageretia minutiflora*), and coontie (*Zamia pumila*), among others (FNAI, 2010). Specific data on the location and abundance of shell mounds throughout the preserve is not currently available, but acreage and location information will be added to the management plan as data is collected and analyzed.



Salt Marsh

(Synonyms: salt marsh, brackish marsh, coastal wetlands, coastal marshes, tidal wetlands.) Salt marsh occurs in coastal zones that are greatly affected by tides and seawater. These herbaceous communities are protected by large waves by the broad, gently sloping topography of the shore, by a barrier island, or by location along a bay or estuary. The width of the intertidal zone depends on the slope of the shore and the tidal range. It is not uncommon for salt marsh to have distinct zones of vegetation, with each zone dominated by a single plant species. Smooth cordgrass (*Spartina alterniflora*) dominates the areas that are most frequently flooded, the seaward edge and borders of tidal creeks. In recent years, there has been debate over the naming of the *Spartina* with some taxonomists renaming it with the genus *Sporobolus*. The iconic, conventional name *Spartina* will be used throughout this document (Bortolus et al., 2019). Black needle rush (*Juncus roemerianus*) dominates higher, less frequently flooded areas. Carolina sea lavender (*Limonium carolinianum*), perennial salt marsh aster (*Symphyotrichum tenuifolium*), wand loosestrife (*Lythrum lineare*), marsh fimbry (*Fimbristylis spadicea*), and shoreline seapurslane (*Sesuvium portulacastrum*) can also be found in that zone.

The landward edge of the marsh is influenced by freshwater influx from the uplands and may be colonized by a mixture of high marsh and inland species, including black needle rush, sawgrass (*Cladium jamaicense*), saltmeadow cordgrass (*Spartina patens*), Gulf cordgrass (*Spartina spartinae*), and sand cordgrass, among others. A border of salt-tolerant shrubs, such as groundsel tree (*Baccharis halimifolia*), saltwater falsewillow (*B. angustifolia*), marshelder (*Iva frutescens*), and Christmas berry (*Lycium carolinianum*), often marks the transition to upland vegetation or low berms along the seaward marsh edge (FNAI, 2010). Over 9,607 acres of salt marsh can be found within the NCAP. Large stands of salt marsh can be found Werner-Boyce Salt Springs State Park, Anclote Key Preserve State Park, and just to the north and south of SMMAP. In the NCAP, salt marshes in some areas are being replaced by mangroves as temperature shifts allow mangroves to propagate coastal areas without the threat of die backs from annual freezes.

Salt marshes are one of the most biologically productive natural communities in the world due to the tidal fluctuations that cycle nutrients and allow marine and estuarine fauna to access the marsh. Salt marshes are also extremely important because of their storm buffering capacity and their pollutant filtering actions. The dense roots and stems hold the destabilized soils together, reducing the impact of storm wave surge. The plants, animals, and soils filter, absorb, and neutralize many pollutants before they can reach adjacent marine and estuarine communities. These factors make salt marshes extremely valuable as a natural community (DEP, 2017).

Variation: Salt Flat

Salt flats are slightly elevated areas within the salt marsh. They flood only from storm tides or extreme high tides. Due to infrequent flushing from tidal events and isolation from freshwater, these communities experience high salt concentrations causing them to be dominated by species that can only tolerate increased salinities. This includes succulents such as saltwort (*Batis maritima*), perennial glasswort (*Sarcocornia ambigua*), southern glasswort (*Salicornia europaea*) annual glasswort (*Salicornia bigelovii*), and bushy seaside oxeye (*Borrichia frutescens*), or short grasses, such as saltgrass (*Distichlis spicata*), seashore paspalum (*Paspalum vaginatum*), and shoregrass (*Monanthochloe littoralis*). Some salt flats are too elevated and become too saline and are unable to sustain much plant life. Vegetation is limited to a very sparse and stunted cover of succulents and/or shoregrasses with much bare ground. Specific data on the location and abundance of salt flats throughout the preserve is not currently available, but acreage and location information will be added to the management plan as data is collected and analyzed.



Mangrove Swamp

(Synonyms: mangrove forest, mangrove swamp, and mangrove islands.) Mangrove swamp is a dense forest that can be found along flat marine and estuarine shorelines with low wave energy. These communities occur in flat coastal areas along saline or brackish portions of rivers, along the edges of

low-energy estuaries, and along the seaward fringes of salt marshes and rockland hammocks. Soils are generally anaerobic and are often saturated with brackish water, becoming inundated during high tides. Mangrove swamps occur on a wide variety of soils, ranging from sands and mud to solid limestone rock. Mangrove swamps predominately consist of red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia germinans*), white mangrove (*Laguncularia racemosa*), and buttonwood (*Conocarpus erectus*). These species can be found together in mixed stands or separated in monospecific zones that reflect varying degrees of tidal influence, levels of salinity, and types of substrate. In the lowest, deep-water zone, red mangrove tends to dominate, black mangrove is most likely to be found in the intermediate zone, followed by white mangrove and buttonwood in the highest, least tidally influenced zone. Mangroves can range considerably within the mangrove swamp. Mangroves can typically be found in dense stands, but it is not uncommon to find them in sparse patches, especially in upper tidal zones where salt marsh species dominate. The range of the mangroves varies from 80-foot-tall trees to swamps often exist with no understory, although shrubs such as seaside oxeye and vines including gray nicker (*Caesalpinia bonduc*), coinvine (*Dalbergia ecastaphyllum*), and rubbervine (*Rhabdadenia biflora*), and herbaceous species such as saltwort, shoregrass, perennial glasswort, and giant leather fern (*Acrostichum danaeifolium*), where present, occur most commonly in openings and along swamp edges (FNAI, 2010). Mangrove swamp communities are important because they provide homes for Florida's commercially and recreationally significant fish and shellfish. These natural communities are also the breeding grounds for substantial populations of wading birds, shorebirds, and other animals. The continuous shedding of mangrove leaves and other plant components produce as much as 80% of the total organic material available in the aquatic food web. Additionally, mangrove swamps help protect other inland communities by absorbing the brunt of tropical storms and hurricanes (DEP, 2017). Over 121 acres of mangrove swamps can be found within the NCAP. Most mangroves are found in the southern portion of the preserve, in coastal areas of Pasco County. Mangrove acreage within the NCAP is likely to increase as updated habitat mapping is conducted and as community migration continues with changing climate trends. .

Consolidated Substrate

(Synonyms: hard bottom, rock bottom, limerock bottom, coquina bottom, relic reef.) Marine and estuarine consolidated substrates are mineral based natural communities generally characterized as expansive, relatively open areas of subtidal, intertidal, and supratidal zones, which lack dense populations of sessile plant and animal species. Consolidated substrates are solidified rock or shell conglomerates and include coquina, limerock, or relic reef materials. These communities may be sparsely inhabited by sessile, planktonic, epifaunal, and pelagic plants and animals but house few organisms within the substrate (DEP, 2017). In the NCAP, over 30 acres of consolidated substrate are present near the western boundary of the preserve near Hernando County. Additional acreage is expected, but not currently identified. Once accurate mapping is completed, total acreage will be updated within the management plan or otherwise published.

The three kinds of consolidated substrate communities occurring in Florida are of limited distribution. Coquina, which is a limestone composed of broken shells, corals, and other organic debris, occurs primarily along the east coast, in marine areas in the vicinity of St. Johns and Flagler counties. Limerock substrates occur as outcrops of bedded sedimentary deposits consisting primarily of calcium carbonate. This consolidated substrate is more widespread than coquina substrate and can be found in a patchy distribution under both marine and estuarine conditions from north Florida to the lower-most keys in Monroe County, including in NCAP. Relic reefs, the skeletal remains of formerly living reefs, are more limited in distribution than limerock outcrops but more common than coquina substrate (FNAI, 2010).

Consolidated substrates are important in that they form the foundation for the development of other marine and estuarine natural communities when conditions become appropriate. Consolidated substrate communities are easily destroyed through siltation or placement of fill, and deliberate removal by actions such as blasting or non-deliberate destruction by forces such as vehicular traffic (DEP, 2017).

Unconsolidated Substrate

(Synonyms: beach, shore, sand bottom, shell bottom, sand bar, mud flat, tidal flat, soft bottom, coralgal substrate, marl, gravel, pebble, calcareous clay.) Marine and estuarine unconsolidated substrates are mineral based natural communities generally characterized as expansive, relatively open areas of subtidal, intertidal, and supratidal zones which lack dense populations of sessile plant and animal species. Unconsolidated substrates are unconsolidated material and include coralgal, marl, mud, mud/sand, sand, or shell. This community may support a large population of infaunal organisms as well as a variety of transient planktonic and pelagic organisms (e.g., tube worms, sand dollars, mollusks, isopods, amphipods, burrowing shrimp, and an assortment of crabs). Within the NCAP, over 10 acres of estuarine unconsolidated substrate can be found in Werner-Boyce Salt Springs State Park. Marine unconsolidated substrate takes up a much larger area, with over 2,896 acres found throughout the preserve. Most of this area is found within Anclote Key Preserve State Park.

In general, marine and estuarine unconsolidated substrate communities are the most widespread communities in the world. However, unconsolidated substrates vary greatly throughout Florida, based on surrounding parent material. Unconsolidated sediments can originate from organic sources, such as decaying plant tissues (e.g., detritus) or from calcium carbonate depositions of plants or animals (e.g., coralgal, marl, and shell substrates). Marl and coralgal substrates are primarily restricted to the southern portion of the state. The remaining four kinds of unconsolidated substrate (mud, mud/sand, sand, and shell) are found throughout the coastal areas of Florida. While these areas may seem relatively barren, the densities of infaunal organisms in subtidal zones can reach the tens of thousands per meter square, making these areas important feeding grounds for many bottom feeding fish, such as red drum or redfish (*Sciaenops ocellatus*), spot (*Leiostomus xanthurus*), and sheepshead (*Archosargus probatocephalus*). The intertidal and supratidal zones are extremely important feeding grounds for many shorebirds and invertebrates (FNAI, 2010).

Unconsolidated substrates are important in that they form the foundation for the development of other marine and estuarine natural communities when conditions become appropriate. Unconsolidated substrate communities are associated with and often grade into beach dunes, salt marshes, mangrove swamps, seagrass beds, coral reefs, mollusk reefs, worm reefs, octocoral beds, sponge beds, and algal beds (DEP, 2017).

Mollusk Reef

(Synonyms: oyster bar, oyster reef, oyster bed, oyster rock, oyster grounds, mussel reef, worm shell reef, Vermetid reef.) Marine and estuarine mollusk reefs are faunal based natural communities typically characterized as expansive concentrations of sessile mollusks occurring in intertidal and subtidal zones to a depth of 40 feet. In Florida, the most developed mollusk reefs are generally restricted to estuarine areas and are dominated by the Eastern oyster (*Crassostrea virginica*). Less common are mollusk reefs dominated by mussels and others dominated by Vermetid worm shells. Numerous other sessile and benthic invertebrates live among, attached to, or within the collage of mollusk shells. Most common are burrowing sponge (*Hadromerida*), anemones, mussels, clams, oyster drill (*Urosalpinx spp.*), lightning whelk (*Busycon sinistrum*), polychaetes, oyster leech (*Stylochus spp.*), barnacles, blue crab (*Callinectes sapidus*), mud crab (*Xanthidae*), stone crab (*Menippe mercenaria*), pea crab (*Pinnotheridae*), amphipods, and starfish (*Asteroidea*). Several fish also frequently occur near or feed among mollusk reefs, including cownose ray (*Rhinoptera bonasus*), Gulf menhaden (*Brevoortia patronus*), gafftopsail catfish (*Bagre marinus*), pinfish (*Lagodon rhomboides*), spotted seatrout (*Cynoscion nebulosus*), spot, black drum (*Pogonias cromis*), and striped mullet (*Mugil cephalus*). Mollusk reefs that are exposed during low tides are frequented by a multitude of shorebirds, wading birds, raccoons, and other vertebrates. One of the United States' largest wintering populations of American oystercatchers (*Haematopus palliatus*) is situated in the heart of the Cedar Keys. The success of this rookery can be attributed to the oyster reefs located here, which are an excellent and tremendously important food source (DEP, 2017). More than 127 acres of oyster reefs can be found within the NCAP boundaries.



Reef-building mollusks require a hard- (consolidated) substrate on which the planktonic larvae (i.e. spat) settle and complete development. The spat dies if it settles on soft (unconsolidated) substrates, such as mud, sand, or grass. Hard substrates include rocks, limestone, wood, and other mollusk shells. Hard substrates are often limited in estuarine natural communities because of the large amounts of silt, sands, and muds that are deposited around river mouths. Once established, however mollusk reefs can generally persist and often expand by building upon themselves.

The most common kind of mollusk reef, oyster mollusk reefs, occur in water salinities from just above fresh water to just below full-strength sea water, but develop most frequently in estuarine water with salinities between 15 and 30 ppt. Their absence in marine water is largely attributed to the many predators, parasites, and diseases of oysters that occur in higher salinities. Prolonged exposure to low salinities (less than two ppt) is also known to be responsible for massive mortality of oyster reefs. Thus, significant increases or decreases in salinity levels through natural or unnatural alterations of freshwater inflow can be detrimental to oyster mollusk reef communities. Mollusk reefs occupy a unique

position among estuarine invertebrates and have been an important human food source since prehistoric times. They present a dynamic community of estuarine ecology, forming refugia, nursery grounds, and feeding areas for a myriad of other estuarine organisms (DEP, 2017).

The major threats to mollusk reefs continue to be pollution and substrate degradation due, in large part, to upland development. Mollusks are filter feeders, filtering up to 100 gallons of water a day. In addition to filtering food, they also filter and accumulate toxins from polluted waters. Sources of these pollutants can be from considerably distant areas but are often more damaging when nearby. Substrate degradation occurs when silts, sludge and dredge spoils cover and bury the mollusk reefs. Declining oyster and other mollusk reef populations can be expected in coastal waters that are being dredged or are receiving chemicals mixed with rainwater flowing off the land, or from drainage of untreated residential or industrial sewage systems (DEP, 2017).

Reported declines in oyster bars are likely due to a departure from historical norms and stem from multiple factors. Extended periods of high salinity are likely stressors of oyster populations, particularly on offshore bars, to the extent that the physical structure of bars is affected by both mortality of older oysters, and the loss of significant recruitment. Once the structure of bars is weakened, bars became

less resilient to wave action, particularly during storm events. Evidence suggests that the primary mechanism is reduced survival and recruitment because of decreased freshwater inputs, causing existing bars to be vulnerable to wave action and sea level rise; once bar substrate becomes unconsolidated, the breakdown of the bar may not be reversible. Emerging threats such as sea level rise, increasing storm intensity, and changes to ocean chemistry are much less understood partly because these threats occur at very broad spatial scales and partly because oyster community response to these stressors may be locally confounded with other stressors such as dredging or overharvest. Evidence suggests that increasing human uses of freshwater inland may be an important factor resulting in habitat loss (FNAI, 2010).

Understanding the resilience of oyster reef communities in the Gulf to these and other threats is important for developing effective conservation, management, and restoration plans for this species and this globally significant habitat. Planning for the conservation of oyster habitat in the Gulf should include scenarios that encompass the interaction of global change and local anthropogenic stressors (DEP, 2017).



Sponge Bed

(Synonyms: branching candle sponge, Florida loggerhead sponge, sheepswool sponge.) Marine and estuarine sponge beds are soft faunal based natural communities characterized as dense populations of sessile invertebrates of the phylum Porifera, Class Demospongiae. The dominant animal species are sponges, such as branching candle sponge (*Verongia longissima*), Florida loggerhead sponge (*Spherospongia vesparium*), and sheepswool sponge (*Hippiospongia lachne*). Although concentrations of living sponges can occur in marine and estuarine intertidal zones, sponge beds are confined primarily

to subtidal zones. Other sessile animals typically occurring in association with these sponges are stony corals (*Scleractinia*), sea anemones (*Actiniaria*), mollusks, tube worms, isopods, amphipods, burrowing shrimp (*Thalassinidea*), crabs, sand dollars (*Clypeasteroidea*), and fishes. Sessile and drift algae can also be found scattered throughout sponge beds. Specific data on the location and abundance of sponge beds throughout the preserve is not currently available, but acreage and location information will be added to the management plan as data is collected and analyzed.

Sponge beds require hard bottom (consolidated) substrate (i.e., coquina, limerock, relic reefs) on which to anchor. Hard bottom substrate occurs sparsely throughout Florida in marine and estuarine areas; however, sponges prefer the warmer waters of the southern portion of the state, limiting the distribution. While sponge beds geographically reside in warmer waters, they are still susceptible to warming Gulf temperatures. Stress on sponges due to thermal changes may reduce the sponge's defenses against disease and can alter the rate at which sponges feed by filtration. (Carbello & Bell, 2017).

Sponge beds may grade into other marine and estuarine hard bottom subtidal, intertidal and supratidal communities (i.e., consolidated substrate, sponge bed, coral reef, mollusk reef, worm reef, and lithophytic algal bed) as well as soft bottom communities (i.e., unconsolidated substrate, ammophytic algal bed, seagrass bed, salt marsh, mangrove swamp) (FNAI, 2010).

Octocoral Bed

(Synonyms: gorgonians, sea fans, sea feathers, sea fingers, sea pansies, sea plumes, sea rods, sea whips, soft corals.) Marine and estuarial octocoral beds are characterized by their large populations of sessile invertebrates including Class Anthozoa, Subclass Octocorallia, Orders Gorgonacea, and Pennatulacea. The dominant animal species are soft corals such as gorgonians, sea fans (*Gorgonacea*), sea feathers and sea plumes (*Pseudopterogorgia spp.*), sea fingers (*Briareum asbetinum*), sea pansies (*Renilla spp.*), sea rods (*Plexaura spp.*), and sea whips (*Leptogorgia spp.*). This community is confined to the subtidal zone and organisms are likely to dry out if not completely saturated. Sea anemones (*Actiniaria*) are also typically occurring in these communities. Specific data on the location and abundance of octocoral beds throughout the preserve is not currently available, but acreage and location information will be added to the management plan as data is collected and analyzed.

An assortment of non-sessile benthic and pelagic invertebrates and vertebrates [e.g., sponges, mollusks, tube worms, burrowing shrimp (*Thalassinidea*), crabs, isopods, amphipods, sand dollars, and fishes] are associated with octocoral beds. Species include flamingo tongue snail (*Cyphoma gibbosa*) and the giant basket starfish (*Astrophyton muricatum*). Sessile and drift algae can also be found scattered throughout octocoral beds.

Octocoral beds require hard bottom (consolidated) substrate (i.e., coquina, limerock, relic reefs) on which to anchor. Hard bottom substrate occurs sparsely throughout Florida in marine and estuarine areas; however, soft corals prefer the warmer waters of the southern portion of the state, severely limiting the distribution. Octocoral beds may grade into other marine and estuarine hard bottom subtidal, intertidal, and supratidal communities (i.e., consolidated substrate, sponge bed, coral reef, mollusk reef, worm reef, lithophytic algal bed) as well as soft bottom communities (i.e., unconsolidated substrate, psammophytic algal bed, seagrass bed, salt marsh, mangrove swamp) (FNAI, 2010).

Algal Bed

(Synonyms: algal mats, periphyton mats.) Marine and estuarine algal beds are floral based natural communities characterized as large populations of nondrift macro or micro algae. The dominant vegetative species include the following genera: Anadyomene, Argardhiella, Avrainvella, Batophora, Bryopsis, Calothrix, Caulerpa, Chondria, Cladophora, Dictyota, Digenia, Gracilaria, Halimeda, Laurencia, Oscillatoria, Penicillus, Rhipocephalus, and Sargassum. This community may occur in subtidal, intertidal, and supratidal zones on soft and hard bottom substrates. Vascular plants (e.g., seagrasses) may occur in algal beds associated with soft bottoms. Sessile animals associated with algal beds will vary based on bottom type. For algal beds associated with hard bottom substrate (lithophytic), faunal populations will be similar to populations associated with octocoral beds and sponge beds. Those associated with soft

bottom substrate (psammophytic) may have similar benthic and pelagic species in addition to infauna species. Recent research has shown that algal beds provide critical habitat for juvenile spiny lobsters (*Panulirus argus*), a species of great commercial importance (FNAI, 2010). Specific data on the location and abundance of algal beds throughout the preserve is not currently available, but acreage and location information will be added to the management plan as data is collected and analyzed.

Lithophytic algal beds are thought to be less widespread within Florida than psammophytic algal beds. The precise distribution of both kinds is not known; however, the distribution is thought to be less than for marine and estuarine seagrass beds. Marine and estuarine algal beds may grade into seagrass beds, salt marsh, mangrove swamp, or many of the other marine or estuarine natural communities. Supratidal algal beds such as periphyton beds (e.g., blue-green algal mats) may grade into various coastal palustrine and terrestrial natural communities.

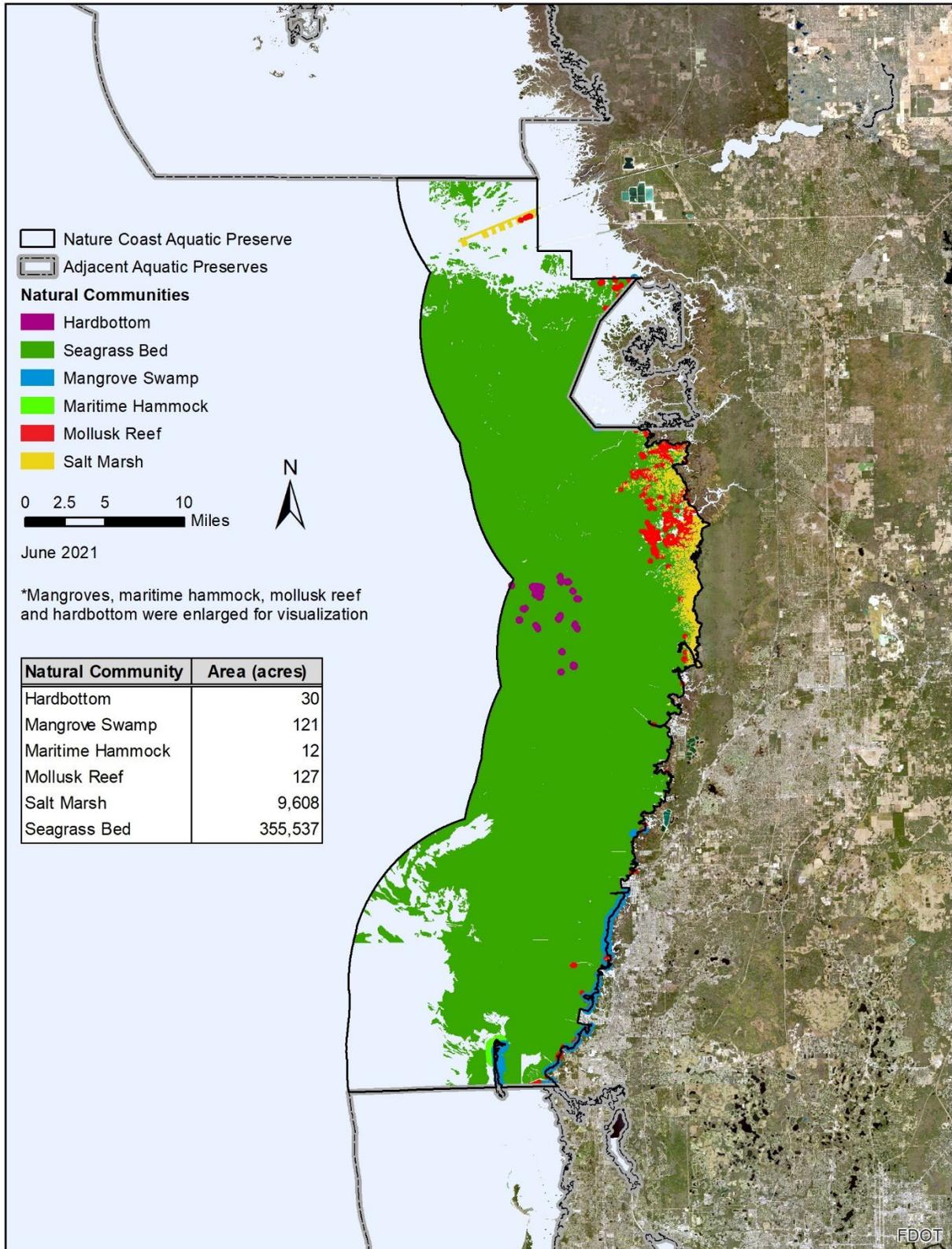
Distribution information for algal beds is lacking. The location of major beds must be determined before this natural community can be managed adequately. Existing state dredge and fill laws provide specific protection for marine and estuarine seagrass beds but not for algal beds. The correction of this deficiency could prove to be the most effective management tool available. The primary threat to marine and estuarine algal beds are dredging and filling activities which physically remove or bury the beds. Other damage occurs from increased turbidity in the water column which reduces available light; pollution, particularly from oil spills; and damage from boats (FNAI, 2010).

Seagrass Bed

(Synonyms: seagrass meadows, grass beds, grass flats.) Marine and estuarine seagrass beds are floral based natural communities typically characterized as expansive stands of vascular plants. This community occurs in subtidal (rarely intertidal) zones, in clear, coastal waters where wave energy is moderate. Seagrasses are not true grasses (*Poaceae*). The three most common species of seagrasses in Florida are turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme*), and shoal grass (*Halodule wrightii*). Nearly pure stands of any one of these species can occur, but mixed stands are also common. Species of *Halophila* may be intermingled with the other seagrasses, but species of this genus are considerably less common than turtle grass, manatee grass and shoal grass. Widgeon grass (*Ruppia maritima*) can also be found occurring with the previously listed seagrasses although they occur primarily under high salinities while widgeon grass occurs in areas of lower salinity. Within the NCAP, seagrass meadows are more prevalent than any other natural community listed here. More than 355,537 acres of seagrasses can be found throughout the preserve.

Attached to the seagrass leaf blades are numerous species of epiphytic algae and invertebrates. Together, seagrasses and their epiphytes serve as important food sources for manatees, marine turtles, and many fish, including spotted sea trout, spot, sheepshead and red drum. The dense seagrasses also serve as shelter or nursery grounds for many invertebrates and fish, including marine snails, clams, bay scallops (*Argopecten irradians*), polychaete worms, pink shrimp (*Farfantepenaeus duorarum*), blue crab, starfish (*Astroidea*), sea urchins (*Echinoidea*), tarpon (*Megalops atlanticus*), seahorses (*Hippocampus spp.*), Florida pompano (*Trachinotus carolinus*), permit (*T. falcatus*), striped mullet, great barracuda (*Sphyraena barracuda*), and long-horned cowfish (*Lactoria cornuta*).

Marine and estuarine seagrass beds occur most frequently on unconsolidated substrates of marl, muck, or sand, although they may also occur on other unconsolidated substrates. The dense blanket of leaf blades reduces the wave-energy on the bottom and promotes settling of suspended particulates. The settled particles become stabilized by the dense roots and rhizomes of the seagrasses. Thus, marine and estuarine seagrass beds are generally areas of soil accumulation. Other factors affecting the establishment and growth of seagrass beds include water temperature, salinity, wave-energy, tidal activity, and available light. Generally, seagrasses are found in waters with temperatures ranging from



Map 8. Florida Natural Areas Inventory natural communities of the Nature Coast Aquatic Preserve.

between 68°- 86 °F (20° and 30 °C). Seagrasses occur most frequently in areas with moderate current velocities, as opposed to either low or high velocities. Although marine and estuarine seagrass beds are most commonly submerged in shallow subtidal zones, they may be exposed for brief periods of time during extreme low tides.

One of the more important factors influencing seagrass communities is the amount of solar radiation reaching the leaf blades. In general, the water must be fairly clear because turbidity blocks essential light necessary for photosynthesis. The rapid growth rate of seagrass under optimum conditions rivals that of most intensive agricultural practices, without energy input from man. Seagrass beds are often associated with and grade into unconsolidated substrate, coral reefs, mangrove swamps, and salt marshes, but may also be associated with any other marine and estuarine natural community (DEP, 2017).

Seagrass beds are extremely vulnerable to human impacts. Many have been destroyed through dredging and filling activities or have been damaged by sewage outfalls and industrial wastes. In these instances, the seagrasses are either physically destroyed or succumb because of decreased solar radiation resulting from increased water turbidity. Seagrass beds are also highly vulnerable to oil spills. Low concentrations of oil are known to greatly reduce the ability of seagrasses to photosynthesize. Extreme high temperatures also have adverse impacts on seagrass beds. The area surrounding power plant outfalls, where water temperatures may exceed 95 °F (35 °C), has been found to be lethal to seagrasses. Seagrass beds are susceptible to long-term scarring cuts from boat propellers, anchors, and trawls. Such gouges may require many years to become revegetated. When protected from disturbances, seagrasses can regenerate and recolonize areas. Additionally, some successful replantings of seagrass beds have been conducted. However, the best management is to preserve and protect seagrass beds in their natural state (FNAI, 2010).

Aquatic Caves

(Synonyms: cave, cavern grotto, chamber, chimney, sink, swallow hole, spring rise.) A cave system is classified as cavities below the surface of the ground in karst areas. All caves develop under aquatic conditions, therefore terrestrial caves can be considered dry aquatic caves. Aquatic caves vary from shallow pools that are highly susceptible to disturbance, to more stable systems that are completely submerged. Within the NCAP, the aquatic caves take the form of offshore spring vents and marine caves and do not share many characteristics of other aquatic caves. Within the cave, vegetation densities drop rapidly due to the decreased illumination levels. Troglobites are organisms that are specially evolved to survive in complete darkness in deep cave habitats. The dependence of troglobites on detrital inputs and other nutrients imported from the surface generally limits the distribution of well-developed aquatic cave communities to karst areas with surface connections. Specific data on the location and abundance of aquatic caves throughout the preserve is not currently available, but acreage and location information will be added to the management plan as data is collected and analyzed.

The dissolution and corrosion of limestone play active roles in enlarging cave passageways. These forces differ primarily in the slopes of the passageways which result. Since limestone caves initially develop in the aquifer, they are frequently associated with aquifer-related surface features. Thus, a spring run stream issues from an aquatic cave. In general, however, aquatic caves are very stable environments with relatively constant physical and chemical characteristics (FNAI, 2010).

Table 1. Summary of Florida Natural Areas Inventory communities in the Nature Coast Aquatic Preserve.

FNAI Natural Community Type	# Acres	% of Area	Global Rank	State Rank	Comments
Hydric Hammock	N/A	N/A	G4	S4	
Coastal Hydric Hammock	12	0.003%			

Shell Mounds	N/A	N/A	G2	S2	
Salt Marsh	9,608	2.14%	G4	S4	
Salt Flat	N/A	N/A			
Mangrove Swamp	121	0.027%	G3	S3	
Consolidated Substrate	30	0.007%	G3	S3	
Unconsolidated Substrate	2,906	0.65%	G5	S5	
Mollusk Reef	127	0.03%	G3	S3	
Ocotocoral Bed	N/A	N/A	G2	S1	
Sponge Bed	N/A	N/A	G2	S2	
Algal Bed	N/A	N/A	G3	S2	
Seagrass Bed	355,537	79%	G2	S2	
Aquatic Caves	N/A	N/A	G3	S2	

Native Species

Native species that hold ecological, economic, and cultural significance within and around the NCAP are listed below. Marine fish and crustaceans make up the bulk of this list because of the importance of recreational and commercial fishing in the region. Native species targeted for commercial fishing include blue crabs and stone crabs. Recreationally sought-after fish species include red drum, spotted seatrout, and tarpon.

American White Pelican (*Pelecanus erythrorhynchos*)

One of the largest birds in the U.S, the American white pelican has a wingspan that can reach nine and a half feet. Adults are white with black tips on their wings. Their legs and bill are pink or reddish orange. White pelicans are found in Florida, as well as southern Mexico, southern California, and the Gulf Coast states, in the winter months and journey to western Canada and the northwest U.S. in the summer. White pelicans fish as a collaborative unit, herding fish as they float on the water's surface and then scooping fish up as they plunge their heads underwater. White pelican populations have suffered historically because of hunting for their white plumage and eggshell thinning due to exposure to pesticides. Though populations have recovered, the species still experiences threats from marine debris (FWC, n.d. u).

Bald Eagle (*Haliaeetus leucocephalus*)

The adult bald eagle (FNAI ranking G5, S3) – a large brown bird with a white head and tail, and yellow bill - is one of the most distinctive birds in the United States. Florida has one of the densest populations of nesting bald eagles in the southern United States – an estimated 1,500 nesting pairs. In Florida, the primary prey of bald eagles is various fish and waterfowl species. As a result, nearly all bald eagle nests in Florida are built within 1.8 miles of water. The bald eagle was delisted from the Endangered Species Act in 2007, and delisted from the Florida Fish and Wildlife Conservation Commission Imperiled Species in 2008. However, it remains protected by the Bald and Golden Eagle Protection Act as well as the Migratory Bird Act (FWC, n.d. v).

Blue Crab (*Callinectes sapidus*)

Blue crabs are highly sought-after shellfish by both commercial and recreational fishermen. They can be found on the Atlantic Coast of the U.S. and in the Gulf of Mexico. Their bodies range from blue to olive green in color. They have bright blue claws, and female claws are accented with red tips. Blue crab fisheries are highly variable from year to year. In the Gulf, blue crabs reach maturity within a year — about six months faster than crabs in Chesapeake Bay. During summer months, crabs can be found in estuaries and shallow areas. In the winter, they burrow into sediment in deeper areas (NOAA, n.d. a).

Brown Pelican (*Pelecanus occidentalis*)

The brown pelican is a large grayish-brown bird with a yellow head, white neck, and large pouched bill. This species spends most of its life on or near the ocean. In Florida, brown pelicans nest primarily in mangroves, but can inhabit beaches, sandbars, docks, islands, and sand spits. Their range extends along both east and west coasts of Florida, and they can be found in both North and South America. They are sometimes seen in inland areas of Florida during non-breeding season. Brown pelican populations experienced a major decline in the 1960s and 1970s because of DDT exposure. The population has recovered since DDT was banned. The main threats impacting this species today are habitat degradation, sea level rise, pollution, and increased coastal development (FWC, n.d. b). There is currently a lack of data on populations of this species in the NCAP (personal communication, Tyson Dallas, July 28, 2021).



Cobia (*Rachycentron canadum*)

Cobia are dark brown fish with a single dorsal fin and alternating black and white stripes along their sides. These fish can grow up to six feet long, reaching 100 pounds. They rely on coastal bays and estuaries during their spawning season. Adults are strong, aggressive predators and have been known to feed on juveniles of the same species. Cobia, both in the Atlantic and the Gulf of Mexico, migrate seasonally. In the Gulf, cobia spend the summer in the northern Gulf and the winter in South Florida (NOAA, n.d. b). The Gulf of Mexico fishery is subject to overfishing, though not currently overfished (NOAA, 2020).

Common Snook (*Centropomus undecimalis*)

Common snook are large fish that grow up to 50 pounds. They are recognizable by the black line that extends along their sides and their protruding lower jaw. They can be found inshore in coastal waters, near mangroves, seagrass beds, beaches, and manmade structures. Common snook are born males, but some individuals become females when they reach 18-22 inches long. They cannot tolerate water temperatures below 60°F and were historically limited to South Florida (FWC, n.d. n). In recent years, they have expanded north of their historical range due to rising temperatures, and there are now established populations in the NCAP region (Purtlebaugh et al. 2020). Established populations are using the first magnitude spring groups in the NCAP region as warm water refuge during the winter months, similar to the Florida manatee (Holzwart et al. 2022). No commercial harvest or sale of common snook is permitted — these fish are only allowed to be recreationally fished (FWC, n.d. n).

Eastern Oyster (*Crassostrea virginica*)

Eastern oysters are bivalve mollusks with a hinged shell that form reefs in intertidal and subtidal areas in the Atlantic and Gulf of Mexico. Oysters first mature into males and then develop into females later in life. One female can produce over 100 million eggs in a single spawning event. Oysters provide a range of ecosystem services, such as removing excess nutrients and improving water quality. They are wild harvested in some areas of the Gulf Coast, and they are farmed in tidal areas (NOAA, n.d. c).

Gag Grouper (*Mycteroperca microlepis*)

Gag grouper are a slow-growing fish that live up to 30 years. They have a long, dark brown body with darker markings along the sides. They begin their lives as females and change to males when they reach 8 years old. They can be found in the western Atlantic and Gulf of Mexico. In the Gulf, they spawn in large groups from January to mid-April. A 2016 stock assessment determined that the Gulf of Mexico stock is not overfished, though it was previously considered overfished before 2014 (NOAA, n.d. e).

Double-Crested Cormorant (*Phalacrocorax auritus*)

Double-crested cormorants are an abundant bird species in coastal areas of Florida, though less commonly seen in north Florida and the panhandle. Double-crested cormorant populations typically increase in winter months as birds migrate south to breed. Cormorants that breed in Florida tend to be smaller than those that breed in other areas. This species is also found in southwestern Alaska, southern Canada, California, southeast Texas, the Bahamas, Cuba, and across the Gulf Coast (FWC, 2003a). There is currently a lack of data on populations of this species in the NCAP (personal communication, Tyson Dallas, July 28, 2021).

Hog Snapper (*Lachnolaimus maximus*)

The hog snapper, or hogfish, is an orange-colored wrasse that is flat and oval-shaped. They are called hogfish because of their rooting behavior. These fish live in small groups with one male and several females. Females change to males after they reach a certain age and size. They are highly valued as a food fish, and fishing pressure has reduced populations in some regions. There has not yet been a formal stock assessment in the Gulf (Bester, 2021). They can be found in Atlantic and Gulf waters. In the Gulf, the fishery is open year-round, and in the Atlantic it is open from May 1 to October 31 (FWC, n.d. i).

Striped Mullet (*Mugil cephalus*)

Mullet grow up to three pounds. They are a bluish gray or green with a white belly and faint black stripes along their sides. They have a short nose and small mouth. These fish can be found in coastal waters around the state. Adults migrate offshore to spawn in large schools. When juveniles reach 1 inch in size, they move inshore and can be found far inland, up tidal creeks. They feed on algae, detritus, and small marine life. They are recognizable from their frequent leaps into the air (FWC, n.d. q).

Pinfish (*Lagodon rhomboides*)

The pinfish has a silver body with blue and yellow stripes, yellow fins, and a dark spot behind the gill cover. They can be found in coastal waters, especially near structures, and have been known to inhabit freshwater areas as well. Pinfish are commonly used as live bait by fishermen. They are infamous bait stealers; their diet relies on small fish and invertebrates (FWC, n.d. l).

Red Drum (*Sciaenops ocellatus*)

Red drum, or redfish, are a copper-bronze color that fades to white on their bellies. They typically have one or more dark spots at the base of their tails. This species feeds on fish and invertebrates and have powerful teeth used to crush shellfish. They can be found in coastal waters. In winter months, they inhabit coastal seagrass meadows, muddy and sandy areas, as well as oyster bars and spring-fed creeks. Juveniles spend their time inshore until about 4 years old and then move to nearshore areas. Spawning redfish create a drumming sound by rubbing muscles against their air bladder; spawning occurs from August through December. Red drum are one of the most popular sport fish in Florida, and they are very widespread in estuarine areas (FWC, n.d. m).

Spotted Seatrout (*Cynoscion nebulosus*)

Spotted seatrout, or speckled trout, grow up to 17 pounds and commonly reach 14 inches long. They have dark gray or green backs and a silvery white belly. Black spots dot the sides of their bodies. These fish can be found in coastal waters near sandy bottoms or seagrass beds. Their diet includes baitfish, mullet, shrimp, and crabs. They spawn closer to shore between March and November. In the winter, they move into deeper waters. Spotted seatrout are a tasty eating fish but are a fragile species; undersized fish must be returned to the water immediately to ensure survival (FWC, n.d. p).

Stone Crab (*Menippe mercenaria*)

Stone crabs are estimated to live 7-8 years for males and 8-9 years for females. Females mate immediately after they shed their exoskeletons, also called molting. Molting and mating happens from September to November. Females hold onto sperm for up to a year, fertilizing eggs during the spring and summer spawning season (FWC, n.d. r). Open harvest for stone crabs occurs in Florida between Oct 15 and May 1. Traps are used to catch stone crabs, and then both claws can be removed before crabs are returned to the water. It is illegal to harvest claws from egg-bearing crabs (FWC, n.d. s).

Tarpon (*Megalops atlanticus*)

Tarpon are very large fish that can reach up to 300 pounds and grow up to eight feet long. They are a silver fish with a darker greenish, blue color on their backs. They have very large scales and a large mouth that points upward. During the summer, tarpon can be found in the northern areas of the Gulf and Atlantic coasts. In the winter, tarpon migrate to South Florida. They typically inhabit inshore areas but travel offshore to spawn. They can tolerate a range of salinities; juvenile fish have been found in fresh water. This species is unique in that it gulps air at the water's surface. These fish are one of the most challenging nearshore sportfish in Florida. They are sought after for their fighting ability but are not valued as a food fish (FWC, n.d. t).

Willet (*Catoptrophorus semipalmatus*)

The willet is a large shorebird that winters in Florida. The eastern willet, one of two subspecies that winter in Florida, also breeds in the state. Willets live in salt marshes and beaches, hiding their nests in marsh grasses. They can be found along the entire Florida coastline and probably breed everywhere they are found (FWC, 2003a). There is currently a lack of data on populations of this species in the NCAP (personal communication, Tyson Dallas, July 28, 2021).

Wilson's plover (*Charadrius wilsonia*)

The Wilson's plover (FNAI ranking: G5, S2), also called the thick-billed plover, lives throughout coastal Florida. Its range extends north along the Atlantic coast to New Jersey and west along the Gulf Coast. It also can be found in coastal areas in central America, northern South America, and the Caribbean. This species can be found on beaches, sand flats, and spoil islands. They typically build nests in dunes or near cover such as rocks, a grass clump, or piece of driftwood. The population of Wilson's plovers in Brevard County decreased after increased developed in the 1960s, suggesting that coastal development may be a threat to this species (FWC 2003b). There is currently a lack of data on populations of this species in the NCAP (personal communication, Tyson Dallas, July 28, 2021).

Other species of note which have been documented within or very close to the NCAP include the peregrine falcon (*Falco peregrinus* [FNAI ranking: G5, S2]), osprey (*Pandion halieatus* [FNAI ranking: G5 S3S4]), yellow-crowned night-heron (*Nyctanassa violacea* [FNAI ranking G5, S3]), black-crowned night heron (*Nycticorax nycticorax* [FNAI ranking G5, S3]), Florida prairie warbler (*Setophaga discolor paludicola* [FNAI ranking: G5T3, S3]), and Gulf salt marsh mink (*Neovison vison halimnetes* [FNAI ranking: G5T2, S2]).

Listed Species

Within the NCAP area, more than 15 native species are listed as endangered, threatened, or a species of concern by state or federal designations. A wide variety of animal species and some plants are included in this list, including birds, reptiles, fish, as well as marine mammals. Many of these species exhibit unique and exceptional characteristics. The Gulf sturgeon, for example, is a prehistoric, anadromous fish that lives in the marine waters of the preserve and swims up the area's freshwater rivers to spawn. The preserve also supports the Kemp's ridley sea turtle — considered the rarest sea turtle in the world. These species are of special concern to the managers of the NCAP. NCAP management activities will work to reduce impacts to these species at every possible opportunity.

American Oystercatcher (*Haematopus palliatus*)

State-Designated Threatened (FNAI ranking: G5, S2)

The American oystercatcher inhabits beaches, sandbars, spoil islands, shell rakes, salt marsh, and oyster reefs. Oystercatchers can be found from the coasts of the northeastern U.S. down to Florida's Gulf Coast (Nol & Humphrey, 1994). Florida is home to both a resident breeding population and a large wintering population of American oystercatchers. Oystercatchers can also be found on the Caribbean coast of Central America (Nol & Humphrey, 1994). Coastal development and shoreline armoring have resulted in widespread habitat loss, leaving few suitable breeding sites. Where breeding occurs, nests are vulnerable to disturbance by beachgoers, boaters, pets, predators, and severe weather events. When breeding adults are disturbed, they will fly from their nest, leaving eggs and chicks vulnerable to the elements and waiting predators. American oystercatchers are largely dependent on marine mollusks, which are particularly sensitive to changes in water quality. Oil spills and pollutants can affect distribution and abundance of mollusks, which subsequently affects prey availability for oystercatchers. Global climate change is an impending threat to American oystercatchers as the rise of sea level may further reduce coastal habitat (FWC, 2021b).



Black Skimmer (*Rynchops niger*)

State-Designated Threatened (FNAI ranking: G5, S3)

The black skimmer inhabits coastal areas in Florida such as estuaries, beaches, and sandbars. Skimmers can be found from the coasts of the northeastern U.S., down to Mexico, and over to the Gulf Coast of Florida. Their breeding range is from Southern California down to Ecuador. Habitat loss due to coastal development is the main threat to the species. Coastal development at unprecedented levels causes increased development and traffic on the beaches, as well as increased predators; all of which are detrimental to skimmer habitat. Predators that feed on skimmer eggs and chicks include raccoons, crows, opossums, feral hogs, and coyotes. Because skimmers nest on the beach and are colonial they are extremely vulnerable to disturbance by people, pets, and predators. Other threats include recreational activity, beach driving, shoreline hardening, mechanical raking, oil spills, and increased presence of domestic animals, all of which may prevent or disrupt nesting or result in the death or abandonment of eggs and young. Global climate change is an impending threat to the black skimmer. Sea level rise may cause destruction to primary nesting areas, resulting in a decreased population size (FWC, 2021b).

Eastern Black Rail (*Laterallus jamaicensis jamaicensis*)

Federally Threatened (FNAI ranking: G3, S2)

One of four subspecies of black rail, the eastern black rail is broadly distributed, living in salt and freshwater marshes in portions of the United States, Central America, and South America. Partially migratory, the eastern subspecies winters in the southern part of its breeding range. Eastern black rail habitat can be tidally or non-tidally influenced and range in salinity from salt to brackish to fresh. Along portions of the Gulf Coast, eastern black rails can be found in higher elevation wetland zones with some shrubby vegetation. Marshes near high elevation areas, inland coastal prairies, and nearby wetlands also provide habitat for the subspecies (USFWS, 2020).

Florida Manatee (*Trichechus manatus latirostris*)

Federally Threatened (FNAI ranking: G1G3T3, S2?)

The Florida manatee is a subspecies of the West Indian manatee (*Trichechus manatus*) that lives in and is native to Florida. The Florida manatee inhabits the state's coastal waters, rivers, and springs. In the Gulf, Florida manatees can be found west through coastal Louisiana and are occasionally sighted as far west as Texas. Prior to winter's coldest months, manatees migrate back to Florida's warm water habitats, which include artesian springs and power plant discharge canals. Florida is at the northern end of the sub-tropical manatee's winter range and these warm-water habitats play an important role in their survival during the winter months. The main threats to manatees are collisions with boats and the loss of warm water habitat. Manatees feed and rest in shallow waters, which makes them vulnerable to interactions with boats. Boat-related manatee deaths are caused by cuts from propellers, impacts from the hull or lower unit of the motor, or a combination of the two. The loss of warm water refuges is seen as a serious long-term threat to the continued existence of the manatee. Due to the inability to regulate their body temperature (thermoregulate) in cold water, cold stress is a serious threat to the manatee (Irvine, 1983). Habitat loss is also an issue as coastal development and pollution can destroy seagrass beds and freshwater aquatic vegetation, which is the main food source of manatees. Other threats include diseases, natural disasters, and red tide (FWC, 2021b).

Green Sea Turtle (*Chelonia mydas*)

Federally Threatened (FNAI ranking: G3, S2S3)

Florida hosts one of the largest groupings of green turtle nests in the western Atlantic. More than 37,000 green sea turtle nests were documented in Florida in 2015 — a record number. During the day, green turtles occupy shallow flats and seagrass meadows. In the evening, they return to their sleeping quarters of rock ledges, oyster bars, and coral reefs. The main threat to green sea turtles at sea is entanglement in fishing gear such as longlines, monofilament fishing line, nets, and crab trap lines. When entangled in marine debris, the green sea turtle cannot escape and is likely to drown. On land, increased beach development is an ongoing threat for sea turtles as development can cause degradation of the habitat and limit the amount of nesting sites available. Coastal development also increases artificial lighting which can cause hatchlings to migrate towards the lights instead of the ocean. Other threats include increased predation on eggs, hits by watercraft, and habitat degradation from contaminants and pollutants (FWC, 2021b).

Gulf Sturgeon (*Acipenser oxyrinchus desotoi*)

Federally Threatened (FNAI ranking: G3T2T3, S2?)

Sturgeon are anadromous, a term used to describe fish that spend a part of their lives in saltwater, yet travel upstream in freshwater rivers to spawn. Such fish return year after year to the same stream where they were hatched. For Gulf sturgeon, which are found from Florida to Louisiana, this means a move from salt to fresh water between February and April and a move downriver between September and November. They spend the winter in the Gulf of Mexico in sandy-bottom habitats six to 100 feet deep, where their diet consists of marine worms, grass shrimp, crabs, and a variety of other bottom-dwelling organisms. They eat very little while in freshwater rivers. The main threat to Gulf sturgeon survival is the dams located on Gulf seaboard rivers, which prevent sturgeon from reaching historic spawning areas, therefore decreasing the spawning rate of the species. Habitat destruction is also a threat to the sturgeon population. Gulf sturgeon habitat has increased vulnerability because they inhabit areas that are at risk of dredging. Other threats to the sturgeon population include lethal by-catch and declining water quality (FWC, 2021b). Water quality can be affected by pollution reaching the floodplains of the river and excessive water withdrawals from the rivers. Sturgeons are slow breeders, which makes any loss of breeders or spawning habitat a serious problem for the species (Wakeford, 2001).

Hawksbill Sea Turtle (*Eretmochelys imbricata*)

Federally Endangered (FNAI ranking: G3, S1)

The hawksbill sea turtle is the rarest sea turtle that regularly occurs in Florida (Meylan & Redlow, 2006). Warm tropical seas are where people are most likely to see hawksbills. In Florida, hawksbills are found primarily on reefs in the Florida Keys and along the southeastern Atlantic coast. The main threat that the hawksbill sea turtle faces is accidental capture in shrimp and fishing nets. Development of nesting beaches is also a threat to the species, as their nests can be destroyed, and it makes available nesting sites limited. Beach armoring is a threat as the structures prevent the natural maintenance of beaches and sand dunes. Other threats include increased predation of eggs, hits by watercraft, and habitat degradation from contaminants and pollutants (FWC, 2021b).

Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)

Federally Endangered (FNAI ranking: G1, S1)

The Kemp's ridley is the rarest sea turtle in the world (FWC, 2021b). Its only major nesting beach is an area called Rancho Nuevo on Mexico's Gulf coast. Nesting females are found mainly on the beaches of Rancho Nuevo, however, they can be found on Florida and South Texas beaches. The main threat to the Kemp's ridley sea turtle is accidental capture in shrimp and fishing nets such as longlines, finfish trawls, beach seines, drift, and set gill nets (Schmid & Barichivich, 2006). Increased development will bring an increase in lighting in the area, which is detrimental to sea turtles as hatchlings will migrate towards the light instead of the ocean. The potential for eggs and hatchlings being crushed or disturbed is increased with the increase of human presence along beaches. Beach sand nourishment can bury Kemp's ridley sea turtle nests along beaches. Beach armoring is a threat as the structures prevent the natural maintenance of beaches and sand dunes. Other threats include habitat degradation from contaminants and pollutants (NMFS et al., 2011).

Least Tern (*Sternula antillarum*)

State-Designated Threatened (FNAI ranking: G4, S3)

Not only are least terns extremely susceptible to nest disturbance, but they have also lost extensive nesting habitat to beach development and increased human activity there. Least terns are colony nesters, meaning they nest in a group, which allows them to exchange information about food sources, as well as to detect and mob predators. An entire colony can be easily destroyed by predation by red foxes, raccoons, dogs, and house cats, by human trampling, or by catastrophic storms (FWC, 2021b). The main threat to the least tern population is habitat loss. Loss of habitat is often attributed to coastal development. Coastal development causes damage to least tern habitat because of the building on the coasts, human traffic on the beaches, and recreational activities. Increased numbers of predators due to the larger amounts of available food and trash for scavenging are also a threat to the least tern. Predators can cause destruction to breeding colonies while they are nesting by destroying nests and eating chicks and eggs. Global climate change is an impending threat to the least tern. Rising sea levels and more frequent strong storms may damage and destroy least tern nests, as well as habitat. Spring tides can also cause flooding of least tern nests. Other threats to the least tern include shoreline hardening, mechanical raking, oil spills, response to oil spill events, and increased presence of domestic animals (Defeo et al., 2009).

Leatherback Sea Turtle (*Dermochelys coriacea*)

Federally Endangered (FNAI ranking: G2, S2)

Leatherbacks are found in Florida's coastal waters, with a small number nesting here, mostly on the Atlantic coast. Globally, they are found throughout the Atlantic, Pacific, and Indian oceans. Travelling as far north as Alaska and Labrador, leatherbacks can regulate their body temperature to survive cold waters. The main threat to leatherbacks at sea is entanglement in fishing gear such as longlines, monofilament fishing line, nets, and crab trap lines (Stewart & Johnson, 2006). When entangled in marine debris, the leatherback cannot escape and will usually drown. Leatherbacks are also harvested illegally for their meat and eggs in some countries. On land, increased beach development is an ongoing threat for sea turtles as the development can cause degradation of the habitat and limit the amount of

nesting sites available for the leatherback. Coastal development also increases artificial lighting, which can be detrimental to hatchlings causing them to migrate towards the light instead of the ocean. Other threats include increased predation on eggs, habitat degradation by pollutants and contaminants, and hits by watercraft (FWC, 2021b).

Little Blue Heron (*Egretta caerulea*)

State-Designated Threatened (FNAI ranking: G5, S4)

Little blue herons inhabit fresh, salt, and brackish water environments in Florida including swamps, estuaries, ponds, lakes, and rivers (Rodgers et al., 1995). In the U.S., the little blue heron can be found from Missouri, east to Virginia, down to Florida, and west to Texas. In peninsular Florida they are relatively common and widespread but somewhat rare in the Panhandle (FWC 2021b). The current threats to the little blue heron are not well understood. Threats include coastal development, disturbance at foraging and breeding sites, environmental issues, degradation of feeding habitat, reduced prey availability, and predators. Other threats may include exposure to pesticides, toxins, and infection by parasites (Rodgers et al., 1995).

Loggerhead Sea Turtle (*Caretta caretta*)

Federally Threatened (FNAI ranking: G3, S3)

Florida's sandy Atlantic and Gulf of Mexico beaches host one of the largest loggerhead nesting aggregations in the world. Females return to their nesting beach every two or more years to lay four to seven nests, one about every 14 days. Each nest contains about 100-126 eggs that incubate about 60 days (FWC, 2021b). The main threat that the loggerhead faces is accidental capture in shrimp and fishing nets such as longlines, finfish trawls, beach seines, drift, and set gill nets. When captured in these nets, the loggerhead cannot escape and will eventually drown. Longlines can entangle or snag sea turtles. Development of nesting beaches is also a threat to the loggerhead, as their nests can be destroyed, and available nesting sites limited. Coastal development also increases artificial lighting which can be detrimental to hatchlings causing them to migrate towards the light instead of the ocean. Increased predation on nests from raccoons and feral hogs is also a significant threat to the loggerhead. Beach armoring is a threat as the structures prevent the natural maintenance of beaches and sand dunes. Other threats include exploitation for meat and eggs in other countries, habitat degradation from contaminants and pollutants, and boat strikes (NMFS & USFWS, 2008).

Marian's Marsh Wren (*Cistophorus palustris marianae*)

State-Designated Threatened (FNAI ranking: G5T3, S3)

Marian's marsh wren inhabits marshes dominated by black needle rush (*Juncus roemarianus*) and cordgrass (*Spartina alterniflora*) on the Florida Gulf coast (FWC, 2021b). This marsh wren species can be found from Pasco to Escambia County, Florida, and into southwest Alabama (Stevenson & Anderson, 1994; Rodgers et al., 1978). The Marian's marsh wren faces many threats, but habitat destruction and fragmentation are the main threats. The salt marshes that marsh wrens inhabit are vulnerable to a practice called dredge and fill — where salt marshes are dug out and filled with sediment to provide areas for coastal development. Dredge and fill cause the decrease of available prey for marsh wrens. Salt marshes are also threatened by dam operations, chemical and toxin pollution, invasive plants, road and bridge construction, industrial/oil spills, and shore hardening. Adjacent uplands that are developed can cause the degradation of habitat quality. Sea level rise can also cause destruction to the marsh wren's habitat (Walton, 2007). Marian's marsh wren's nests are also susceptible to increased predation from raccoons, minks, and rice rats (Rodgers et al., 1978).

Scott's Seaside Sparrow (*Ammodramus maritimus peninsulae*)

State-Designated Threatened (FNAI ranking: G4T3, S3)

Seaside sparrows primarily inhabit tidal marshes in Florida (FWC, 2021b). Scott's seaside sparrow can be found from Pasco County to Pepperfish Keys in Dixie County, Florida (FWC, 2021b). Habitat loss and

fragmentation are the main threats to this species. Salt marshes are vulnerable to dredge and fill. Dredge and fill activities cause a decrease in available prey for the seaside sparrows. Salt marshes are also threatened by dam operations, chemicals and toxins, invasive plants, road and bridge construction, industrial/oil spills, and shoreline hardening. Seaside sparrows will desert their salt marsh habitat when woody vegetation becomes too dominant. Other threats include increased predation and nesting site competition with rice rats (Post, 1981; Post et al., 1983).

Snowy Plover (*Charadrius nivosus*)

State-Designated Threatened (FNAI ranking: G3, S1)

This species occurs on Florida's narrow fringe of sandy beaches along the Gulf of Mexico coast. Within Florida, the breeding population is disjunct: one group occurs in northwest Florida from Franklin County west, and the other occurs from Pasco to Collier counties in Southwest Florida. Nesting on sandy beaches makes this species extremely vulnerable to disturbance and predation. Threats to the snowy plover include increased disturbance from humans, increased population of predators in its range, and habitat loss. Causes of habitat loss include development, shoreline hardening, invasive vegetation, beach raking/grooming, beach driving, and some beach renourishment activities. Increased populations of humans may lead to increased populations of predators and more frequent disturbance to nesting adults, which increases the detectability of nests and chicks to predators. Animals such as raccoons, opossums, rats, coyotes, crows, feral cats, and off-leash dogs pose a threat to chicks, eggs, and adult snowy plovers. Sea level rise is also an impending threat to snowy plover habitat (FWC, 2021b).

Tricolored Heron (*Egretta tricolor*)

State-Designated Threatened (FNAI ranking: G5, S4)

Tricolored herons inhabit fresh and saltwater marshes, estuaries, mangrove swamps, lagoons, and river deltas (Frederick, 1997). They can be found from Massachusetts, down through the Gulf of Mexico and Caribbean, to northern Brazil. Tricolored herons are widespread, permanent residents in Florida, although they are less common in some parts of the Panhandle (FWC, 2021b). The tricolored heron faces many threats to its population, such as the continued development of wetlands. As with other birds that inhabit estuaries, the exposure to pollutants and pesticides are a threat to the tricolored heron population (Rodgers, 1997). Other threats include alterations to the hydrology of foraging areas, reduced prey abundance, and oil spill impacts to critical breeding, foraging, and roosting sites.

Wood Stork (*Mycteria americana*)

Federally Threatened (FNAI ranking: G4, S2)

Wood storks nest in mixed hardwood swamps, sloughs, mangroves, and cypress domes/strands in Florida (FNAI, 2010). They forage in a variety of wetlands including both freshwater and estuarine marshes, although limited to depths less than 10-12 inches. The wood stork breeds in Florida, Georgia, South Carolina, and North Carolina (FWC, 2021b). The South Florida population has collapsed due to agricultural expansions and altered hydrocycles (Coulter et al., 1999). Wood storks need normal flooding to increase prey population with a natural drawdown to concentrate prey in one area (FWC, 2021b). Successful breeding also depends on normal hydrocycles. The drainage of cypress stands prevents the wood stork from nesting and promotes predation from raccoons (USFWS, 1986).

Invasive Non-native and/or Problem Species

Invasive non-native species are species that have been introduced to an area, naturalized, and are spreading on their own. Not all introduced species become invasive and the ones that do are generally opportunistic, aggressive, and early colonizing species in their native range. If left unchecked, invasive non-native plants and animals alter the character, productivity, and conservation values of the natural areas they invade (FWC, 2021a). In some cases, native wildlife and vegetation may also pose management problems or nuisances. A nuisance animal is an individual native animal whose presence or activities create special management problems (FWC, 2021a). Florida is second only to Hawaii in the

number of established invasive species (Simberloff, 1994). An invasion of a non-native species has been classified as “the second most important threat to native species, behind habitat destruction” (Ecological Society of America, 2004). Introductions of non-native marine invertebrates and seaweeds to coastal habitats in the United States have increased one hundred-fold in the last 200 years (Jacoby et al., 2003).

Asian Green Mussel (*Perna viridis*)

First discovered in Tampa Bay in 1999, green mussels have been found along the southwestern coast of Florida and along the Atlantic Coast. Several observations have been logged along the northern Gulf Coast, but it is believed that a significant population does not yet exist there. Populations have been found at major ports, suggesting that the mussels have come to Florida attached to the hulls of boats or ships. Green mussels have a range of impacts influence, fouling ships, marinas, and buoys; clogging crab trap and clam culture bags; and displacing native species like oysters. Green mussels can be harvested for human consumption in waters open to shellfish harvest by recreational fishers with a fishing license, however, little is known about how safe it is to consume them; in other areas of the world, they have been known to build up toxins and illness-causing plankton (McGuire & Stevely, 2009).

Asian Tiger Shrimp (*Penaeus monodon*)

Also known as black tiger shrimp and giant tiger prawn, the Asian tiger shrimp can be distinguished from American penaeid shrimp by their rusty brown color and white and black bands across their back and tail. This invasive species has been observed along the Atlantic and Gulf Coast of Florida; the first observation in Florida was in 1988. Their introduction along the Florida coast is believed to be the result of flooding of aquaculture facilities by storms and hurricanes. Impacts to native ecosystems is unknown but, because these shrimp feed on a variety of native invertebrates, they may present competition to other species. Tiger shrimp also carry viral diseases and could possibly transit these diseases to native crustaceans (Knott et al., 2019).

Australian Pine (*Casuarina spp.*)

Australian pine was to Florida in the 1800s due to its salt tolerant and shade providing characteristics. This pine tree is a tall, aggressive grower that served as a windbreak along coastal areas. Three species are found in Florida: *C. cunninghamiana*, *C. equisetifolia* and *C. glauca*. The State of Florida has since labeled the latter two of the three as ‘noxious weed’ species and prohibits cultivation and planting of them. All three species are Class I Prohibited Aquatic plants. This evergreen tree species is prolific and can grow in various substrates including on sandy beaches, rocky coasts, and maritime hammocks along the Florida coastline from St. Johns to Dixie County. Impacts to native communities include outcompeting native vegetation by shading out the understory with its thick layer of needles. (FDACS, n.d. a)

Blackchin Tilapia (*Sarotherodon melanotheron*)

Blackchin tilapia are small gray fish similar in appearance to a sunfish or black bass. They were first observed in Florida in 1959, likely introduced from fish farms in the Tampa area or release from aquariums. This species was released in East Florida to create a commercial fishery. Populations now exist along the Atlantic and Gulf Coasts of the state. When an abundance of these fish is present in the environment, they outcompete other native fish. They also carry fungal diseases and may spread those infections to other species (Nico & Neilson, 2021).

Brazilian Pepper (*Schinus terebinthifolia*)

Brazilian pepper can form dense infestations that shade out and disrupt native vegetation. Foliage contains allelopathic chemicals to deter other flora and fauna. This plant is tolerant to a variety of environmental conditions but grows best in moist soils. All parts of this plant can cause a rash on the skin or irritate airways of people. Introduced to Florida in the 1840s as an ornamental plant, this invasive can now be found throughout the state of Florida, especially central and southern parts of the state (FLIP, 2011). Citrus County extension agents have noticed that Brazilian pepper has become more

invasive as temperatures have warmed in the NCAP area (personal communication, BJ Jarvis & Sarah Ellis, February 23, 2021).



Lionfish (*Pterois volitans*)

Lionfish were first reported off Florida's Atlantic Coast near Dania Beach in 1985. Since the mid-2000s, lionfish reports have increased rapidly. As of 2010, they have begun to show up in areas where lionfish previously were not found such as along the northern Gulf of Mexico off Pensacola and Apalachicola. Movement of lionfish likely followed currents up the Atlantic Coast, around to the Bahamas and then into the Gulf. Lionfish are a predatory reef fish. They eat native fish, which can reduce native populations and have negative effects on the overall reef habitat and health. They can eliminate species that serve important ecological roles, such as fish that keep algae in check on the reefs. Lionfish also compete for food with native predatory fish, such as grouper and snapper (FWC, 2021a).

Pike Killifish (*Belonesox belizanus*)

This invasive fish has a dark gray tone on its dorsal body that fades long the sides, along with several rows of black spots. It has long jaws, like a pointed beak, and large teeth for its size. This species was first observed in Florida in 1957, when individual fish that were being used for medical research were released into a South Florida canal. Some fish may have also escaped a Hillsborough County fish farm in 1997. Populations can now be found in South Florida and the Gulf Coast of the state. This species eats other fish and is believed to have reduce populations of eastern mosquitofish (*Gambusia holbrooki*). It also may compete for resources with juvenile snook (Schofield et al., 2021).

Regal Demoiselle (*Neopomacentrus cyanomus*)

This small grey fish with yellow fins was first seen in the northern Gulf of Mexico in 2017 and are believed to be established along the Florida Panhandle. Individuals inhabit coral reefs and be found up to 60 feet

deep. The impacts of this species on coral reef ecosystems are unknown, though there is potential for competition with native damselfishes (Schofield & Neilson, 2021).

Wild Hog (*Sus scrofa*)

The wild hog is also called feral hog, feral swine, feral pig, wild boar, wild pig, or piney woods roter. This species is not native to Florida; however, resident populations have existed here for hundreds of years – they may have been introduced by Spanish explorer Hernando DeSoto as early as 1539. Wild hogs occur in all 67 counties of Florida. They are found in a wide variety of habitats but prefer oak-cabbage palm hammocks, freshwater marshes and sloughs, pine flatwoods, and open agricultural areas (FWC, 2021a).

Archaeological and Historical Resources

The NCAP area is considered a prehistorical hub for trade and cultural activity by indigenous people (personal communication, Jeff Moates, February 2, 2021). The region has been deemed a high-density area for cultural resources with evidence of many prehistorical people living there and a high number of archeological and historical sites (personal communication, Gary Ellis, March 26, 2021). Shell middens, ceremonial sites, human remains, and various artifacts have been documented both on islands included within the NCAP boundaries as well as inland, among areas surrounding the preserve. Archaeological sites and historical resources in the state of Florida are protected (Chapter 267, Florida Statutes) and are not to be disturbed unless prior permission is granted from the Department of State's Division of Historical Resources. However, these resources are undergoing extreme disturbances due to continuous and worsening natural conditions, some of which are surge events arising from tropical storms and hurricanes as well as rising seas related to climate change. The area has seen a loss of up to 50% of archaeological and cultural sites within coastal river and estuarine contexts (personal communication, Gary Ellis, August 16, 2021).

Within Citrus County alone, over 1300 prehistoric archaeological sites have been recorded and numerous others are likely not yet discovered. At least 180 sites within the NCAP area range from simple food-processing stations to large villages and ceremonial centers. The Crystal River area has received a great deal of attention by archaeologists. The Crystal River Site (8Ci1) includes four platform mounds, a burial mound, a series of burial earth and shellworks, and a crescent-shaped shell midden. Multiple cultural groups have been associated with the site, including members of the Orange tradition, the Woodland period, the Deptford period, early Weeden Island cultures, and the Safety Harbor culture (Norman et al., 2018b).

In eastern Citrus County, the Tatham Mound has been determined to be an indigenous burial mound that includes human remains and artifacts from indigenous communities. The mound was constructed between 1000 – 1600 A.D. Human remains were deposited there after the indigenous people were in contact with European settlers, 1500-1560 A.D. Evidence of ceremonial artifacts, such as quartz crystals and shell dippers used to serve "black drink," a beverage created from yaupon holly (*Ilex vomitoria*), were also found (Mitchem & Hutchinson, 1986). Extinct mammalian species from the Pleistocene era were found in Saber-tooth Cave in Citrus County. Numerous extinct species were discovered in a red clay deposit (Simpson, 1928).

In Hernando County, the Weeki Wachee mound is a rare example of a Native American archaeological site containing European artifacts. The site is especially unique in that it contains human skeletal remains. The mound is dated between A.D. 1525 and 1550. The artifacts there have been important in interpreting early Spanish and Native American interaction in the West Central Florida region (Hutchinson & Mitchem, 1996). A 2013 archaeological survey found that 12 historic structures and three archaeological sites in the Weeki Wachee archaeological site. The site originally included the main pool of Weeki Wachee Springs and an earthen burial mound from the early 16th century A.D. (O'Donoghue & Sassaman, 2013).

Located immediately north of the Cross Florida Barge Canal on the Gulf of Mexico, Trout Creek is a tidally influence waterway at the southern end of the Withlacoochee estuarine system that hosts 11 shell

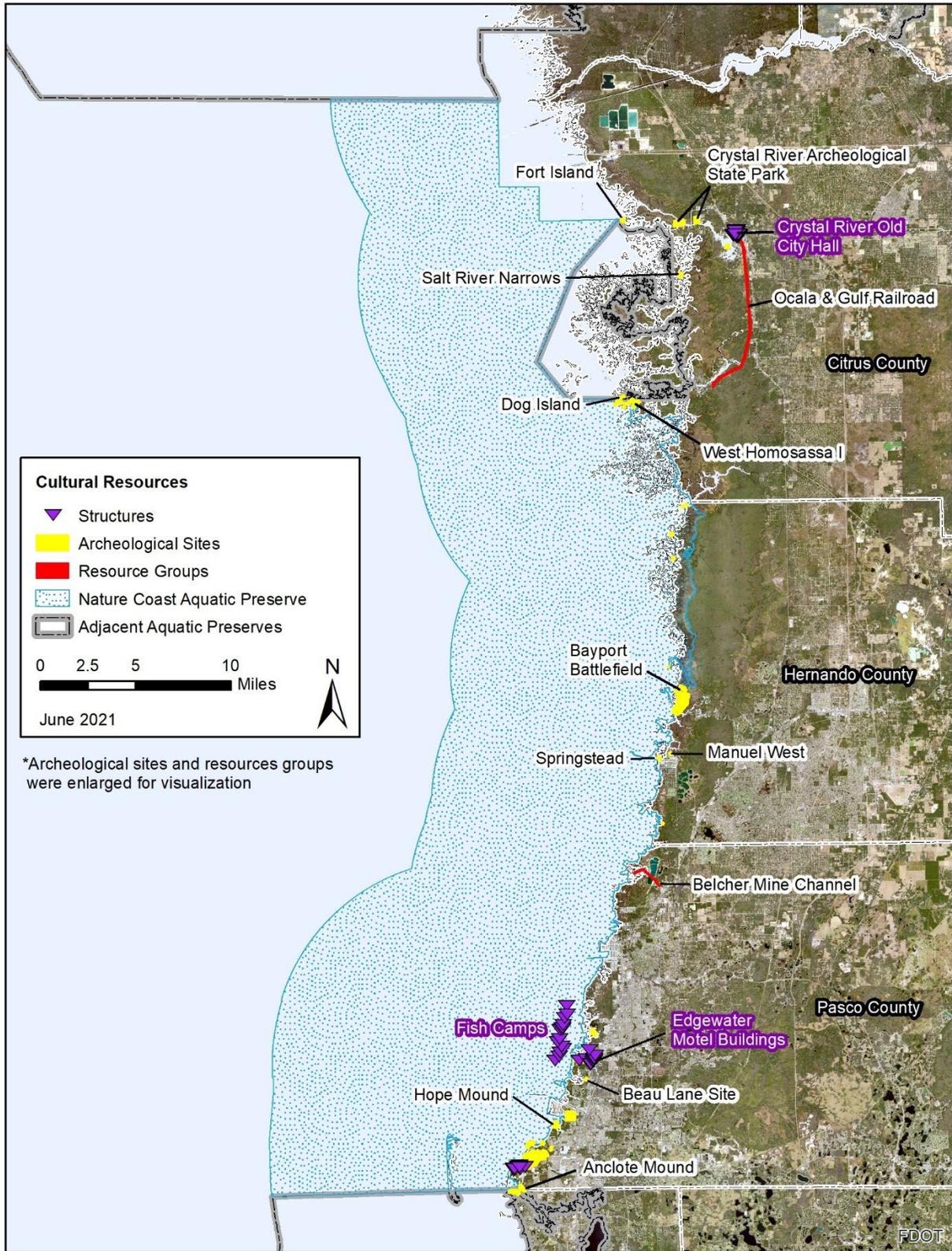
middens. Archaeological remains from the site have been associated with the Mount Taylor, Orange, Woodland, Deptford, Weedon Island, Switch Creek, and Safety Harbor traditions. The area was modified in modern history through the Cross Florida Barge Canal project, an engineering project that truncated a natural overflow delta for the Withlacoochee River (Norman et al., 2019). One consequence of the canal is that waters from the Withlacoochee River still move across a now much narrower landscape at a higher velocity. The archaeological sites within this confined area now experience degradation from the river and sea due to oscillating redeposition (personal communication, Gary Ellis, August 16, 2021). While these three sites are outside the immediate boundary of the Nature Coast Aquatic Preserve, they are highlighted to show the complexity of the cultural resources located within the area. These, among other identified sites, demonstrate the magnitude this area served as a hub for activity primarily driven by the resources the natural communities offered.

Numerous culturally significant sites within the NCAP boundary have also been identified. Bayport Battlefield in coastal Hernando County and the fish camp stilt houses in coastal Pasco County are two examples of more recent historical resources whose remnants are still visible today. Bayport Battlefield is now identified within Historic Bayport Park at the mouth of the Weeki Wachee River in Hernando County. This area was a busy port town in the 1850's that proved significant before and during the Civil War. According to the Bayport in Civil War – Historical Marker on site, the Battle of Bayport activity occurred between 1962 and 1965 during which the Union's East Gulf Coast blockading Squadron stopped eleven blockade runner attempts in the area. Even more recent historical icons are still standing in the shallow coastal waters at the Gulf of Mexico-Pithlachascotee River confluence. The many wooden fish camps structures, more commonly known as 'stilt houses,' stand as eerie relics in the Gulf. Although their exact history is not clearly documented, these structures date back as far as early 1900's. It is estimated that the first stilt house was constructed sometime between 1916 and 1918 with the purpose of sheltering fisherman while at sea and to store their catch to prolong fishing trips (History of Pasco County, 2018).

The Gulf Archaeology Research Institute has conducted widespread coastal and estuarine surveys to expand on the cultural inventory but also to prepare a baseline for determining significance and protection. One such program, the Rapid Midden Assessment, was developed to determine the condition of sites in and around Crystal River Preserve State Park as well as coastal lands managed by the Office of Greenways and Trails. The assessment analyzes over 20 variables and attributes, which help to prioritize management and mitigation of sea level rise and other environmental factors that could impact archaeological evidence. Many of the sites analyzed consist of shell middens associated with Woodland period cultures. Many have already sustained significant damage from storm surges and flooding (Norman et al., 2018b).

It is crucial to note that habitat preservation is inextricably linked to the preservation of archaeological sites. As habitats degrade from environmental or human-induced pressures, so do the cultural remains contained within those sites. Coupled management between land managers and archaeologists could help to strengthen the mitigation response to the loss of important archeological and historical sites in the NCAP (personal communication, Gary Ellis, March 26, 2021). Utilizing a natural-cultural management model is not only appropriate but essential to ensure that the protection of one resource type is not made at the expense of another (personal communication, Gary Ellis, August 16, 2021).

Recommendations to minimize impact to cultural resources include avoiding historic structures and archaeological sites and monitoring activities that may impact shoreline or underwater deposits (O'Donoghue & Sassaman, 2013). Archaeological sites can also serve as archives of changing coastal conditions, documenting shifts in invertebrate and fish populations as well as geologic sediments. Coupled research between archaeologists and natural resource managers is needed to explore ecological questions over long-term time scales at these archaeological sites (personal communication, Ken Sassaman, July 21, 2021).



Map 9. Cultural and Archaeological sites near the Nature Coast Aquatic Preserve.

3.4 / Values

Natural Values

The natural resources present within the NCAP are some of the most precious in the state. Within the preserve's boundaries are complex ecosystems that provide critical habitat for many ecologically, commercially, and recreationally important species. Key habitats include seagrass beds, salt marshes, and mangrove swamps. The area also contains spring-fed waters from nearby riverways that attract large numbers of the threatened Florida manatee during the winter months when these animals seek thermal refuge in warmer waters.

Florida's Gulf Coast is characterized by shallow waters that gently slope to deeper levels offshore. These shallow submerged lands offer prime habitat for seagrass — the area contains one of the largest contiguous seagrass beds in the U.S. (Mattson et al., 2007). Seagrasses provide many ecosystem services, including stabilizing sediments, reducing shoreline erosion, sequestering carbon, improving water clarity, and providing habitat for ecologically and economically critical species (Hemminga & Duarte, 2000). Many species rely on seagrass meadows at some point in their lifecycle. Bay scallops in Florida are dependent on seagrasses for successful recruitment (Arnold et al., 2005). Seagrass beds and salt marshes serve as nurseries for juvenile blue crabs (Gandy et al., 2011), and many other marine species. Green sea turtles, a threatened species, rely on the shallow flats of the Gulf Coast, grazing on the seagrasses there (FWC, 2021b).

Seagrass meadows are ranked the third-most valuable ecosystems globally, after estuaries and wetlands (Reynolds et al., 2018). The ecosystem services derived from seagrass meadows have been valued at nearly \$29,000 a year for each 2.5 acres (Constanza et al., 2016). One acre of seagrass can support nearly 40,000 fish and 50 million small invertebrates (Reynolds et al., 2018). Seagrasses also help to prevent erosion, reducing wave action and stabilizing sediments by 20% (Spalding et al., 2016). Additionally, they provide strategies for climate mitigation: in some cases, one acre of seagrass can sequester more than 1,200 pounds of carbon ever year (McLeod et al., 2011).

Salt marshes in NCAP serve as a transitional zone between the estuaries and the uplands, protecting uplands from saltwater intrusion, waves, and storm surges, while also protecting estuaries by trapping pollutants flowing into the waterway (Perillo et al., 2009; Doody, 2008). Plant species that inhabit salt marshes provide habitat for various bird, invertebrate, and finfish species. Many fish species use the area as nursery grounds, seeking shelter from larger predators there during high tides (DEP, 2017). Florida's salt marshes and nearby estuaries provide a nursery environment for at least 70% of the area's recreational and commercial fishery species (DEP, 2020b).

Mangrove swamps, including red and black mangrove species, are also prevalent in the NCAP (DEP, 2017). Historically, Levy and Citrus counties serve as the northern terminus of red mangrove extent along the Gulf Coast (USFWS, 2012). The fringe forest mangrove swamps of NCAP provide an important protective barrier between storm and wave energy and the immediate coastline while also improving water quality from excess nutrients and pollutants (Ewel et al., 1998). Mangrove prop roots and pneumatophores trap nutrients and sediments, in turn creating a highly productive environment. These prop roots and pneumatophores also provide protection and serve as nursery grounds for several species of juvenile fish and invertebrates (Manson et al., 2005). Mangrove swamps also serve as important rookery and feeding sites for several bird species in NCAP (USFWS, 2012).

Economic Values

The NCAP and surrounding areas are closely tied to important economic drivers in the area, including commercial and recreational fishing, recreation, and tourism. Florida's Gulf Coast has long been known for its recreational fishing. Historian Jack Davis' Pulitzer Prize-winning biography of the Gulf opens with a description of Winslow Homer tarpon fishing near Homosassa (Davis, 2017). Other notable figures also frequented the regions waters, such as professional baseball players Babe Ruth, Ted Williams, and Dazzy Vance (Homan & Reilly, 2001). Recreational fishing charters are a popular activity, offering tourists the opportunity to fish for red drum, cobia, sheepshead, spotted seatrout, grouper, snook, and mackerel,

among other species (DEP, 2017). A sought-after fishing experience in the region is called an “inshore slam” — a fishing experience where an angler catches a redfish, trout, and snook in one day (personal communication, Capt. Dan Clymer, March 9, 2021).

Commercial fisheries that depend on NCAP’s seagrass generate more than \$12 million annually (FWC, 1999-2022). Florida’s stone crab fishery is focused on the west coast of the state. The Crystal River region ranks third in terms of production in the state, contributing about 20% annually (Muller et al., 2011). A year-round blue crab fishery is also present in the region. In 2011, 6.8 million pounds of blue crabs were harvested from Florida’s Gulf Coast (Cooper et al., 2013). Other commercial fisheries include shrimp and oysters. Sponge harvesting also occurs in Pasco County, primarily from sponge harvesters traveling north from Tarpon Springs (personal communication, Keith Kolasa, February 11, 2021).

Coastal tourism and recreation in the NCAP generate more than \$250 million, supporting nearly 8,000 jobs and 500 businesses (NOAA, n.d. d). Recreational scalloping alone has contributed nearly \$2 million in both Citrus and Hernando counties each year since 2003 (Blassy, 2018). Reopening the scalloping season in Citrus County in 2002 resulted in 35 new jobs, \$636,300 in labor income, \$1,639,386 in total output, \$110,028 in indirect business taxes, and \$982,253 in value added (Stevens et al., 2004). Visitors also travel to the region to witness the threatened Florida manatee in the waters in and around the NCAP, especially in the winter months. The total economic value of the Florida manatee in Citrus County is estimated to be \$8,667,120 (Solomon et al., 2004). The area’s state parks also attract tourists and recreational users. Florida’s 175 state parks and trails attract more than 29 million visitors each year (Florida State Parks Foundation, n.d.).

Scientific Values

The seagrasses of the NCAP are important habitats that provide refuge for commercially important and endangered species. In 2016, 396,100 acres of vegetated bottom were identified within 14 miles of the shoreline in the Springs Coast area. Large tracts of unmapped areas of seagrass have also been observed further offshore, though these areas are less dense. Since 2007, seagrass cover has increased by 17,290 acres, or .5%/yr, in the area (Yarbro & Carlson, 2018). Seagrass communities are dominated by turtle grass. Other varieties of seagrass occur throughout the region but are less common, such as manatee grass (*Syringodium filiforme*), shoal grass (*Halodule wrightii*), star grass (*Halophila engelmannii*), and widgeon grass (*Ruppia maritima*) (Yarbro & Carlson, 2018). Continuous monitoring of seagrass beds inshore and offshore would add to the scientific knowledge of this important resource (personal communication, Chris Anastasiou, February 24, 2021). Ecologically important environmental gradients and the existence of a relatively intact seagrass system allow research questions to be pursued in the NCAP area that could not be asked elsewhere. Several lab groups at the University of Florida have maintained active seagrass research programs in the NCAP area over the past two decades. Research projects have focused on seagrass response to environmental variables, invertebrate communities inhabiting seagrass, seagrass susceptibility to grazing pressure, and propeller scar mapping or restoration/protection.

Project COAST is another University of Florida driven program that has collected water quality monitoring data within this region since 1997. Sampling of 50 stations in the Withlacoochee, Crystal, Homosassa, Chassahowitzka, and Weeki Wachee river systems began in 1997, with an additional 40 stations in the Hudson, Aripeka, Pithlachascotee, and Anclote River systems added in 2000. Project COAST has established a baseline dataset, which allows resource managers to effectively assess changes in nutrient concentrations and eutrophication with a focus on shifts in water quality that may negatively affect seagrass beds (Frazer et al., 2006). Recent research examining the composition of living versus dead mollusk assemblages suggests that seagrasses in the region have remained relatively stable in recent centuries (e.g., Hyman et al., 2019; Hardin et al., 2022; Grimmelbein et al., 2022). This stability is a rarity in Florida, highlighting the key importance of the NCAP as a reference ecosystem and natural laboratory that allows research pursuits that would be difficult or invalid in other systems.

Techniques for restoration for a variety of habitat types and organisms have been researched and implemented in the NCAP area. In addition, a sponge research and restoration project is currently

underway in Hernando County. The project will survey offshore sponge populations, prioritize species for restoration, test aquaculture methods and locations, and use the most successful methods to restore local sponge beds (Behringer & Patterson, 2021). Another major research focus is restoration, prevention, and environmental effects of propeller scarring in seagrass (e.g., Gruninger et al., 2019; Barry et al., 2020; 2022a; 2022b).

Florida's Gulf Coast has seen a substantial increase in sea level in the past century, resulting in a redistribution of the intertidal zones of the region (Raabe & Stumpf, 2016). For example, tree survival and species richness declined remarkably in concert with a 22-117% increase in saltwater flooding of forested islands between 1992 – 2014 (Langston et al., 2017). Alongside habitat shifts have been changes in fish assemblages both inshore and offshore (Fodrie et al., 2010). Some fish have become more abundant, while others are entirely new to the region (Fodrie et al., 2010; Purtlebaugh et al., 2020). Changes have been observed in plant assemblages (Langston et al., 2017) and freshwater ecosystems (Mulholland et al., 1997). Continued research on these shifts will be a critical element of monitoring and management activities in the NCAP area.

Social and Cultural Values

Humans have inhabited and relied on the resources found in the NCAP area for more than 12,000 years. Archaeological evidence shows that many different cultural groups passed through the region in prehistory (Norman et al., 2018a), and cultural items from the area have been discovered at archaeological sites across the country, suggesting national significance (personal communication, Jeff Moates, February 2, 2021). Shell middens, ceremonial sites, human remains, and various artifacts have been documented both on islands included within the NCAP boundaries as well as inland, among areas surrounding the preserve (Norman et al., 2018a). Within Citrus County alone, over 180 prehistoric archaeological sites have been recorded and numerous others are likely not yet discovered. Sites range from simple food-processing stations to large villages and ceremonial centers. Many of these sites are currently under threat of degrading from sea level rise, storm surges, and other environmental factors (Norman et al., 2018b).

Estuaries are highly productive coastal environments that present a range of benefits to modern communities (Anthony et al., 2009). Many individuals in the area are not only connected to the preserve through their livelihood, but they have their own personal memories of the landscape and natural systems. In some cases, families have lived in the region for generations and hold local ecological knowledge about the area that can be beneficial to management discussions (Silvano & Valbo-Jorgensen, 2008). Having access to marine and coastal resources can also contribute to a sense of well-being (Koss, 2010) and can foster sense of place (Khakzad & Griffith, 2016). Close connection to these natural systems can inspire an investment in their health as well as a desire to protect them, spawning environmental stewardship (Bennett et al., 2018).

As climate change impacts shift these coastal systems, management must consider sociological values that may be more difficult to quantify, such as sense of place and feelings of well-being. Though these tacit values may be more elusive to document, they are often the most influential factors in stakeholder involvement because they connect to the experiences and beliefs of individuals, influencing behavior (Anthony et al., 2009).

3.5 / Citizen Support Organization

In 2014, a group of Florida citizens formed a Citizen Support Organization (CSO) called the Aquatic Preserve Society, Inc. Since then, the Aquatic Preserve Society has gained 501(c)3 status, and it also has been given statutory authority to accept funds on behalf of aquatic preserves to be applied to their management needs. The CSO serves to provide funds for research, management, and outreach efforts through fundraising activities. The CSO also serves as a means to accept donations of funds or equipment from individuals, corporations, or community organizations desiring to contribute to the restoration or management of public lands and/or waters. The statewide CSO, the Aquatic Preserve Society, Inc., may provide support to NCAP.

NCAP does not currently have a “Friends Group” CSO specifically dedicated to the aquatic preserve but the NCAP Management Advisory Committee identified the formation of a CSO as an important goal.

3.6 / Adjacent Public Lands and Designated Resources

Anclote Gulf Park

This 23-acre park is positioned on the Gulf and features a fishing pier, canoe access, and a boardwalk that connects to Key Vista Park. (Pasco County, n.d. d).

Anclote Key Preserve State Park

Located three miles off the coast of Tarpon Springs, Florida are the four islands that make up Anclote Key Preserve State Park: Anclote Key, North Anclote Bar, South Anclote Bar, and Three Rooker Island. The 11,773-acre park is home to at least 43 species of birds, including the American oystercatcher, bald eagle, and piping plover. (DEP, 2018a).

Anclote River Park & Boat Ramp

A 31-acre park that features a 300-foot swimming area on the Gulf of Mexico. The park has a large boat ramp and is part of the Great Florida Birding and Wildlife Trail. It is located just north of Anclote Key Island. (Pasco County, n.d. d).

Annutteliga Hammock

The Annutteliga Hammock is a 570-acre area and important region for groundwater recharge into Florida's primary drinking water source, the Floridan aquifer system. Situated on the Brooksville Ridge, which runs from northern Citrus County down into central Pasco County, the lands are slightly higher in elevation than the adjacent coastal or central portions of the state. The area within the Brooksville Ridge typically has well-drained soils, karst limerock outcroppings and is dominated by sandhills, upland hardwood forests, and scrub communities. This property links with the Chassahowitzka Wildlife Management Area, which is a prime Florida black bear habitat area (SWFWMD, 2018a)

Bluebird Springs Park

Located one mile west of Homosassa Springs, this park offers a 300-foot grass beach. No swimming is permitted (Citrus County, n.d.).

Chassahowitzka National Wildlife Refuge

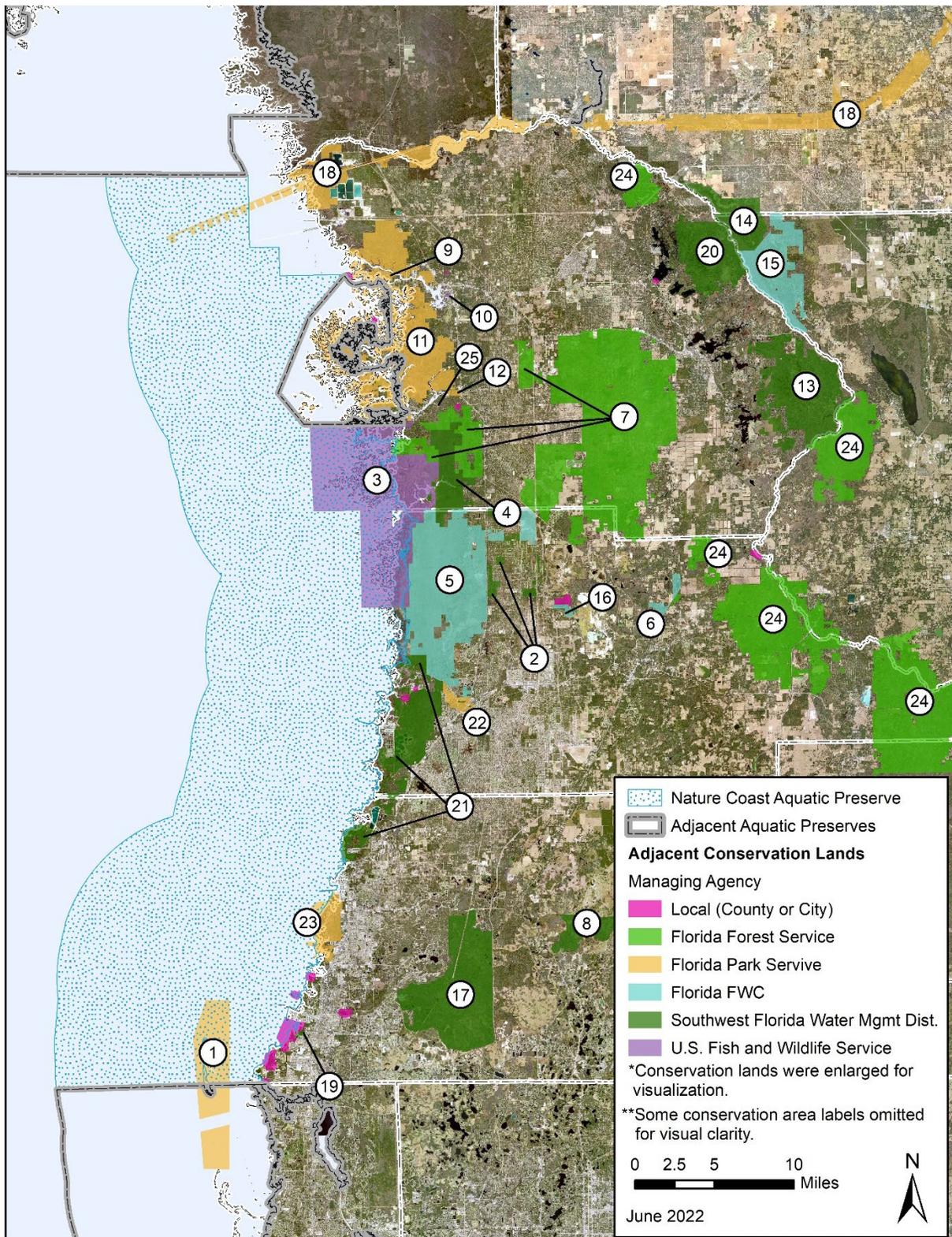
Chassahowitzka National Wildlife Refuge was established in 1943 for waterfowl conservation. This 31,000-acre refuge protects saltwater bays, estuaries, brackish marshes, and hardwood swamps in Homosassa. This refuge provides habitat for one federally threatened species, the Florida manatee (USFWS, n.d. a.).

Chassahowitzka River and Coastal Swamps

This conservation tract is made up of the Chassahowitzka River headwaters, many tributaries and springs managed by the Southwest Florida Water Management District. Located in Hernando County, Florida, this parcel provides access to the gulf traversing a close to pristine landscape of this Outstanding Florida Waterway. (SWFWMD, n.d. a)

Chassahowitzka Wildlife Management Area

The Chassahowitzka Wildlife Management Area (CWMA) includes 27,836 acres in Hernando County that is managed for the conservation of natural communities and wildlife species. The area contains extensive hardwood swamps and uplands, allowing for seasonal movement of wildlife as water levels fluctuate. Wildlife inhabiting the area include the Florida black bear, gopher tortoise, Florida mouse, eastern indigo snake, and southern fox squirrel. FWC manages the CWMA, considering wildlife as well as natural, cultural, and water resources in the area (CWMA, 2021). The CWMA uses a combination of prescribed fire, timber management, and mechanical and chemical treatments to manage the area for wildlife.



Map 10. Adjacent conservation lands.

See Table 2 for a key to the number labels depicted on the map.

Table 2. Adjacent conservation land identifiers found in Map 10.

Map Number	Conservation Area	Managing Agency
1	Anclote Key Preserve State Park	Florida Park Service
2	Annutteliga Hammock	Southwest Florida Water Management District
3	Chassahowitzka National Wildlife Refuge	U.S Fish and Wildlife Service
4	Chassahowitzka River and Coastal Swamps	Southwest Florida Water Management District
5	Chassahowitzka Wildlife Management Area	Florida Fish and Wildlife Conservation Commission
6	Chinsegut Wildlife and Environmental Area	Florida Fish and Wildlife Conservation Commission
7	Citrus and Homosassa Wildlife Management Areas	Florida Fish and Wildlife Conservation Commission
8	Conner Preserve	Southwest Florida Water Management District
9	Crystal River Archaeological State Park	Florida Park Service
10	Crystal River National Wildlife Refuge	U.S Fish and Wildlife Service
11	Crystal River Preserve State Park	Florida Park Service
12	Ellie Schiller Homosassa Springs Wildlife State Park	Florida Park Service
13	Flying Eagle Preserve	Southwest Florida Water Management District
14	Gum Slough Conservation Easement	Southwest Florida Water Management District
15	Half Moon Wildlife Management Area	Florida Fish and Wildlife Conservation Commission
16	Janet Butterfield Brooks Wildlife and Environmental Area	Florida Fish and Wildlife Conservation Commission
17	Jay B. Starkey Wilderness Preserve	Southwest Florida Water Management District
18	Marjorie Harris Carr Cross Florida Greenway State Recreation and Conservation Land	Florida Park Service
19	Pasco Palms Preserve	Southwest Florida Water Management District
20	Potts Preserve	Southwest Florida Water Management District
21	Weeki Wachee Preserve	Southwest Florida Water Management District
22	Weeki Wachee Spring State Park	Florida Park Service
23	Werner-Boyce Salt Spring State Park	Florida Park Service

Map Number	Conservation Area	Managing Agency
24	Withlacoochee State Forest	Florida Forest Service
25	Yulee Sugar Mill Ruins Historic State Park	Florida Park Service
Pink (no number)	Locally managed parks and conservation areas	Citrus County, City of Crystal River, Hernando County, and Pasco County

Monitoring of native birds, gopher tortoises, gopher frogs, Florida scrub-jays, and other species are regularly undertaken within CWMA as well (CWMA, 2019). Land management in CWMA is currently focused on improving the hydrology of hardwood swamps, increasing water flow to coastal areas. Old culverts that have failed will be replaced in the first phase of this project (Steven Brinkley, personal communication, July 22, 2021).

Chinsegut Wildlife & Environmental Area

This area is located in Hernando County, about 50 miles north of Tampa. The Chinsegut Wildlife & Environmental Area includes Chinesgut Hill is considered the one of the highest points in Florida, with an elevation reaching 274 feet. Elevations across McCarty Woods range from 144 to 160 feet (Beckwith, 1967). This area includes a 400-acre tract of virgin longleaf pine forest (*Pinus palustris*) (Feldman, 1987), which is considered the only remaining tract of old-growth longleaf pines in Florida (Beckwith, 1967).

Citrus Wildlife Management Area

Citrus Wildlife Management Area includes nearly 50,000 acres in Citrus and Hernando counties, just west of Inverness. High-quality sandhills support approximately 60 active colonies of red-cockaded woodpeckers, as well as indigo snakes, fox squirrels, gopher tortoise, and white-tailed deer. This wildlife management area is one of seven large tracts that make up the Withlacoochee State Forest (FWC, n.d. d). This parcel is managed through a partnership between the Florida Forest Service and FWC.

Conner Preserve

The Conner Preserve is composed of 2,980 acres in the eastern central portion of Pasco County. It is managed by the Southwest Florida Water Management District (SWFWMD) since 2003 for preservation of natural systems, groundwater recharge, water quality, and flood water attenuation. Conner Preserve is considered a key link in a proposed wildlife habitat corridor connecting the 18,240-acre Starkey Wilderness Preserve to the west and the 7,460-acre Cypress Creek well field to the east. Historically, the preserve was used for agricultural and silvicultural purposes. These past uses resulted in about 43% of the area's natural uplands being converted to pasture and pine plantation. Many of the remaining upland communities are intact (SWFWMD, 2008).

Crystal River Archaeological State Park

As a National Historic Landmark, this 61-acre complex contains 6 pre-Columbian mounds located on the bank of the Crystal River, Florida. Burial mounds, ceremonial mounds and an impressive midden now used as an observation platform are accompanied by a museum full of artifact relevant to the period of this facilities use. As one of the longest continuously occupied complexes in Florida, this area played a significant role in Native American culture. Florida Park Service took over this property in 1962 (DEP, 2008).

Crystal River National Wildlife Refuge

As the only National Wildlife Refuge (NWR) created to protect the Florida manatee, the Crystal River NWR, and specifically Kings Bay, is home to nearly 600 manatees in the winter months. The refuge protects key areas of Kings Bay and Three Sisters Springs (USFWS, n.d. b).

Crystal River Preserve State Park

The 27,500 acres of Crystal River Preserve State Park contain a variety of habitats, including scrub, pinewoods, hardwood forests, salt marshes, and mangrove islands. The park's wetlands play a key role in replenishing the Floridan aquifer. The property has been managed by the Florida Park Service since 2004, and the state since 1974. One section of the park holds historical significance with remnants of the turpentine industry from the early 1900s (Florida State Parks, n.d. a).

Cypress Creek Preserve

Purchased to provide flood protection and serve as a public water supply, Cypress Creek's floodplain helps filter nutrients in runoff waters. Cypress Creek Well Field serves as an important source of water for the surrounding region and is managed by Tampa Bay Water. Cypress Creek is a tributary of the Hillsborough River. Within the property, the creek threads its way through an expanse of cypress and hardwood forests. Slash pine, longleaf pine, and palmetto grow on the higher ridges, which are collectively known as Florida flatwoods (SWFWMD, n.d. b).

Eagle Point Park

Situated on 661 acres of conservation lands, Eagle Point Park offers 17 acres of developed land for recreation. The park includes canoe/kayak access to the Gulf of Mexico, three docks, and walking trails (Pasco County, n.d. d).

Ellie Schiller Homosassa Springs Wildlife State Park

Homosassa Springs, a first-magnitude freshwater spring, lies at the center of this state park, which also functions as a rehabilitation center for injured and orphaned manatees, birds, and other native wildlife. Manatees are rehabilitated in the freshwater spring before being released back into the wild. Visitors can view manatees and other native species in the semi-natural landscape (Florida State Parks, n.d. b).

Fickett Hammock Preserve

This 149-acre preserve is in the northwestern section of Hernando County. The area, which is designated environmentally sensitive land, features walking trails and bird watching for visitors (Hernando County, n.d. a).

Flying Eagle Preserve

The Flying Eagle Preserve is surrounded by the Tsala Apopka Chain of Lakes and is connected to the Floridan aquifer's hydrologic system. The Withlacoochee River forms a portion of the eastern property boundary and is a vital component of regional drainage and flood conveyance. This property is a mosaic of small lakes, marshes and swamps, with numerous scattered islands of forested uplands. A broad mixture of hardwood and cypress swamps covers the floodplain of the Withlacoochee River (Flying Eagle Preserve, n.d.). The Flying Eagle Wildlife Management Area contains more than 10,000 acres. These lands provide recreation and are managed for aquifer recharge and protection of wildlife, including gopher tortoise, American alligator, swallow-tailed kites, and wild turkey (SWFWMD, 2018c; FWC, n.d. f.).

Fort Island Gulf Beach

This park features a boat ramp and a white-sand beach situated on the Gulf of Mexico. It also includes a wildlife trail and a fishing pier. Fort Island Gulf Beach is listed as one of the Environmental Health Department's Healthy Beaches (Citrus County, n.d.).

Gum Slough SWFWMD Conservation Easement

Gum slough is a conservation easement open to public recreation. This property is over 9,500 acres located in Lake Panasoffkee, Florida. It is bordered to the east by FWC's Half Moon Wildlife Management Area. The acquisition of this property was intended to protect and preserve natural water sources for the Withlacoochee River, Gum Slough and their tributaries. This area is predominantly undeveloped and the

uplands are composed of natural pine flatwoods and oak hammocks. Recreational activities for the public include hiking, biking, equestrian trail riding and fishing. This property is managed as a partnership between Southwest Florida Water Management District, the parcel owners and the Florida Fish and Wildlife Conservation Commission, the primary land managers. (SWFWMD, n.d. c)

Half Moon Wildlife Management Area

Half Moon is composed of 9,554 acres in Sumter and Marion counties. Florida purchased the Carlton Half Moon Ranch in 1989 to help preserve the water quality of the Withlacoochee River and its tributaries. In 1992, the then-Florida Game and Fresh Water Fish Commission entered a lease agreement with the SWFWMD, and an additional 4,021 acres were added to the management area. Half Moon Wildlife Management Area features pine flatwoods with marshes and oak hammocks. The Withlacoochee River and its hardwood swamp comprise the southern and western borders of the management area. The Gum Slough spring run and its floodplain forest are situated on the northern edge of the property. Scrubby flatwoods and the Mill Creek swamp comprise much of the eastern side. Half Moon also has pockets of baygall, sandhill, and wet flatwoods. Numerous rare plants occur here, including the giant airplant, plume polypody, yellow butterwort, blue butterwort, angle pod, and cardinal flower (FWC, n.d. g).

Hernando Park and Beach

This three-acre park offers opportunities for swimming, water skiing, fishing, and recreation. It features a beach and fishing pier (Hernando County, n.d. b).

Homosassa Wildlife Management Area

Homosassa Wildlife Management Area is approximately 5,000 acres located in southwest Citrus County. Predominately forested wetlands planted pines and improved pastures, this public area has designated hiking and biking trails. Hunting is also permitted during designated season with appropriate permits. This WMA is one of seven large tracts that make up the Withlacoochee State Forest. This parcel is managed through a partnership between the Florida Forest Service and FWC (FWC, n.d. j).

Hunter Springs Park

This park features a spring, about 100 feet offshore, that feeds Crystal River and Kings Bay. There is a small beach at the park and a roped-off swimming area. The park also features a canoe/kayak launch area and a living shoreline. Manatees are frequent visitors to the park in winter months (City of Crystal River, n.d. b).

Janet Butterfield Brooks Wildlife and Environmental Area

This 319 acre parcel in Hernando County was donated to the state to ensure the preservation of natural and cultural resources for future generations. It is one of the last known tracts of old growth longleaf sandhill forest in the region. At this time, the property is not open to the public and FWC is drafting a 10 year management plan for the resources (FWC, 2021c).

Jay B. Starkey Wilderness Park

The Jay B. Starkey Wilderness Park is a natural area in southwestern Pasco County made up of nearly 19,000 acres composed of 18 natural community types. The Anclote River, a slow-moving black water stream characterized by turbid acidic water, makes up the southern border of the area. Two historical turpentine camps are located there (Ferguson, 2004). This park consists of three tracts that are managed in partnership by Pasco County and the Southwest Florida Water Management District.

Jenkins Creek Park & Boat Ramp

This 15-acre park includes freshwater springs, man-made canals, coastal marshes, and access to the Gulf of Mexico. It has a boat ramp for small boats and a fishing pier (Hernando County, n.d. b).

Key Vista Park Nature Park

This park features 101 acres of lands near Rocky Creek, which flows into the Gulf of Mexico. The park features fishing access, nature trails, and a boardwalk that connects to Anclote Gulf Park (Pasco County, n.d. d).

Kings Bay Park & Boat Ramp

Located north of the Hunter Spring Run in Kings Bay, this park includes a fishing dock and a kayak/canoe launch (Citrus County, n.d.).

Marjorie Harris Carr Cross Florida Greenway State Recreation and Conservation Land

Spanning from the Gulf of Mexico on the west coast to the St. Johns River on the east coast, this 110 mile linear trail was created from land associated with the Cross Florida Barge Canal project. The roughly 70,000 acres of conservation land is divided into 17 trail sections and also serves as a significant wildlife corridor. (Florida Historical Society, 2015).

Nobleton Wayside Park & Boat Ramp

This 30-acre park includes water access to the Withlacoochee River, which flows through 13 miles of the Withlacoochee State Forest (Hernando County, n.d. d).

Ozello Community Park & Boat Ramp

Positioned just north of the SMMAP, this park offers a boat ramp for easy access to the Gulf of Mexico (Citrus County, n.d.).

Ozello Park Fishing Pier

The Ozello Pier is a 30-foot wooden fishing pier near the Salt River (Citrus County, n.d.).

Pasco County Palms Preserve

Pasco Palms is composed of native forested wetlands, salt marshes, mixed hardwood pine forests, mangrove swamps, and tidal flats. This coastal property serves as a nesting habitat for migratory birds and listed species including the white ibis and snowy egret. A short nature trail winds through the preserve to an observation deck constructed within a mangrove forest (Pasco County, n.d. e).

Potts Preserve

The wetlands of Potts Preserve play a role in both the Tsala Apopka Chain of Lakes and the Withlacoochee River systems, part of the Floridan aquifer's recharge/discharge system. The site provides habitat to wildlife, including a small population of threatened Florida scrub-jays (SWFWMD, n.d. e).

Rogers Park & Boat Ramp

This three-acre park is on the Weeki Wachee River. It includes a beach, a boat ramp, a canoe/kayak launch, a swimming area, and an observation deck (Hernando County, n.d. b).

Two Mile Prairie State Forest

This property lies along the southern bank of the Withlacoochee River at the northern end of the Tsala Apopka Lake system. The Withlacoochee River is designated as an Outstanding Florida Water, which makes the river highly suitable for recreation, fishing, and wildlife. This location on the river is very attractive to recreational users seeking a canoe paddle or hike along the riverbank. Purchased jointly by the state of Florida and SWFWMD, one of the primary purposes for acquisition of the property is its ability to provide significant water recharge and natural flood control. SWFWMD completed a hydrologic restoration project that allows excess waters from the Hernando Pool to be moved to storage and recharge areas in the Two Mile Prairie marsh system. Ecosystem benefits include wetland restoration, flood protection, and increased groundwater recharge. The Florida Forest Service manages the property as a part of the Withlacoochee State Forest (FDACS, n.d. b; SWFWMD, n.d. f).

Weeki Wachee Preserve

The Weeki Wachee Preserve is an area of protected land owned by SWFWMD that includes over 11,200 acres in Hernando County. It provides a wide array of wildlife habitats, including several miles along the Weeki Wachee River, portions of the Mud River, dense hardwood swamps, freshwater and saltwater marshes, and pine-covered sandhills. The preserve is best known for its Florida black bear population, as well as a popular birding destination. These wetlands transport spring water to the Gulf of Mexico and filter out pollution from runoff before it reaches surrounding water bodies. The preserve also protects native Florida ecosystems that provide water storage during hurricanes to minimize flood risks and buffer nearby residential communities from tropical storm events (SWFWMD, n.d. g).

Weeki Wachee Spring State Park

Weeki Wachee Springs are showcased in this state park and former roadside attraction that features mermaid shows who perform for audiences in an underwater theatre. The park also features a swimming area and boat rides down the Weeki Wachee River. The attraction was first created in 1946. It was purchased in 1959 by the American Broadcasting Company, which hosted underwater shows such as “Alice in Wonderland” and “Peter Pan” in the underwater theatre. In 2007, cave divers discovered an extensive underwater cave system, solidifying Weeki Wachee Spring as the deepest known freshwater cave system in the U.S. (Florida State Parks, n.d. d).

Werner-Boyce Salt Springs State Park

A 351-foot-deep spring is featured in the state park, which runs along the coastline of Pasco County. Wildlife found in the park include gray fox, gopher tortoises, dolphin, bald eagles, roseate spoonbills, and black rail (Florida State Parks, n.d. c).

Withlacoochee River Park

With 406 acres of conservation lands, the Withlacoochee River Park offers opportunities to view wildlife such as bald eagles, Florida panthers, and river otters. The park includes nature trails, a fishing pier, canoe/kayak access, and an observation tower (Pasco County, n.d. d).

Withlacoochee State Forest

Located north of Brooksville, Withlacoochee State Forest is the third largest state forest in Florida. Several waterways flow through the forest, including the Withlacoochee River, Little Withlacoochee River, and Jumper Creek. The forest is managed for timber, wildlife, ecological restoration, and outdoor recreation. Tree species found there include slash pine, longleaf pine, pond cypress, southern magnolia, gum, and hickory. Wildlife found in the area include wild turkey, fox squirrel, and gopher tortoise (FDACS, n.d. b).

Yeoman Nature Park

Located near Crystal River Preserve State Park, Yeoman Park is a nature preserve that includes walking trails and a fishing dock overlooking a creek (Citrus County, n.d.).

Yulee Sugar Mill Ruins Historic State Park

Formerly a sugar plantation owned by David Levy Yulee, this state park spans over 5,100 acres and features historical remains of the plantation, including a steam-driven sugar mill. At one time the plantation was run by more than 1,000 enslaved people. Sugarcane was processed into syrup, molasses, and, eventually, rum. The park is located three miles west of Homosassa Springs (Florida State Parks, n.d. e).

3.7 / Surrounding Land Use

Urbanization

Citrus, Hernando, and Pasco counties are characterized by a combination of both natural areas and urban development that support recreational, tourism, and other industries. All three counties are growing in terms of development and population. Each county has addressed management of issues that could impact the NCAP area through their comprehensive plans and development codes. A selection of the most relevant codes, requirements, and plans to balance development with the conservation of natural areas are listed below.

Citrus County

The Land Development Code for Citrus County includes provisions for landscaping, buffering, tree preservation, and stormwater management. Buffer areas are required between agricultural, residential, commercial, and industrial zoning, but not when agricultural areas abut other agricultural areas or when residential areas abut other residential areas. The county's codes note that Florida Friendly Landscaping should be used in these buffer areas whenever possible. Codes for stormwater management call for management to maintain or enhance, groundwater, surface water, and surrounding water bodies (Citrus County, 2016).

Hernando County

The Hernando County 2040 Comprehensive Plan includes a Coastal Management Element, which addresses coastal resource preservation, coastal zone development, and protection of marine resources. The plan states that county seeks to preserve the functional integrity of Hernando County's coastal ecosystems by managing growth, development, and natural resources. Protections of habitation within the county's Coastal Zone (all areas west of U.S. Highway 19) include wetland protection, prohibiting major water withdrawals from springs and rivers for consumptive use, identifying and protecting important coastal vegetation and wildlife, prohibiting mining and excavation that significantly alters the natural landscape, remediating pollution, and eliminating septic tanks. Additional protections are listed specifically for the Weeki Wachee springs and riverine system. The county also has a Strategic Marine Area Plan that aims to maintain, restore, or create stabilized shorelines, nearshore oyster reefs, and artificial reefs with the purpose of supporting both economic and ecological services (Barshel et al., 2018).

Pasco County

The Pasco County 2025 Comprehensive Plan includes a section summarizing management of coastal issues. The plan acknowledges that increased development and public use of coastal areas can lead to degradation of natural resources. The plan states that in order to protect coastal resources and public access of coastline within the county, land development will be allowed based on the necessity of the development to water-dependent uses. The plan mentions a Seagrass Protection Zone ordinance, which includes the specific seagrass protection zones that prohibit boating and are marked by signs indicating the protected areas. An educational program for boaters is also included in the ordinance. Mandatory setbacks of development are required near the Anclote, Hillsborough, Pithlachascotee, and Withlacoochee rivers. Setbacks are also required near Outstanding Florida Water, Classified Shellfish Harvesting Areas, natural wetlands, and wetland mitigation areas. Fifty-foot setbacks are required for rivers, Outstanding Florida Waters, shellfish areas, and wetlands. A 25-foot buffer zone is required around wetlands. Other protections within the Pasco County plan for coastal areas include stormwater management, coordination of dredge and fill operations with other state regulatory agencies, limits on artificial waterways, and limits on the construction of wastewater treatment facilities (Pasco County, 2013).

Landscaping

Traditional landscaping practices can degrade the nutrient quality of soils over time because organic matter, such as grass clippings and leaves, are removed from landscaped areas instead of being left to

decompose. Furthermore, when developed areas are initially constructed, topsoil is scraped from construction sites and saved for later use. As buildings go up, vehicle traffic compacts graded soils, and then lawns are installed around newly developed homes. This process significantly alters soil characteristics, resulting in compacted soil that is limited in the amount of water that it can absorb, leading to increased runoff (Bean et al., 2020). It can take several decades for organic matter to naturally build up again (Cogger, 2005). Soil compaction can also make it difficult for roots to break through densely packed soils. Plants that are unable to reach deeper soils with their roots can become stressed by an inadequate amount of nutrient retention, leading to increased applications of fertilizer and pesticides because stressed plants are most susceptible to pests and diseases. The combination of frequent runoff with increased fertilizer and pesticides can lead to excess nutrients flowing into nearby watersheds. The presence of excess nutrients can lead to algal and aquatic plant growth in surface waters, streams, springs, rivers, and estuaries. Groundwater can also be affected over time (Bean et al., 2020).

Urban soils that have degraded through traditional construction and landscaping activities can be supplemented with organic soil amendments, like compost, to rebuild nutrient content. Adding compost before landscape installation can lead to improved soil quality, increased soil organic matter, increased infiltration, a reduced need for irrigation, and decreased runoff (Bean et al., 2020). A study was conducted in the On Top of the World Communities within nearby Marion County to evaluate the water conservation potential of amended landscapes. Twenty-four lots were included over a two-year period. Lots were either tilled, tilled with compost, or left compacted before irrigation and landscaping was installed. Homeowners were not informed of their lot treatment but were asked to reduce their irrigation run times by 25%. The study found that homeowners with lots amended with compost reduced their irrigation run times by 55% and maintained higher water content than other lots. The addition of compost did not affect the total phosphorous and nitrogen concentrations in leachate (Bean & Radovanovic, 2021). A detailed guide for incorporating soil amendments into urban soils is available through DEP (Bean et al., 2020).

Reclaimed Water

Reclaimed water is wastewater that has been treated after use in residential, commercial, and industrial facilities. Wastewater treatment facilities disinfect the water and remove nutrients and pathogens. Treated water is not considered safe for human consumption in Florida, but it can be used for non-potable uses, such as landscape irrigation, agricultural irrigation, flushing toilets, groundwater recharge, wetlands restoration, and industrial processes (Toor & Lusk, 2020). More than 75% of Florida's reclaimed water is used for agricultural and public land irrigation. Reclaimed water can be higher in salts, nutrients, and synthetic chemicals from pharmaceuticals and household products (known as emerging contaminants) than drinking water. All of these constituents can result in ecological impacts when pumped into agricultural and public lands. Nutrients from reclaimed water can flow into water bodies and feed surface water pollution. Emerging contaminants, though typically present in very small concentrations, can result in impacts on humans and wildlife. Additional research is needed to understand the effects of using reclaimed water more thoroughly for various activities in natural areas (Toor & Lusk, 2020).

Septic Systems

According to the Florida Department of Environmental Protection, approximately one third of Florida's population utilizes onsite septic systems to treat their wastewater needs. This equates to an estimated 2.6 million operational systems in the state. (DEP, 2021). Wastewater from septic systems can carry pathogens, nutrients like nitrogen and phosphorus, and trace organic chemicals that can impact both human health and ecosystem function (Lusk et al., 2017), making it crucial to ensure proper treatment of wastewater (Lusk et al., 2020). Permitting and inspection of septic systems are handled by the Environmental Health Section of the Florida Department of Health (DOH) in each county (DEP, 2021). The DOH hosts a tool called the Florida Water Management Inventory, which maps the known and likely locations of septic tanks throughout the state. A quick survey of the three counties that make up the

preserve show a large portion of areas near the coast that are either known or likely locations of septic tanks. Citrus County includes 44,392 parcels (58.6%) with likely or known septic, and Hernando County includes 46,090 parcels (55.6%) with known or likely septic. Compared to the other two counties, Pasco County has a greater amount of land that is serviced by known sewers — 79,248 parcels (37.7%) have likely or known septic tanks (DOH, 2021).

In Yankeetown, a municipality located in Levy County just north of the Withlacoochee River, an ordinance was passed in 2015 to adapt land use, septic management, and other public facilities to account for climate-related environmental changes in the area. The ordinance mandates that all new septic systems or septic replacements in environmentally sensitive residential areas must use performance-based septic systems that provide secondary treatment that equals 10 milligrams per liter maximum nitrogen. All other new and replacement septic systems in other land use districts are required to meet minimum state standards designated for Outstanding Florida Waters (Town of Yankeetown, 2015).

Industry

Major industries in the NCAP area that could impact natural resources include energy plants, mining, and livestock. A description of some of the most influential operations are listed below.

Agriculture

The Florida Department of Agriculture and Consumer Services (FDACS) estimates statewide agricultural water demand and land use estimates. In 2018, 1.9 million acres of agricultural lands and nearly 400,000 acres of irrigated crop lands were identified in the SWFWMD. Statewide, irrigated crop land is expected to increase by 18,000 acres (1%) by 2045. In the SWFWMD, irrigated lands are expected to decrease by 6,578 acres (2%) by 2045. Of the three counties included in the NCAP, Hernando County is expected to acquire additional irrigated lands by 2045, while Citrus and Pasco Counties will either stay the same or decrease their irrigated acreage. FDACS also estimates water usage for livestock and aquaculture. For 2018, 10.2 million gallons/day (mgd) of water was used by SWFWMD for livestock and 6.3 mgd for aquaculture (FDACS, 2020).

Anclote Power Plant

From 2012 to 2013, Progress Energy Florida, a subsidiary of Duke Energy, converted its power plant in Pasco County to a 100% natural gas facility. The facility previously used both oil and natural gas. The company stated that the conversion is intended to eliminate the emissions of most metals and sulfur dioxide from the plant's steam units (Associated Press, 2012). According to 2015 data from USGS, over 1,775 mgd of saltwater was used to cool power generation facilities in Pasco County that year (Marella & Dixon, 2018). The highest median temperatures in the 10 Anclote Anchorage stations measured by Project COAST were observed at stations near the Anclote Power Plant, influenced by the discharge of cooling water from the plant (Tampa Bay Water, 2003). Thermal effects from the discharge were measured by the Florida Power Corporation between May 1990 and January 1991. The monitoring program found that heat content increased by an average of 2.6% in the warmest summer period and up to 25% in the winter months, producing "extremely variable thermal regimes" in the region (Mote Marine Laboratory, 1991).

Cemex and the Camp Castle Mine

Located in Brooksville, the Camp Castle hard rock mine was created in 1925 by the Camp Concrete Rock Company. The company allowed the Florida Power Corporation to build a dam at the mouth of the Withlacoochee River on the condition that the power would be brought to the mine in Brooksville. The 3,400-acre Lake Rousseau was created by the construction of the Inglis Dam in 1909. The mine began closing in 1938, and a new location called the Cemex complex, situated northwest of Brooksville, began operating. The Cemex complex produces hard rock, cement, clay, lime, electricity, and a variety of concrete products (Camp Castle, 2015).

Crystal River Power Plant

Duke Energy agreed to begin decontaminating and dismantling the Crystal River Nuclear Plant in October 2020 (Duke Energy, 2020). Two retired coal plants are also part of the energy complex. Two active coal plants and two natural gas units are currently operating. The complex sits on a 5,000-acre parcel in Citrus County and includes seven units, four of which are still operating. The facility previously withdrew water from the Gulf as part of the cooling process, but this is no longer a part of the operation's practices — 2011 was the last year water was drawn from the Gulf (personal communication, Enrique Latimer, April 5, 2021). The plants now use closed-cycle cooling, a system where water is alternated between cooling and heating without air contact. However, some power plants in the area continue to use saltwater in their operations. According to USGS data from 2015, 1262 mgd of saltwater was used to cool power generation facilities in Citrus County that year (Marella & Dixon, 2018).

Holcim Mining Operations and Cattle

Holcim owns a tract of land north of the Citrus County line that holds mining operations and cattle ranchlands. Duke Energy is building a solar power plant on Holcim land, near US-19 (personal communication, Enrique Latimer, April 5, 2021).

Roadways and Canals

The Veterans Expressway/Suncoast Parkway is a major roadway in the NCAP area, connecting the Tampa International Airport to the Lecanto area. Canals in the area include the Masaryktown Canal and the remnants of the Cross Florida Barge Canal, which has been made into a public greenway.

Cross Florida Barge Canal

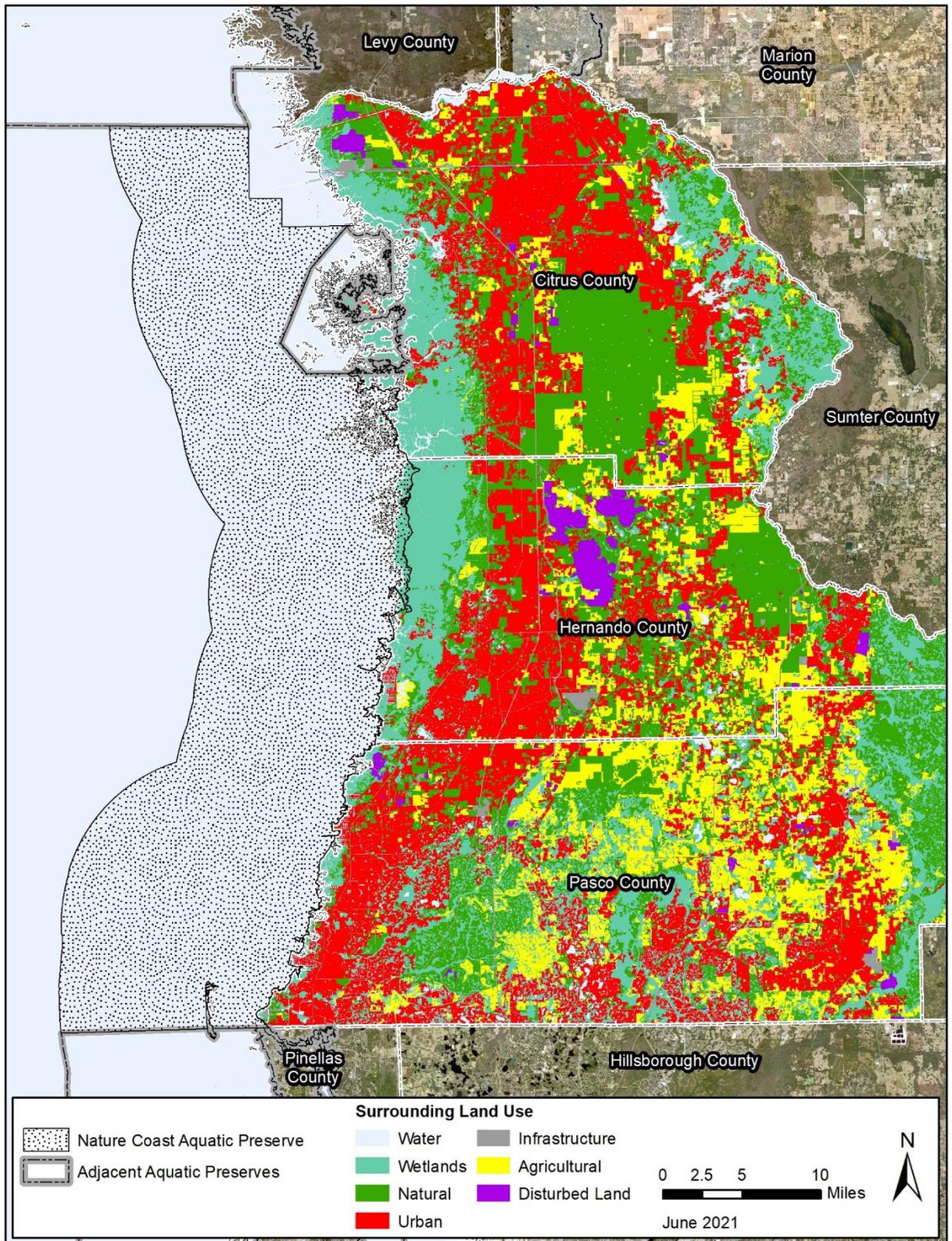
The Cross Florida Barge Canal was a project organized by the Army Corps of Engineers to build a 30-foot-deep waterway across the state in order to save ships several days of travel time, rather than having to travel around the entire peninsula. The canal was intended to begin in Jacksonville and connect through the St. Johns River to the Ocklawaha River, past the Withlacoochee River, and out to the Gulf of Mexico near Yankeetown. Construction of the canal began in 1935 near Ocala and was halted in 1971 after Marjorie Harris Carr and a group of environmental activists argued that the canal would cause irreparable damage to the area's natural ecosystems. This project was officially deauthorized by Congress in 1991. The remnants of the canal are now part of the Marjorie Harris Carr Cross Florida Greenway, a 110-mile linear park of hiking and biking trails (Florida Historical Society, 2015).

Masaryktown Canal

Construction of the Masaryktown Canal began in 1969 by the SWFWMD (SWFWMD Blog, 2018). The canal is in Pasco County, near the Hernando County border. The canal site is now monitored and maintained by SWFWMD for flood protection with oversight from the USGS Florida Water Science Center (National Water Quality Monitoring Council, 2021).

Veterans Expressway/ Suncoast Parkway

State Road 589, also called the Veterans Expressway, spans from the Tampa International Airport through Hillsborough County. A spur of the expressway, called Suncoast Parkway, then extends through Pasco, Hernando and Citrus counties, reaching State Road 44 (West Gulf to Lake Highway) in Lecanto, Florida. The toll road is operated by Florida's Turnpike Enterprise (AA Roads 589, n.d.).



Map 11. Surrounding land use.



Chapter 4 / The Nature Coast Aquatic Preserve Management

Programs and Issues

The work performed by the Office of Resilience and Coastal Protection (ORCP) 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. Partnering is a necessity, and by bringing issues into a

broad public consciousness, partners ensure 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 Nature Coast Aquatic Preserve (NCAP) directly or are of significant local or regional importance that the aquatic preserve's participation in them may prove beneficial. While management focal points may be the same for each preserve, the goals, objectives, and strategies employed to address the focus may vary depending on the ecological and socioeconomic conditions present within and around a particular aquatic preserve's boundary. In this management plan, Nature Coast Aquatic Preserve 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 associated goals, objectives, and strategies. Goals are broad statements of what the organization plans to do and/or enable in the future. Goals 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. ORCP ensures that, when applicable, consistent techniques are used across sites to strengthen Florida's ability to assess the relative condition of coastal and freshwater resources. This enables decision-makers to prioritize restoration and resource protection goals more effectively. In addition, by using the scientific method to create baseline conditions of aquatic habitats, the Ecosystem Science Management Program allows for objective analyses of the changes occurring in the state's natural and cultural resources.

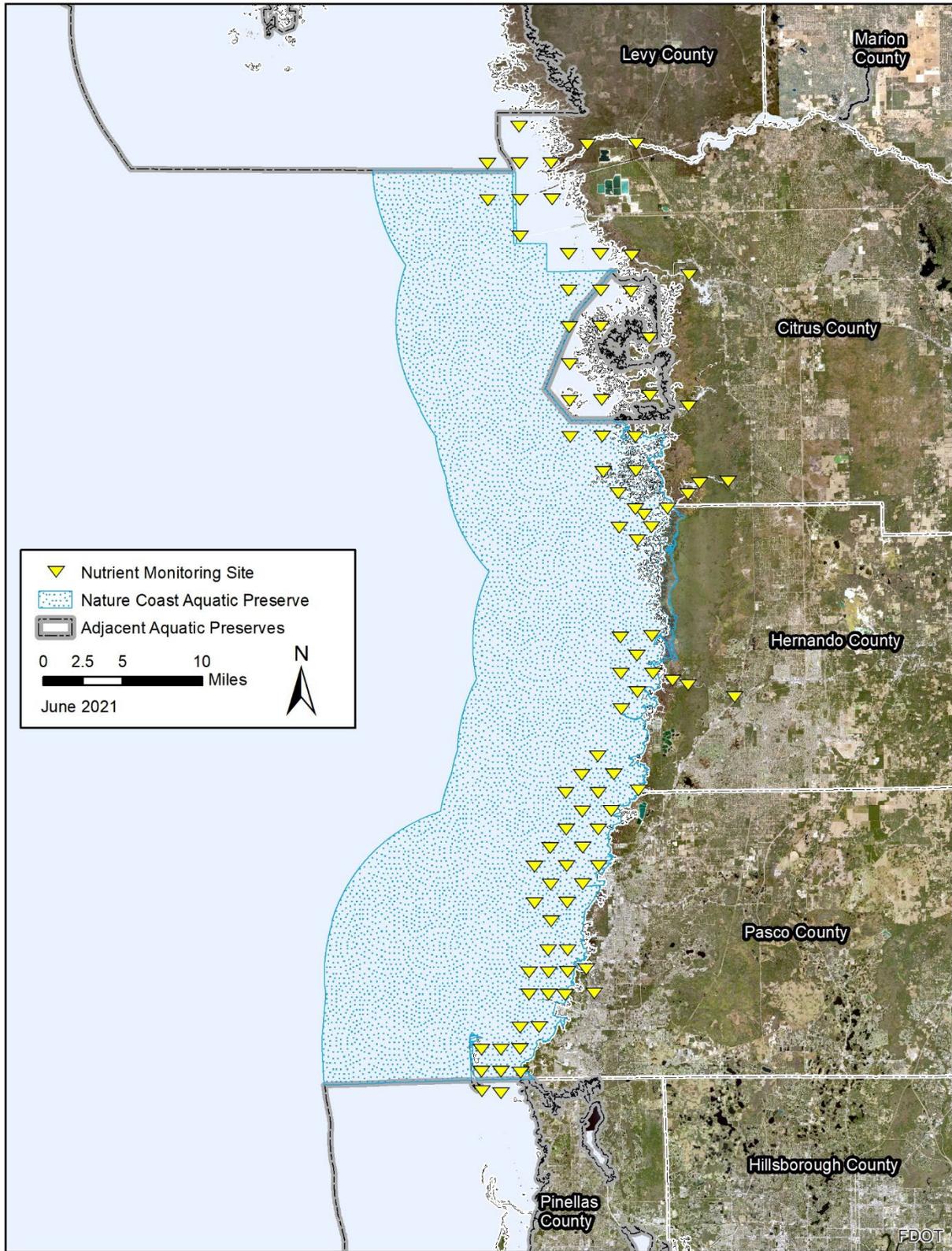
4.1.1 / Background of Ecosystem Science at Nature Coast Aquatic Preserve

Though NCAP is a newly formed aquatic preserve in Florida, science-based research programs have been present in the area for many years. Background information on some of the relevant ecosystem science programs and projects can be found below.

Project COAST

Since 1997, the University of Florida (UF) has coordinated a water quality monitoring program called Project COAST (COastal ASsessment Team). For many years, the project collected field samples at up to 90 fixed sites within the NCAP area. Sampling occurred within the Withlacoochee, Crystal, Homosassa, Chassahowitzka and Weeki Wachee River systems from 1997 through 2019. The four river systems located in Pasco County: Aripeka, Hudson, Pithlachascotee and Anclote were historically sampled from 2000- 2012. Within the NCAP, this water quality monitoring program was reinstated in 2021 to include all 90 of these historical COAST stations.

Examples of parameters collected include light attenuation through the water column, temperature, salinity, pH, secchi depth, and dissolved oxygen. Water samples are also filtered and processed for chlorophyll assessment and surface water grab samples are taken for total nitrogen and phosphorous analysis. All COAST samples are processed by UF, and current data is stored in an electronic database which is available to the public upon request. Project COAST has established a baseline dataset that allows resource managers to effectively assess changes in nutrient concentrations and eutrophication, with a focus on shifts in water quality that may negatively affect seagrass beds (Mattson et al., 2007).



Map 12. Project COAST water quality monitoring stations.



Harmful Algal Bloom/Red Tide Task Force

FWC coordinates the Harmful Algal Bloom Task Force, which was established in 1999 and reactivated in 2019. The task force works to determine strategies to research, monitor, control, and mitigate red tide and other harmful algal blooms in Florida waters. The Task Force works closely with the Blue Green Algae Task Force and Mote Marine Laboratory's Florida Red Tide Mitigation and Technology Development Initiative to evaluate current policies, procedures, research, and response efforts. They also identify and prioritize actions and make recommendations (FWC, 2019).

Seagrass Monitoring and Research

The west coast of peninsular Florida has a shallow, gently sloping bathymetry that creates a favorable habitat for seagrass meadows. One of the largest contiguous seagrass beds in the US is in this region (Mattson et al., 2007). In 2016, 396,100 acres of seagrass was identified within 14 miles of the shoreline in the Springs Coast area. Large tracts of unmapped areas of seagrass have also been observed further offshore, though these areas are less dense. Since 2007, seagrass cover has increased by 17,290 acres, or .5%/yr, in the area (Yarbro & Carlson, 2018). Seagrass communities are dominated by turtle grass (*Thalassia testudinum*). Other varieties of seagrass occur throughout the region but are less common, such as manatee grass, shoal grass, star grass, and widgeon grass (Yarbro & Carlson, 2018). Seagrass monitoring that occurred within this area is included in FWC's Seagrass integrated Mapping and Monitoring (SIMM) reports.

Seagrasses provide many ecosystem services, including stabilizing sediments, reducing shoreline erosion, sequestering carbon, improving water clarity, and providing habitat for ecologically and economically critical species (Hemminga & Duarte, 2000). Seagrass growing on the Gulf Coast of the

Florida peninsula show variation in morphology, shoot density, growth rates, and elemental composition in relation to a gradient in water column total phosphorous concentrations. Areas with higher total phosphorous produced taller shoots with wide leaves, and shoots were less dense. This is evidence that seagrasses balance shoot morphology and density in relation to phosphorous to maintain growth and survival across a wide range of nutrient supply (Barry et al., 2017).

Seagrasses are influenced by the nutrient loads of coastal rivers that discharge into the Big Bend area. An increase in nutrients in river systems leads to an increase in phytoplankton, which can influence water clarity (Hale et al., 2004). An increase in the abundance of phytoplankton and suspended solids were found to influence the amount of light reaching seagrasses along Florida's central Gulf Coast. Regions fed by rivers higher in color were associated with less seagrasses than regions fed by rivers with little color and sourced by nearby artesian springs (Hale et al., 2004).

Areas with less seagrass on Florida's central Gulf Coast are characterized by higher color and concentrations of nitrogen, phosphorous, and chlorophyll *a*. Light was a limiting factor in seagrass growth, but other factors were found to affect growth as well, such as substrate, temperature, salinity, and dissolved oxygen (Choice et al., 2014). Seagrasses require more light than other photoautotrophs, which means that by ensuring enough light is available for seagrasses, other primary producers will also benefit (Choice et al., 2014).

Connectivity has a greater influence in marine environments than terrestrial areas (Burrows et al., 2011). Seagrass meadows differ depending on what intertidal plant communities are nearby, such as salt marshes and mangroves. Clear differences were seen in the sediment organic matter and net nitrogen gas fluxes between salt marsh, mangrove, and ecotone habitats in the Cedar Key region. The magnitude and direction of these changes were seasonally influenced. Seagrass meadows near mangroves were found to decrease in belowground biomass during the winter, suggesting a vulnerability to stressors associated with mangroves. Slight differences in community assemblages were also seen between intertidal habitats (Sullivan et al., 2021).

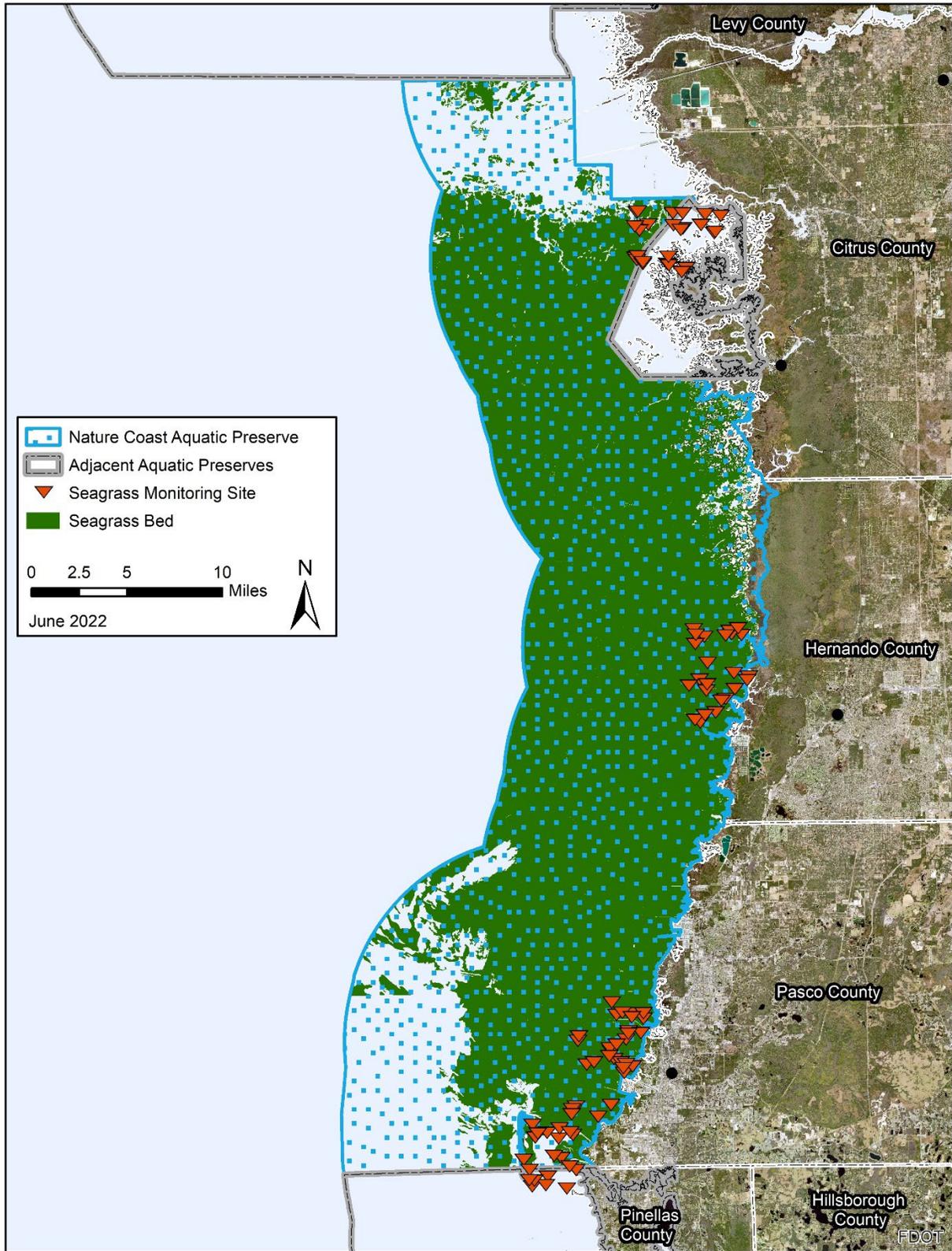
As green turtles become more abundant in the Gulf, seagrass grazing will increase. Turtle grass shows a consistent response from grazing on metabolic carbon capture rates. Rates of metabolic carbon capture are lower in grazed seagrass meadows than ungrazed meadows. However, grazing does not stimulate ecosystem respiration or result in large remineralization of the carbon already stored in seagrass meadows (Johnson et al., 2019).

Seagrass Mapping

The Southwest Florida Water Management District (SWFWMD) maps seagrass in the NCAP area with a hybrid data collection approach every four years. Aerial photographs are collected, interpreted by desktop analysis, and ground truthed in the field (personal communication, Chris Anastasiou, February 24, 2021).

Scallop Research and Monitoring

FWC surveys bay scallop populations in Citrus, Hernando, and Pasco counties each year, although a 2020 survey was not conducted because of restrictions related to COVID-19. Surveys assess scallop abundance in open and closed areas; data can be accessed on scallop abundance in the Gulf region dating back to 2012. The average number of scallops observed per 200 square meters between 2012 and 2019 were 15 for Citrus, 10.3 for Hernando, and 10.4 for Pasco. The averages of all three counties are higher than the number of scallops seen in the region in 2019, which were 4.3 for Citrus, 2 for Hernando, and 6.4 for Pasco (FWC, n.d. a). FWC studies five regions that are closed to scallop harvest on the Gulf Coast, including one in NCAP - the Anclote Keys area in Pinellas and Pasco counties. Scallop densities have increased in these closed areas in the past 10 years because of both prohibited harvest and restoration efforts (FWC, n.d. a).



Map 13. Seagrass monitoring locations within the Nature Coast Aquatic Preserve.

Sponge Research and Restoration

More than 60 species of sponges are found in Florida's hard-bottom communities, but only four species from Florida's Gulf Coast have substantial commercial value (Storr, 1976). Commercially valuable sponge species include the sheepswool sponge (*Hippiospongia lachne*), the yellow sponge (*Spongia Barbara*), the grass sponge (*Spongia graminea*), and the Gulf grass sponge (*Spongia graminea tampa*) (Behringer & Patterson, 2021).

Sponge beds in NCAP provide structural complexity to hard-bottom habitats. The multi-dimensional habitat sponges help to create attracts a variety of organisms, including fish, sea turtles, stone crabs, snapping shrimp, and brittle stars (Tellier et al., 2008). Sponge communities in the Florida Keys have declined in recent years because of eutrophication, disease, commercial fishing, and persistent algal blooms, especially cyanobacteria. Restoration efforts have been attempted in the Florida Keys following repeated die-off events but were largely unsuccessful due to impacts from persistent algal blooms (Behringer & Patterson, 2021). Along Florida's Gulf Coast cyanobacteria blooms are uncommon. In their place are red tide blooms from the toxic algae *Karenia brevis*. The red tides produced from blooms of this algae are not associated with sponge die-offs, and instead, sponges may help filter red tide algae from the water column (Echevarria et al., 2012).

A sponge research and restoration project is underway in Hernando County based on the research described here. The project will survey offshore sponge populations, prioritize species for restoration, test aquaculture methods and locations, and use the most successful methods to restore local sponge beds (Behringer & Patterson, 2021). Sponge restoration is also supported by the Pinellas County and Boca Ciega Bay Aquatic Preserves (PCBCBAP) management plan. The plan sets goals to assist with restoration of damaged resources, seek recommendations for restoration, and create and maintain a database of possible mitigation projects designed to restore damaged areas. The plan also encourages research from outside organizations, such as academic institutions (DEP, 2018d).

Fish Community Assessment

Collaborative efforts between the SWFWMD and FWC conducted summer and winter fish surveys of the first magnitude springs systems in the NCAP region from 2013 through 2019 (Johnson et al. 2019). Since then, these important surveys to monitor the status of the fish community recently resumed and are



expected to be conducted every 3-5 years in the near future (personal communication, Kym Rouse Holzwart, May, 2022).

FWC is leading a project in the Homosassa River system that uses acoustic telemetry, electrofishing, mark-recapture, habitat assessment, and abiotic measurements to investigate the increase in marine fish during winter months and their potential effects on freshwater fish. Biologists are using an ecosystem-based approach aimed at protecting species dependent upon the health of this freshwater environment for forage, refuge, and reproduction. As of September 2021, this research was still in progress (Dluzniewski, 2019; Allen et al., 2022).

Current research is being conducted, due to the establishment of Common Snook populations in the NCAP region and their use of spring systems as thermal refuge during the winter months, to collect the necessary information on Common Snook movement, behavior, and habitat use. One collaborative example being that the SWFWMD, FWC, and UF IFAS Nature Coast Biological Station recently began a multi-year acoustic telemetry project in Kings Bay/Crystal River to track the effects of water temperature on Common Snook movement, behavior, and habitat use (personal communication, Kym Rouse Holzwart, May, 2022).

Marine Turtle Research

In-water Research Group first conducted vessel-based visual surveys in the preserve area in 2012 and identified exceptionally high numbers of marine turtles in the waters between the Crystal and Homosassa Rivers. This led to the expansion of the project and commencement of marine turtle surveys and captures. Since then, we have completed over 300 miles of transects in the area and have made over 800 turtle sightings. Consequently, we have captured 450 turtles of four species (241 green turtles, 184 Kemp's ridleys, 24 loggerheads, 1 hawksbill) ranging from juvenile to adult size classes. This work resulted in a 2021 publication where density, distribution, demographics, disease prevalence and genetic contribution was described for each of the species found in the area³. We also discovered unexpectedly high rates of green turtles with debilitating fibropapilloma tumors. While the waters of the preserve appear relatively pristine with dense seagrass and sponge beds, green turtles have a disease prevalence at a rate expected in degraded or polluted areas⁴. Additionally, loggerhead turtles tested positive for the disease but did not exhibit the debilitating tumors seen on green turtles.

4.1.2 / Current Status of Ecosystem Science at Nature Coast Aquatic Preserve

The NCAP was designated in June 2020. DEP oversees management of the NCAP and contracts with UF for staffing support for water quality and seagrass monitoring programs. The ecosystem science activities outlined in this section have been prioritized by NCAP staff with input from the advisory committee and the public. The order in which they are viewed does not reflect their significance to this management plan or DEP. As possible, NCAP staff will collect water quality and seagrass data to contribute to ongoing monitoring of aquatic systems in the NCAP area.

4.1.3 / Ecosystem Science Issue

Issue One: Water Resources

Water resource conditions are known to directly affect the health and productivity of Florida's submerged coastal resources. Water quantity assessment and continuous monitoring of water quality within the Nature Coast Aquatic Preserve can provide vital insight to impacts both natural and human related events may have to the coastal communities.

Researchers and resource managers around the state use water quality datasets to determine both short- and long-term changes to abiotic parameters such as turbidity or salinity. An increase in freshwater input from high rain events can increase turbidity over an extended time, resulting in a notable decline in seagrass. This is due to the lack of sunlight able to penetrate through the water column,

inhibiting the seagrass' ability to photosynthesize. Once the waterway has time to stabilize, the seagrass can potentially recover on its own, once the turbidity clears. Trends like this, once identified, can then be applied to explain community changes, and will be used to guide managers in future resource management decisions.

As the Nature Coast Aquatic Preserve was recently designated and this is the first management plan created, current water quality monitoring efforts are still being developed. To properly assess water quality conditions within the NCAP, assessment of historical datasets and efforts of partners will need to be analyzed. DEP's Statewide Ecosystem Assessment of Coastal and Aquatic Resources (SEACAR) database is one of many data inventories that will be utilized for these assessments. NCAP staff can then begin the establishment of a long-term datasets, which will be crucial in guiding management decisions and protecting these valuable natural resources. In addition to gathering necessary data, partner collaboration (or interagency collaboration) and disseminating (publicizing) this data will also be a primary focus attributed to the future management of the NCAP.

Goal One: Assess and define water quality and quantity monitoring needs.

Objective One: Identify existing water quality monitoring programs, catalog the parameters being recorded and identify essential data gaps within the NCAP and its contributing tributaries.

Integrated Strategy: Communicate with partners, like Southwest Florida Water Management District, to determine current and historical locations of continuous water quality monitoring station locations within the NCAP.

Integrated Strategy: Communicate with partners, like DEP's Division of Environmental Assessment and Restoration (DEAR), to determine current and historical locations of water quality nutrient monitoring site locations within the NCAP.

Integrated Strategy: Identify and compare nutrient monitoring efforts with partner efforts, like DEP's DEAR nutrient monitoring program, to determine overlap/gaps.

Integrated Strategy: Identify and collaborate with citizen science programs collecting relevant data within the NCAP.

Goal One, Objective One - Performance Measure One: Identify water quality efforts within the NCAP and compile an internal report of findings to better determine area needs within one year of plan adoption.

Objective Two: Identify and formulate options relating to historical programs and data gaps associated with water resources within the aquatic preserve boundaries and its contributing tributaries.

Integrated Strategy: Assess feasibility of restarting historical data collection at locations that are relevant to maintaining a sound baseline dataset for the NCAP.

Integrated Strategy: Determine if current sampling efforts are sufficient, and if not – develop and propose a revised plan of action.

Goal One, Objective Two - Performance Measure One: In coordination with partners, create a monitoring plan complete with sampling timeline and execution strategy within one year of plan adoption.

Goal Two: Expand strategic long-term continuous water quality monitoring efforts within NCAP to assist in the identification and future management of issues relating to the aquatic preserve's submerged resources.

Objective One: Establish a reliable baseline dataset to assess and monitor water quality within the Nature Coast Aquatic Preserve.

Integrated Strategy: Identify appropriate continuous water quality monitoring station locations.

Integrated Strategy: Apply for appropriate funding sources to obtain necessary equipment, as well as maintenance supplies, to install and maintain an appropriate number of continuous water quality monitoring stations.

Integrated Strategy: Coordinate with appropriate agencies to determine if the installation of supplemental equipment (e.g flow meters) at continuous monitoring stations is needed to assess water quantity or other supplemental parameters where applicable.

Goal Two, Objective One - Performance Measure One: Develop an annual data brief detailing station location, outside funding sources, scientific results, and recommendations regarding the water quality within NCAP.

Issue Two: Protection and Management of Submerged Resources

Submerged resources around the state face unique challenges based on their geographic locations. The location of the Nature Coast Aquatic Preserve presents the benefit of remoteness which has allowed for almost pristine coastal conditions. The designation as an aquatic preserve arrived in a timely manner to allow resource managers the ability to establish monitoring criteria to ensure this area thrives for future generations to enjoy. Submerged resources include, but are not limited to seagrass meadows, oyster reefs, hardbottom structure, sponge communities and macroalgae beds.

Nature Coast Aquatic Preserve's natural and cultural resources have been the focus of researchers and neighboring resource managers for many years prior to being designated as an aquatic preserve. Analyzing historical and current mapping, modeling and research efforts will greatly benefit the NCAP to advance and prioritize these efforts. Developing a knowledgeable steering committee to provide ongoing input on the science-based management within the aquatic preserve will promote robust collaboration of resources and also ensure that future threats and impacts are identified in a timely manner.

Goal One: Assess historical and present condition of submerged resources to guide management decisions within the Nature Coast Aquatic Preserve.

Objective One: Identify and formulate monitoring programs to assess status and trends associated with submerged resources within NCAP.

Integrated Strategy: Coordinate with agencies and other groups monitoring submerged resources within the NCAP.

Integrated Strategy: Participate in and / or host interagency collaborative meetings focusing on submerged resources to ensure data gaps and duplicate efforts are addressed and data is shared in a timely manner (e.g., SIMM).

Integrated Strategy: Assess feasibility of restarting historical data collection at locations that are relevant to maintaining a sound baseline dataset for NCAP.

Integrated Strategy: Determine if current sampling efforts are sufficient, and if not, develop and propose a revised plan of action.

Goal One, Objective One - Performance Measure One: Identify submerged resource monitoring efforts within the NCAP and compile an internal report of findings identifying needs within one year of plan adoption.

Goal One, Objective One - Performance Measure Two: In coordination with partners, create a monitoring plan complete with sampling timeline and execution strategy within two years of plan adoption.

Objective Two: Determine the status of intertidal natural resource communities within NCAP.

Integrated Strategy: Assess the need for, and determine the feasibility of establishing mapping and/or monitoring programs for oyster reef, salt marsh and mangrove island habitats within NCAP.

Integrated Strategy: Leverage interagency collaboration to assist with mapping and monitoring of intertidal communities.

Integrated Strategy: Participate in and/or host interagency collaborative meetings focusing on intertidal communities (e.g., OIMMP, CHIMMP).

Goal One, Objective Two - Performance Measure One: Identify intertidal monitoring efforts within the NCAP and compile an internal report of findings to better determine area needs within one year of plan adoption.

Goal One, Objective Two - Performance Measure Two: Attend appropriate subject matter meetings/workshops throughout the duration of the plan to ensure monitoring efforts of these resources remain comparable and are represented appropriately; reduce gaps and duplication.

Objective Three: Identify current and potential future threats and impacts to the natural communities within NCAP.

Integrated Strategy: Develop a steering committee of academic experts and resource managers to promote robust collaboration of efforts and to identify threats and impacts before or as they occur.

Integrated Strategy: Coordinate with agencies and other groups currently monitoring submerged resources within the NCAP to ensure threat or impact indicators are captured in monitoring datasets.

Goal One, Objective Three - Performance Measure One: In coordination with partners, create a monitoring plan complete with sampling timeline and execution strategy within two years of plan adoption.

Goal One, Objective Three - Performance Measure Two: Attend or host appropriate subject matter meetings/workshops throughout the duration of the plan to ensure identified threats and impacts remain topics of focus.

Issue Three: Climate Change

The Gulf Coast has seen a substantial increase in sea level in the past century. According to a tide station in Cedar Key, Florida (approximately 48 miles from the northern edge of the NCAP), mean sea level increased by an average 1.93 mm/year between 1914 and 2013 (NOAA, 2013). An analysis of the transition of the intertidal area in the Big Bend region over the last 120 years, showed a 9% decrease of tidal marsh to open water, which led to a forest-to-marsh transition and a 23% increase in coastal lowlands (Raabe & Stumpf, 2016).

Fish assemblages offshore and in the Gulf of Mexico estuary have resulted in northward shifts in recent years because of environmental changes linked to a warming climate. A study comparing the fish species present within seagrass meadows in the northern Gulf of Mexico between the 1970s and mid-2000s found significant shifts in the presence and abundance of saltwater fishes. Fish observed that were completely absent from the 1970s data included lane snapper (*Lutjanus synagris*), red grouper (*Epinephelus morio*), spotfin butterflyfish (*Chaetodeon ocellatus*), grouper (*Mycteroperca sp.*), rock sea bass (*Centropristis philadelphica*), bluespotted cornetfish (*Fistularia tabacaria*), yellowtail snapper (*Ocyurus chrysurus*), bluehead wrasse (*Thalassoma bifasciatum*), and spotlight parrotfish (*Sparisoma viride*). Other species increased in abundance, including gag grouper (*Mycteroperca microlepis*), gray snapper (*Lutjanus griseus*), and emerald parrotfish (*Nicholsina usta*) (Fodrie et al., 2010). The common

snook (*Centropomus undecimalis*) has also expanded northward, with snook from all life stages found in the Lower Suwannee River region in 2018. The presence of snook in the region is likely to lead to shifts in habitat as well as the food web of the region (Purtlebaugh et al., 2020). A northward expansion of mangrove forests has also been seen on the Gulf Coast; these shifts are consistent with changes in temperature thresholds (Saintilan et al., 2014).

Marine turtles utilize various habitats within the aquatic preserve and are an integral part of multiple ecological cycles. The abundance and health of marine turtles within the aquatic preserve can act as an indicator to the overall health of the preserve that is easily understandable by stakeholders. Paired with other relatable indicators, such as charismatic megafauna (elasmobranchs, manatees), recreational and commercial fish species (scallops, sea trout, redfish), and habitats (hectares of seagrass, sponge bed), stakeholders will be able to understand tangible changes within the aquatic preserve that represent its overall health.

Sea level rise has led to both short and long-term changes in plant assemblages along the Florida Gulf Coast. The freshwater forest islands that dot the Gulf Coast in the Big Bend region and further south have changed in recent years as tree species decline in response to salt stress. Between 1992 and 2014, tidal flooding of these forest islands increased by 22% to 117% in 13 plots studied in Waccasassa Bay Preserve State Park, located several miles north of the northern boundary of NCAP. Tree species, especially cabbage palm (*Sabal palmetto*) and southern red cedar (*Juniperus virginiana*) decreased alongside flooding (Langston et al., 2017).

Climate change impacts will also affect freshwater ecosystems, producing effects that will flow downstream to Gulf Coast habitats. Many of these effects will exacerbate current anthropogenic stressors. Anticipated ecological effects to freshwater ecosystems in the Gulf Coast region include reductions in habitat for freshwater organisms, in water quality, and in organic matter storage. Subtropical species, including invasive species that are currently confined to South Florida, will shift northwards. Wetlands will expand alongside increased in runoff from urban and agricultural areas, which will result in changes in the salinity regimes of coastal areas (Mulholland et al., 1997).

In recent years, submerged aquatic vegetation has shifted globally from rooted macrophytes, such as sea grass species, to filamentous macroalgae. Research on submerged aquatic vegetation in spring-fed rivers in Florida revealed that this shift in habitat type will likely have impacts on communities of small fish and macroinvertebrates, as well as the species that feed on these species. While habitats characterized by filamentous algae supported an equal or greater number of small fish and macroinvertebrates than habitats of rooted macrophytes, a less diverse assemblage was present in algae-dominated habitats. Furthermore, a shift from grasses to algae may be a sign of an eventual shift to unvegetated substrate, which would likely lead to more dramatic declines in fish and macroinvertebrate abundance (Camp et al., 2014).

Impacts to urban and residential areas is likely alongside climate change shifts as well. An analysis of sea level rise impacts on Port Richey and New Port Richey, two municipalities in western Pasco County, show that the coastal flooding associated with half a meter of sea-level rise would lead to nearly 50% land loss and \$217,108,692 in property loss. The areas that would lead to greater vulnerability in local communities were located primarily near floodplains and the coast, west of U.S. Highway 19. A high population of disabled community members live in this area, placing them at elevated an elevated risk in sea-level rise scenarios of half a meter or greater (Harris, 2017).

With recent studies confirming shifts in both habitat and community structure, it is essential for the Nature Coast Aquatic Preserve to address climate change in a proactive manner. Utilizing the Nature Coast as a whole to better understand the effects and begin to offset the impacts will be a main focal point for this aquatic preserve.

Goal One: Ensure that the NCAP remains resilient to expected impacts from climate change, including tropicalization and climate-induced habitat migration.

Objective One: Track and predict climate factors such as sea level rise, increases in sea surface temperature, storm frequency and intensity and alterations in drought/flood cycles as they pertain to all NCAP's submerged and coastal resources.

Integrated Strategy: Expand and build new collaborative research and monitoring partnerships with universities, their research stations, and other state agency programs, whereby data collection, research equipment, volunteers, student training, and other human resources are shared to achieve monitoring objectives.

Integrated Strategy: Develop a steering committee of academic experts and resource managers to review climate-related ecosystem research in the region and provide science-based guidance for submerged resource management planning and program development.

Goal One, Objective One - Performance Measure One: Host a regional climate change / resiliency kickoff workshop to engage potential steering committee members and gather existing data on related subject matter pertaining to the Nature Coast Aquatic Preserve within the first two years of plan adoption.

Goal One, Objective One - Performance Measure Two: Coordinate a steering committee that will meet at least once per year to provide science-based guidance for submerged resource management planning and program development and facilitate future modeling efforts.

Objective Two: Establish processes to track and predict climate-driven changes to all NCAP's submerged resources to guide adaptive management approaches.

Integrated Strategy: Establish monitoring for tidally influenced communities, like salt marsh and mangroves, to better understand factors such as accretion and erosion rates and habitat transitions/migrations (e.g., mangrove encroachment or uplands to salt marsh/mangroves).

Integrated Strategy: Review and incorporate partner projects to develop recommendations and incorporate adaptive planning tools that address shifting submerged resources (e.g., USFWS/ANERR SET stations, FWC Estuary Restoration Teams to support habitat suitability modelling).

Integrated Strategy: Explore citizen science data collection to augment research and monitoring programs (examples: temperature, water levels, climate-driven species shifts, photo posts, drone imagery or other parameters like elevation, pre-post storm documentation).

Integrated Strategy: Identify knowledge gaps in climate-vulnerable resources including seagrasses and western offshore regions of stony corals, hardbottom, and sponge habitats. Pursue collaborative research to address gaps.

Integrated Strategy: Work with partners to model the impact of sea level rise on the NCAP's submerged lands and resources including documented cultural sites and tidal wetlands using the most appropriate models and frameworks (e.g., NOAA 2040 and 2070 predictions).

Integrated Strategy: Based on predictive modeling, identify areas where submerged and intertidal habitats will be likely to shift due to sea level rise and apply a response framework (e.g., RAD, stakeholder-driven adaptation plan) to guide resource management decisions.

Integrated Strategy: Identify known submerged and intertidal cultural resource sites that may be affected by climate change impacts such as sea level rise and storm damage and consult with cultural resource partners to determine priorities for documenting and, if warranted, protecting at risk sites due to climate change.

Goal One, Objective Two - Performance Measure One: Implement monitoring procedures for climate sensitive habitats at strategic locations throughout the NCAP and

compile data into a technical report to be shared with collaborative science participants as updates are available.

Goal One, Objective Two – Performance Measure Two: Share or present model findings to the steering committee and other appropriate groups throughout the duration of the plan to ensure risks to resources are communicated and are acted upon appropriately.

4.2 / The Resource Management Program

The Resource Management Program addresses how ORCP manages the Nature Coast Aquatic Preserve and its resources. The primary concept of Nature Coast Aquatic Preserve Resource Management projects and activities are guided by ORCP's mission statement: "Conserving, protecting, restoring, and improving the resilience of Florida's coastal, aquatic, and ocean resources for the benefit of people and the environment." ORCP's sites accomplish resource management by physically conducting management activities on the resources for which they have direct management responsibility, and by influencing the activities of others within and adjacent to their managed areas and within their watershed. Watershed and adjacent area management activities, and the resultant changes in environmental conditions, affect the condition and management of the resources within their boundaries. ORCP managed areas are especially sensitive to upstream activities affecting water quality and quantity. ORCP 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. Focusing on Ecosystem Science, Education and Outreach and Public Use as 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. The Nature Coast Aquatic Preserve also collaborates with these groups by reviewing various protected area management plans. The sound science provided by the Ecosystem Science Program is critical in the development of effective management projects and decisions. The nature and condition of natural and cultural resources within the Nature Coast Aquatic Preserve are diverse. This section explains the history and current status of our Resource Management efforts.

4.2.1 / Background of Resource Management at Nature Coast Aquatic Preserve

Basin Management Action Plans

DEP manages three Basin Management Action Plans (BMAP) in the NCAP region: Crystal River/Kings Bay, Chassohowitzka/Homossassa, and Weeki Wachee. As DEP continues to assess resource conditions associated with the Nature Coast Aquatic Preserve, changes may occur to existing BMAP's. The creation of new TMDLs and establishment of new BMAPs are possible.

Crystal River/Kings Bay

The Crystal River/Kings Bay Basin Management Action Plan area consists of 178,753 acres located in Citrus County. The BMAP area contains the Crystal River/Kings Bay spring complex, which has more than 70 springs that account for 99% of the fresh water entering the 600-acre Kings Bay. The Priority Focus Area includes the majority of the BMAP area, except for the water discharge area along the Gulf Coast and portions of the southern and eastern springshed that have lower recharge characteristics as well as fewer nitrogen sources. The Priority Focus Area represents the area in the basin where the aquifer is most vulnerable to inputs and where there are the most connections between groundwater and the springs. DEP set nitrate and orthophosphate water quality restoration targets for five springs in the Kings Bay Spring Group and total nitrogen and total phosphorus targets for Kings Bay. In 2014, DEP adopted total maximum daily loads of 0.23 milligrams per liter (mg/L) of nitrate and 0.028 mg/L of orthophosphate at the five spring vents, and TMDLs of 0.28 mg/L of total nitrogen (TN) and 0.032 mg/L of TP for Kings Bay (DEP, 2018b).



Chassahowitzka/Homosassa

The Chassowitzka/Homosassa basin management action plan comprises 340,609 acres located in southern Citrus County, including the city of Inverness, and northern Hernando County, as well as a portion of the city of Brooksville. The BMAP area contains both the Homosassa Spring Group, comprised of numerous springs that are the source waters for the Homosassa River, and the Chassahowitzka Spring Group, comprised of six springs that make up the headwaters of the Chassahowitzka River (an impaired Outstanding Florida Water), that discharges into the Gulf of Mexico. The Priority Focus Area comprises 77,732 acres and includes a region in the western part of the Homosassa Springshed (36,961 acres) and Chassahowitzka Springshed (40,771 acres) that are subareas within the BMAP boundary. The Priority Focus Area represents the area in the basin where the aquifer is most vulnerable to inputs and where there are the most connections between groundwater and the springs. DEP adopted nutrient TMDLs for the Homosassa Spring Group, Chassahowitzka Spring Group, and Chassahowitzka River-Baird Creek in 2014. The TMDLs established a monthly average nitrate target of 0.23 milligrams per liter (mg/L) for Homosassa Spring Group and Chassahowitzka Spring Group and a total nitrogen water quality target of 0.25 mg/L for Chassahowitzka River-Baird Creek (DEP, 2018c).

Weeki Wachee

The Weeki Wachee Basin Management Action Plan area consists of 200,474 acres located in southern Hernando County, including a portion of the city of Brooksville, and northern Pasco County. The BMAP area contains the Weeki Wachee Spring Group which is composed of a single, large main spring and numerous smaller springs spread over an area of nearly five square miles. Weeki Wachee Spring is the primary source of the Weeki Wachee River and the largest spring (by discharge) in the group. The BMAP area also contains Magnolia-Aripeka Springs Group; Mud Spring, Salt Spring, Wilderness Spring; and Jenkins Creek Spring which are located within the Weeki Wachee riverine system Outstanding Florida Water boundaries. The Priority Focus Area comprises 90,415 acres and includes a region in the western part of the springshed for Weeki Wachee Spring. The Priority Focus Area represents the area in the basin

where the aquifer is most vulnerable to inputs and where there are the most connections between groundwater and the springs. DEP adopted nutrient total maximum daily loads for Weeki Wachee Spring and Weeki Wachee River in 2014. The TMDLs established monthly average nitrate targets of 0.28 milligrams per liter (mg/L) for Weeki Wachee Spring and 0.20 mg/L for Weeki Wachee River. DEP adopted nitrate targets of 0.23 mg/L for Magnolia-Aripeka Springs Group; WildernessMud-Salt Springs Group; and Jenkins Creek Spring through adoption of TMDLs in 2016 (DEP, 2018e).

H2OSAV

UF/IFAS Extension hosts this program to promote water conservation, which uses metered water data to inform utilities, extension agents, and the publication about their water consumption. H₂OSAV stands for Water Savings, Analytics, and Verification. Updated information on water use is incorporated into an online tool that can display information across multi-year timeframes and allows for comparisons of water use before and after retrofit programs and land development policies have been implemented (UF/IFAS, 2021c).

Inshore Artificial Reefs

The Citrus County Aquatic Services department has applied for funds from the RESTORE Act to create 10 inshore artificial reefs and one offshore reef, which will be managed to support fisheries enhancement (personal communication, Mark Edwards, February 11, 2021). In Hernando County, RESTORE funds have also been used to fund artificial reefs, including oyster reefs and living shorelines. Hernando County Aquatic Services continues monitoring those sites (personal communication, Keith Kolasa, February 11, 2021).

Scallop Restoration

FWC surveys bay scallop populations in Citrus, Hernando, and Pasco counties each year (FWC, n.d. a). A three-year restoration project was undertaken in Tampa Bay, Anclote River, Homosassa River, and Crystal River in the late 1990s after scallop populations had decreased to the point of threatening the local recreational fishery. Wild adult scallops were collected and then induced to spawn in a laboratory. In the first year, ~1,100 scallops survived and spawned, ~4,700 in the second year, and 12,000 in the third year (Arnold et al., 2005). More successful restoration was seen from placing scallop cages at lower densities, leading to increased growth and survival though this placement did not lead to more live scallops during spawning. Scallops were less likely to survive, and the survivors grew more slowly if they were placed directly on substrate compared to being placed in a seagrass bed or being elevated above substrate (Arnold et al., 2005).

Springs Coast Steering, Management, and Technical Committees

The Springs Coast Steering Committee through the SWFWMD has created a series of committees to review technical data about the springs system and make recommendations in the Springs Coast region. The committees of representatives from local organizations and stakeholder groups makes recommendations to the steering committee on how to best develop management plans that specifically address issues and solutions for each spring system. A public meeting is held periodically and is accessible via a virtual format (SWFWMD, 2021).

4.2.2 / Current Status of Resource Management at Nature Coast Aquatic Preserve

The NCAP designated in June 2020. DEP oversees management of the NCAP and contracts with UF for staffing support for water quality and seagrass monitoring programs. The resource management activities outlined in this section have been prioritized by NCAP staff with input from the advisory committee and the public. The order in which they are viewed does not reflect their significance to this management plan or DEP. As possible, NCAP staff will collect water quality and seagrass data to contribute to ongoing monitoring of aquatic systems in the NCAP area.

4.2.3 / Resource Management Issue

Issue One: Water Resources

There are multiple factors that can influence water quality in coastal ecosystems including land management practices, rainfall patterns, environmental context, and major storm events. An increase in nutrient loading related to land use change, population growth, and other anthropogenic factors has the potential to increase light attenuation by washing pollutants into coastal zones and fueling algal growth, potentially leading to harmful algal blooms. Water color, a measure of dissolved humic substances, can increase following significant rain events. Increased algal growth and color can shade out submerged vegetation if an event is long-lasting or if events are frequent. Large-scale storms can lead to erosion and resuspension of sediments, reducing light availability further. For these reasons, it is critical to maintain a water quality regime that promotes submerged vegetation survival and growth and sustains water clarity. Early detection of changes in nutrient regimes could be the key in mitigating these issues before they cause long-term damage. Regular long-term monitoring for nutrients, chlorophyll-a, and physio-chemical parameters will define baseline water quality status and are essential for determining if there are changes occurring over time. Working with upstream managing entities to ensure the freshwater supply entering the Nature Coast Aquatic Preserve will play a pivotal role in the long-term management of this important area.

NCAP staff will ensure that the aquatic preserve's water resources maintain or exceed their current designations by conducting appropriate water quality monitoring practices, such as nutrient monitoring and harmful algae bloom sampling, remaining involved with land-based influences, and integrative adaptive management strategies throughout the region.

Goal Three: Ensure that NCAP waters meet or exceed water quality standards associated with their designated use as Class II and III waters, and that those that currently exceed the designated use are not degraded below their ambient condition pursuant to NCAP's status as an Outstanding Florida Water

Objective One: Identify trends, changes, and needs within the NCAP's waters.

Integrated Strategy: Assist with and utilize data from the FWC-FWRI Harmful Algal Bloom program to monitor for changes.

Integrated Strategy: Conduct nutrient monitoring and analyze data for system health assessments. Utilize partner data in annual analysis. (e.g., Project COAST, DEP DEAR nutrient sampling, SWFWMD sampling).

Integrated Strategy: Develop adaptive management strategies to address and improve water quality components that exceed benchmark/threshold criteria.

Integrated Strategy: Conduct appropriate short term/temporary monitoring or disaster response monitoring to inform efforts to mitigate environmental threats in collaboration with partners.

Goal Three, Objective One - Performance Measure One: Compile data and conduct analysis annually. Present notable trends to stakeholders/partners at appropriate meetings and collaborate to develop effective course of actions based on findings.

Goal Four: Emphasize upland connections to NCAP's submerged resources.

Objective One: Identify influencing factors outside the aquatic preserve boundary contributing to resource degradation and provide support and collaboration to prevent degradation and improve conditions when possible.

Integrated Strategy: Notify agency partners of findings, propose changes to address present or potential future impacts to the NCAP, assist in efforts where applicable and possible through interagency collaboration.

Integrated Strategy: Establish and/or host quarterly regional workshops to encourage collaboration and data sharing to improve contributing water quality (e.g., engage with groups like Springs Coast Committee, create NCAP steering committee).

Integrated Strategy: Participate in decision making processes for actions in upriver/inland water bodies influencing NCAP (e.g., TMDL, BMAP, minimum flows and level).

Integrated Strategy: Support federal, state, local and non-governmental land acquisition programs to protect headwaters and riparian corridors for rivers and streams that discharge into the NCAP.

Integrated Strategy: Develop adaptive management strategies to address and improve water quality components.

Goal Four, Objective One - Performance Measure One: Work in tandem with other state and federal agencies to establish a list of parameters of concern within two years of plan adoption.

Goal Four, Objective One - Performance Measure Two: Within five years of plan adoption, establish benchmark/threshold criteria for nearshore areas in collaboration with DEAR and/or SWFWMD for water quality, focused on seagrass health.

Objective Two: Partner with nearby landowners to protect and improve conditions of the Nature Coast Aquatic Preserve.

Integrated Strategy: Identify and include appropriate nearby landowners/managers in decision making processes and education/outreach.

Goal Four, Objective Two - Performance Measure One: Provide annual reports on water quality conditions to neighboring/influencing landowners for review and comment.

Objective Three: Partner with government agencies and committees including but not limited to federal, state and local government agencies and stakeholders.

Integrated Strategy: Engage with local government natural resource and planning departments to enhance coastal information input (e.g., fertilizer ordinances, wetland protection).

Integrated Strategy: Participate in decision making processes for actions in upriver/inland waterbodies influencing NCAP (development, construction, habitat acquisition, watershed activities, etc.).

Goal Four, Objective Three - Performance Measure One: Attend meetings of local/state government boards and agencies to provide updates and discuss relevant issues within NCAP as appropriate to influencing factors as they are identified.

Issue Two: Protection and Management of Submerged Resources

Conserving, protecting, restoring and improving resources within the Nature Coast Aquatic Preserve is pivotal to maintaining the ecological significance of the Springs Coast. Assessment and monitoring of these resources will be necessary to determine thresholds and ecosystem functions of each community. While some habitats, like seagrass meadows, have robust historical data, the significance of other communities, like sponge and corals associated with hardbottom habitat, within the aquatic preserve are lacking. Cultural resources and intertidal communities, like mangroves and salt marsh, should also be assessed as changing climates are altering Florida's coasts at undeniable rates. Additionally, the connection upland influences have to the aquatic preserve's submerged and intertidal resources remains uncertain.

Staff will address these concerns regarding both submerged and intertidal resources through comprehensive assessments and by following science driven frameworks to ensure that conservation, or

improvement, of these resources allows for future generations to enjoy them. Staff will work diligently with upland managing entities to reduce negative impacts to the resources by providing data and proposing solutions as the needs arise.

Goal Two: To understand, protect and maintain existing seagrass resources, and restore and enhance degraded seagrass resources where these occur.

Objective One: Manage seagrass communities through research and monitoring, education and outreach, and collaborative mapping efforts with other state agencies to effectively protect and maintain this habitat as a valuable habitat throughout NCAP.

Integrated Strategy: Complete a comprehensive assessment of the current and historic spatial extent of seagrass habitat and spatially characterize the relative quality of that habitat, including areas of heavy prop scarring.

Integrated Strategy: Establish and implement annual submerged aquatic vegetation monitoring in collaboration with neighboring Aquatic Preserve programs.

Integrated Strategy: Incorporate research-based indicators of seagrass condition (e.g., above:belowground biomass, tissue stoichiometry, stable isotopes, indicator species status (e.g., marine turtles, bay scallops, manatees) etc.) and sediment quality (e.g., organic carbon and nutrient stocks, sulfides, and grain size and texture) into monitoring programs to provide insights and early-warning signs of seagrass stress.

Integrated Strategy: Identify, implement, and support research to deepen understanding of seagrass community function along environmental gradients (e.g., north-south, inshore-offshore).

Integrated Strategy: Identify needs and funding sources for restoration and enhancement efforts to address seagrass resource degradation identified within the NCAP.

Goal Two, Objective One - Performance Measure One: Within two years of plan adoption, compile a comprehensive technical report for NCAP's seagrass resources summarizing new data collected by NCAP, partner findings, and past research within the NCAP that is to be updated at least every two years.

Goal Three: To understand, protect and maintain hardbottom (coral/sponge bed) resources.

Objective One: Protect and manage hardbottom communities to ensure long term survivorship and ecological functions continue within the NCAP.

Integrated Strategy: Identify, implement, and support research into ecosystem function and significance of hardbottom communities.

Integrated Strategy: Continue comprehensive assessments of the spatial extent of hardbottom habitat within NCAP.

Integrated Strategy: Establish and implement hardbottom community monitoring in collaboration with neighboring Aquatic Preserves programs (i.e., assess coral and sessile invertebrate abundance and composition on hardbottom habitat and analyze monitoring data for trends).

Integrated Strategy: Characterize hardbottom habitats, including areas of special significance and areas of incompatible use.

Integrated Strategy: Explore use of spatial management areas including sea turtle, coral, and sponge refugia, areas that are most appropriate for non-consumptive ecotourism, no-anchoring areas, as well as areas where moorings and/or designated anchoring may be provided for sport fishing and non-consumptive tourism.

Goal Three, Objective One - Performance Measure One: Establish a hardbottom monitoring program for NCAP's hardbottom resources summarizing new data collected by NCAP, partner findings, and past research within the NCAP that is to be updated at least every two years.

Goal Four: Monitor the distribution and abundance of macroalgae within NCAP.

Objective One: Establish a baseline understanding of macroalgae components of the NCAP ecosystem.

Integrated Strategy: Develop a catalog of macroalgal species that occur within NCAP and identify taxa of special concern (e.g., species with nuisance/bloom potential, ecological indicator species).

Integrated Strategy: Explore the use of volunteer-based science programs to monitor the abundance of drifting macroalgae.

Goal Four, Objective One - Performance Measure One: Produce a technical brief about macroalgae species and patterns present within the NCAP to distribute to partners and the public.

Goal Five: Preserve the conditions of Nature Coast Aquatic Preserve's submerged resources.

Objective One: Work towards establishing minimum thresholds/monitoring criteria/benchmarks for NCAP's submerged resources in coordination with scientists and managers from other agencies and institutions.

Integrated Strategy: Identify/map sensitive submerged habitats like seagrass, hardbottom sponge communities, and submerged marine vents, for management purposes.

Integrated Strategy: Establish baselines of habitats that are linked to water quality such as seagrass, sponges, oyster reefs (distributions, community structure, densities, biomass estimates, etc.).

Integrated Strategy: Implement adaptive management tools and restoration projects when/if minimum thresholds / benchmarks are not met.

Goal Five, Objective One - Performance Measure One: Use a dashboard mechanism to facilitate data dissemination and rapid response notifications within the duration of the plan.

Goal Five, Objective One – Performance Measure Two: Engage with experts and utilize available data to determine consensus for minimum thresholds/benchmarks for water quality associated habitats within five years of plan adoption.

Objective Two: Identify and protect submerged and intertidal cultural resources.

Integrated Strategy: Partner with federal and state cultural resource agencies, NGOs and universities to ensure cultural resources are accurately documented and protected.

Integrated Strategy: Work with cultural resource partners to identify and address threats to cultural resources from human impacts such as looting, boat wake erosion, climate change, and other NCAP user group activities.

Integrated Strategy: Support cultural resource partners in establishing and implementing submerged cultural resource monitoring comparable to programs utilized by neighboring Aquatic Preserves.

Goal Five, Objective Two - Performance Measure One: Staff will obtain the appropriate training for identifying cultural resource issues (e.g., Archeological Resource Monitoring (ARM) Training, Heritage Monitoring Scouts).

Goal Five, Objective Two - Performance Measure Two: Work with Division of Historical Resources to report the condition of cultural resources within the NCAP and notify Division of Historical Resources of any new or potentially unrecorded sites as needed.

Goal Five, Objective Two – Performance Measure Three: Staff will monitor unidentified cultural resources during other activities in the aquatic preserve. Archaeologists will be invited to join them in the field.

Issue Four: Human Dimensions

Recreational activities in Florida commonly revolve in and around water bodies. It comes as no surprise that the Nature Coast is a popular destination for boating, paddle crafting, diving and snorkeling, and fishing. Aside from recreation, the abundance of commercially and recreationally targeted species increases the draw to this part of the state. The way humans interact with natural resources and how these actions impact the environment are complex and often researched, understood, and managed through the human dimensions framework (Bright et al. 2003). If left unmanaged, human influences can result in significant negative impacts to the Nature Coast's submerged resources. Many human related impacts can be improved through education and increased awareness. Others require policy updates to obtain necessary changes to improve resource conditions. Marine debris is a common component of the human dimension concept that requires direct action of managers in conjunction with community involvement and stewardship. This portion of the management plan outlines how NCAP staff will work to directly identify and remove marine debris sources that are impacting submerged resources throughout the region.

Goal One: Identify the impacts of, remove, and reduce the presence of marine debris (litter, derelict vessels, ghost traps, aquaculture and discarded fishing gear) within the Aquatic Preserve.

Objective One: Identify implications to the natural resources of the various types of marine debris occurring within the Aquatic Preserve.

Integrated Strategy: Conduct surveys assessing types of marine debris, documenting areas of high concentration, and noting habitat impacts of each type.

Integrated Strategy: Analyze data collected from marine debris removal efforts (both Aquatic Preserve and partner hosted events).

Integrated Strategy: Apply results of analysis to prioritize marine debris removal and educational efforts for contributing user groups.

Integrated Strategy: Review County comprehensive plans regarding the reduction of marine debris and attend meetings of local and state government boards and agencies to provide guidance and discuss relevant issues within NCAP.

Goal One, Objective One - Performance Measure One: Collect and analyze survey data and create a NCAP Marine Debris Action Plan for marine debris removal efforts organized by county for the duration of the management plan.

Objective Two: Remove marine debris from the resource by physical means.

Integrated Strategy: Apply for funding to offset cost of marine debris removal efforts.

Integrated Strategy: Conduct community-based marine debris removal events and invite partners/source contributors to attend and assist (e.g., members of the public for shoreline cleanups; law enforcement, recreational and commercial fishers, and aquaculture industry for fishing gear cleanups, etc.).

Goal One, Objective Two - Performance Measure One: Utilize the NCAP Marine Debris Action Plan to conduct removals and provide finding reports to participants and stakeholders.

Objective Three: Reduce marine debris at the source.

Integrated Strategy: Assess types of marine debris within the NCAP, quantify the data and determine the sources.

Integrated Strategy: Work with community members to reduce quantity of debris entering the NCAP.

Integrated Strategy: Host community-based cleanup events to improve user group interest.

Integrated Strategy: Engage with local government natural resource and planning departments to reduce or prevent the creation of litter/marine debris outright and attend meetings of local/state government boards and agencies to provide updates and discuss relevant issues within NCAP as appropriate to influencing factors of litter/marine debris production as they are identified.

Goal One, Objective Three- Performance Measure One: Track marine debris and promote behavior changing stewardship through education and other interventions.

Objective Four: Promote community education regarding implications of marine debris in the Aquatic Preserve and of solutions/impactful debris reduction actions that can take.

Integrated Strategy: Involve local decision makers and community influencers in marine debris removal events and provide information about marine debris interventions that can be implemented upstream.

Integrated Strategy: Promote community education and awareness by attending and/or facilitating community events relating to marine debris.

Goal One, Objective Four - Performance Measure One: Provide Marine Debris Action Plan and invitations to marine debris removal events to community influencers.

Goal One, Objective Four - Performance Measure Two: Track participants and materials distributed at community events.

4.3 / The Education and Outreach Management Program

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

4.3.1 / Background of Education and Outreach at Nature Coast Aquatic Preserve

The NCAP will work to collaborate with organizations in the region who have years of education and outreach geared toward environmental issues in Citrus, Hernando, and Pasco counties. NCAP will work to build upon and support exist programs instead of recreating initiatives that are already rooted in the region. A selection of education and outreach programs that are relevant to the NCAP management area are included below.

After the Flush

UF/IFAS Extension has crafted messaging that describes how septic systems work and what implications a mismanaged system can have on water quality. The program's materials explain how leaching from septic systems can lead to eutrophication in surrounding water bodies, leading to algal blooms and the deterioration of water quality. A series of instructions are provided to help homeowners who have septic systems installed properly maintain their systems (Lusk & Albertin, 2018).

Be Seagrass Safe

UF/IFAS Extension and Florida Sea Grant have spearheaded a campaign targeting boaters along the Nature Coast and Spring Coast regions. The campaign works to educate boaters how and why to avoid seagrass scarring while motoring in shallow areas where seagrass is present. Boaters are asked to take a pledge to engage in "seagrass safe boating." A variety of communications materials were developed to spread this message including a pledge card, banners, signs, brochures, and an informational website. Outreach was also conducted at boat ramps in Citrus and Hernando counties during the summer of 2019 (Florida Sea Grant, 2015).

Catch a Florida Memory

FWC's Catch a Florida Memory is designed to increase environmental stewardship in Florida anglers by providing incentives for catching a diversity of species, thus decreasing pressure on popular target species, and promoting responsible angling techniques. The program offers rewards for fishing achievements. Anglers are encouraged to release their catches and to use responsible handling (FWC, n.d. c).

Clean & Resilient Marina Program

DEP leads this program that offers a voluntary designation to marinas that follow best management practices such as addressing environmental issues like sensitive habitats, waste management, stormwater control, spill prevention, and emergency preparedness. The Clean & Resilient designation is reserved for facilities that also work to strengthen their ability to withstand natural and manmade disasters. Specific designations are outlined for Clean Marinas, Clean Boatyards, and Clean Marine Retailers (DEP, 2020a). The NCAP will work to increase participation in this program in the surrounding area.

Crystal River Mariculture Center

Duke Energy manages an 8,100-square-foot mariculture center in Citrus County. The center has successfully bred 12 marine species in its facilities, which include eight one-acre ponds that each hold one million gallons of seawater. The center also features environmental stewardship campaigns, through programs like its Marine Science Camps (personal communication, Enrique Latimer, April 5, 2021). In 2018, this facility established a large salt marsh nursery focusing on cultivating estuarine vegetation to assist in restoration efforts along Florida's Gulf Coast. The first plants from the center were harvested and relocated to their coastal locations in 2020 and the program has continued to gain momentum since (UF/IFAS, 2021a).

Energy and Marine Center

The Energy and Marine Center is in Pasco County on a coastal hammock on the Salt Springs Run Estuary. The center supports Pasco County's Marine Explorers Elementary Program, which includes a hands-on curriculum about estuarine ecosystems. It also has a high school program called Eco-Researchers, which gives students an opportunity to participate in field research, lab experiences, and other science activities (Pasco County Schools, n.d.).

Florida Boating and Angling Guide Series

FWC's Fishing and Wildlife Research Institute produced a series of educational guides for boaters and anglers across the state. The guides describe information about coastal and marine systems, including maps and text about marine resources and environmental information. The guides also describe how

boating and angling can impact the environment. Over 2.5 million guides have been printed, with specific edition on nearly all of Florida's coastal waters (FWC, 2013). Two guides cover the NCAP area. One has been produced for Citrus County and one was produced for Hernando and Pasco Counties.

Florida Friendly Fishing Guide/Florida Friendly Angler

This program, established by UF/IFAS, Florida Sea Grant, and FWC, recognizes fishing guides and recreational anglers who have committed to sustainable boating and fishing techniques. This voluntary certification can be acquired through participation in an online course that covers science-based techniques to reduce environmental impacts while fishing. The guide course takes about four hours to complete and is valid for three years while the recreational angler course takes about an hour. Topics include in the course include best practices for catch and release fishing, seafood safety and handling, sustainable waste management and fueling, an overview of marine ecology, environmental ethics, sustainable on-board materials, and giving back to fisheries management and research (Florida Sea Grant, n.d.).

Florida Friendly Landscaping Program

The primary objectives of the Florida-Friendly Landscaping Program are to increase the efficiency of landscape water use, reduce stormwater runoff and non-point source pollution, expand the use of Integrated Pest Management to manage and prevent pest problems with minimal environmental harm, and support the incorporation of the nine research-based Florida Friendly Landscaping principles into new and existing landscapes within Florida counties (Barber et al., 2020). In Pasco County, the Florida Friendly Landscaping program conserved an estimated 6.2 million gallons of water in 2020. The program spent approximately \$141,670 on educational services and hosted 36 presentations and events for the community in 2020, which included less programs than 2019 because of the COVID-19 pandemic. In 2020, they spent \$203,962 and hosted 55 presentations and community events (Barber et al., 2020)



Florida Horseshoe Crab Watch – Linked with Limulus

In 2015, FWC's Fish and Wildlife Research Institute (FWRI), UF/IFAS, and Florida Sea Grant launched a citizen science initiative that trained volunteers to assist biologists in surveying, tagging, and resighting Florida's nesting horseshoe crab populations using a standardized scientific protocol. The program has been so successful that FWC and UF/IFAS Florida Sea Grant expanded efforts to a statewide level. Current sampling areas include beaches in Hernando, Pinellas, Brevard, Taylor, Manatee, Volusia, Indian River, Martin, St. Lucie, Franklin, Nassau, Dixie, Levy, Sarasota, Charlotte, Lee, Sarasota, Monroe, Miami-Dade, and Collier counties (FWC, n.d. e). New sites in Pasco County entered the program in 2021 (personal communication, Savannah Barry, May 15, 2021).

Green Industries Best Management Practices

Green Industries Best Management Practices is an educational program for people working in lawn-care and landscape maintenance organized by UF/IFAS. The program teaches environmentally safe landscaping practices that help conserve and protect Florida's ground and surface waters. It includes a Pesticide Applicator Training program (UF/IFAS, 2021b).

High School Fishing Program

FWC began the High School Fishing Program to teach students how to become conservation-minded anglers. Students are taught about ethical angling, conservation, Florida's aquatic habitats, basic fishing gear, and general fishing concepts to help them become confident and environmentally responsible anglers. FWC works with schools across the state to share this curriculum. Participating schools are asked to conduct a conservation project by the end of the year (FWC, n.d. h).

Marine Science Station

The Marine Science Station, established in 1967, is a school in Citrus County that works to increase student environmental literacy through hands-on laboratory and field-based educational experiences in the Gulf of Mexico and surrounding areas (Citrus County Schools, 2022). The facility includes about 20 acres with nine buildings, including a museum, aquarium, and observation tower. Citrus County students in fourth and seventh grade science courses visit the school at no cost; 19 schools are served within the county. The school also offers a five-day summer camp where students stay in dorms. A central part of the curriculum is to teach students about the surrounding watershed, including nearby rivers, springs, and other waterways, and how those water bodies are connected to the Gulf of Mexico (personal communication, Earnie Olsen, March 9, 2021).

Master Gardener Program

The Master Gardener Program was created in 1979 by a group of extension agents. The program is now coordinated by UF/IFAS, relying on volunteers to provide gardening services to their communities. The program provides horticultural training to volunteers. In 2020, volunteers from the program contributed 186,000 hours, an estimated value of \$4.6 million (Master Gardener Program, n.d.).

Master Naturalist Program

The Florida Master Naturalist Program is an educational program targeted toward adults who are interesting in learning more about Florida's environment. The program was developed by the University of Florida and is provided by participating organizations. Graduates of the program are asked to share their knowledge about environmental sustainability and Florida's diverse ecosystems with their communities (Master Naturalist Program, n.d.).

Monofilament Recovery and Recycling Program

The Monofilament Recovery and Recycling Program is a statewide campaign to educate the public about the impacts of monofilament line, or fishing line, that is discarded in natural areas. Bins are located across the state to encourage recycling. The program also promotes volunteer cleanup events. Indoor and outdoor bins can be found in Citrus, Hernando, and Pasco counties (FWC, n.d. k).

Scallop Shell Disposal

The Homosassa River Alliance, UF/IFAS Extensions, Florida Sea Grant, and the SWFWMD has championed a program to limit the number of scallop shells dumped in the Homosassa River and other freshwater rivers near coastal regions known for scalloping. The program uses research and the distribution of educational materials to target recreational scallopers, including signs for private properties, rack cards, posters, and displays (Homosassa River Alliance, n.d.)

Scallop Sitter Program

The Scallop Sitter Program is a volunteer program that originated in the Florida Panhandle but has recently begun to recruit volunteers in Citrus, Hernando, and Pasco counties. The program was originally started by FWC and is now also supported by UF/IFAS Extension in Hernando County. Volunteers monitor and maintain cages of planted scallops by visiting them via kayak or at private docks. The cages are designed to protect scallops from predation and increase the population size of scallops in the region by contributing to the number of reproducing individuals (FWC, n.d. a).

Septic Upgrade Incentive Program

This program is led by DEP in Citrus, Hernando, Leon, Marion, Orange, Pasco, Seminole, Volusia, and Wakulla counties. DEP creates grant agreements with each county to conduct feasibility studies that identify the locations of onsite sewage treatment and disposal systems. Then, each county can best prioritize where it would be most appropriate to upgrade septic systems (DEP, n.d.).



Springs Coast Environmental Center

This Hernando County facility provides opportunities for students within the county to learn about environmental systems and environmental stewardship. The center has programs specifically geared toward elementary and middle school students and offers a summer camp (Hernando County, n.d. c).

Statewide Tournament Anglers Rodeo

The Coastal Conservation Association hosts an annual fishing competition in all of Florida's coastal counties. The competition is open to anglers of any skill level and offers prizes in a variety of categories, both for catching tagged and untagged fish. The tournament asks participants to follow a suite of conservation measures, including special handling instructions. They also provide prizes and community service hours for anglers who collect trash while out on the water. A citizen science component is part of the program's structure, as anglers are asked to log detailed information about their catches. Citrus County has promoted this event by releasing an additional four tagged redfish in their region (personal communication, Leiza Fitzgerald, April 20, 2021).

4.3.2 / Current Status of Education and Outreach at Nature Coast Aquatic Preserve

The NCAP was designated in June 2020. DEP oversees management of the NCAP and contracts with UF for staffing support for water quality and seagrass monitoring programs. NCAP staff will work to collaborate with organizations in the region who have years of education and outreach geared toward environmental issues in Citrus, Hernando, and Pasco counties. NCAP staff will build upon and support exist programs instead of recreating initiatives that are already rooted in the region. The education and outreach activities outlined in this section have been prioritized by NCAP staff with input from the advisory committee and the public. The order in which they are viewed does not reflect their significance to this management plan or DEP.

4.3.3 / Education and Outreach Issue

Issue Two: Protection and Management of Submerged Resources

Education and outreach are popular management tools that have been used to boost the success of resource management around the state. By providing science-based knowledge to an area's community, a sense of ownership and accountability can develop, which may improve user group behaviors. While the Nature Coast Aquatic Preserve has not had a structured, DEP lead education and outreach management component historically, stakeholders have been working in the area with the goal to maintain or improve specific resource impacts for many years. By partnering with these stakeholders, the NCAP aims to improve public awareness and promote informed stewardship and sustainable use. In addition, improving data accessibility can enhance these goals. Using current and historical data collected by a wide variety of contributors not only improves management decisions but can promote stewardship when made readily accessible to members of the community. DEP's SEACAR database is a collaborative process involving academic institutions, nongovernmental organizations, and local, state and federal natural resource managers. Data obtained from inventory and monitoring programs around the state are available here to help identify ecological the status and trends of Florida's estuarine resources and provide the best available science to guide public understanding, habitat management, planning and restoration efforts in formats that are accessible to all. Moving forward, the NCAP will strive to reach the goal of maintaining and restoring the aquatic preserve for future generations through sharing scientific data to improve stewardship and improving community understanding of submerged resources via improving audience reach.

Goal Six: Provide scientific data and information on the current and projected status of submerged resources to Nature Coast communities, businesses, and officials to improve stewardship of the NCAP in decision-making for coastal development and conservation.

Objective One: Improve community understanding of submerged resources and factors that impact the Nature Coast Aquatic Preserve by improving data dissemination and accuracy.

Integrated Strategy: Upload all eligible data into DEP’s Statewide Ecosystem Assessment of Coastal and Aquatic Resources (SEACAR) database, as well as other science-based databases to improve reach.

Integrated Strategy: Collaborate with partners to develop information briefs on submerged resources with executive summaries that are readily accessible and written for public distribution.

Goal Six, Objective One - Performance Measure One: Compile and upload NCAP submerged resource data into science-based databases, such as SEACAR, annually.

Goal Six, Objective One - Performance Measure Two: Within the first three years of plan implementation, develop a working list serv of interested parties for annual data briefing digital distribution.

Goal Six, Objective One - Performance Measure Three: Track quantity of subject matter specific materials distributed throughout the NCAP.

Issue Four: Human Dimensions

The education and outreach component associated with managing NCAP’s natural resources can be a complex component to the management plan. Many factors can and will impact the resources that this region has to offer. Importunely, human related causes are at the heart of many of these threats. By focusing on the human dimension element, staff can begin to address some of these threats and fortify public awareness.

One management topic that will need prioritization regarding education is marine debris. Marine debris comes in a variety of forms and can have a wide range of implications to NCAP’s submerged and intertidal resources. Identifying type of debris and their sources, in addition to involving the community, will steer management in the right direction to reduce marine debris entering the aquatic preserve. By identifying sources, staff can work with industry and user group members contributing sources to reduce these inputs. Hosting community-based shoreline cleanups and large-scale marine debris removal events can bolster stewardship and create personal connections to foster sustainable stewardship of the NCAP’s resources.

Improving community and decision makers/government leader understanding of the types of debris and the influence it has on the resources, in conjunction with the economic impacts, is crucial to the preservation of NCAP’s future. Reaching beyond this topic is necessary for the future and prosperity of the NCAP. Broadcasting accurate information regarding the NCAP’s water, submerged, intertidal and cultural resources will be an additional focus of this section. Sharing ecosystem function data, shoreline stabilization options, and citizen science/community driven resource protection programs will also strengthen public awareness and improve positive stewardship. NCAP staff will improve reach to the public and community decision makers by creating and distributing site and content specific information and attending community events and government meetings.

Goal Two: Support community engagement to foster sustainable stewardship of NCAP’s resources.

Objective One: Improve community understanding of the Nature Coast Aquatic Preserve’s water quality and submerged and intertidal resources including factors that impact the Aquatic Preserve.

Integrated Strategy: Create and disseminate accurate information via community outreach, media and signage.

Integrated Strategy: Develop appropriate media communications associated with water quality and submerged resource topics of concern to broaden information dispersal.

Integrated Strategy: Hold/support workshops on subjects such as shoreline protection, green infrastructure, coastal-friendly living, coastal resilience, and ecosystem services.

Integrated Strategy: Provide educational on-water site visits to the NCAP for community leaders to aid them in making informed decisions about coastal development and conservation; and members of the public to broaden awareness regarding the Nature Coast Aquatic Preserve.

Integrated Strategy: Support community driven resource protection programs to encourage user-driven education (e.g., Blue Star Fishing Guides, Florida Society for Ethical Tourism, Florida Friendly Fishing Guide, etc.).

Integrated Strategy: Support local education programs that enhance and foster sustainable stewardship practices within the NCAP (e.g., STEAM programs in public schools, Citrus County Marine Science Station, Florida Sea Grant 3rd Grade Manatee Curriculum, Sea-level Rise in the Classroom, Hook Line and Thinker, etc.).

Goal Two, Objective One - Performance Measure One: Track quantity of subject matter specific materials distributed throughout the NCAP.

Goal Two, Objective One - Performance Measure Two: Host or attend at least one workshop of coastal significance annually.

Goal Two, Objective One - Performance Measure Three: Promote at least one on-water site visit to community leaders each year.

Goal Two, Objective One - Performance Measure Four: Promote at least one on-water educational opportunity to the public each year.

Goal Two, Objective One – Performance Measure Five: Support the development of a citizen support organization that will foster communication and information dissemination and/or provide volunteer opportunities.

Goal Two, Objective One – Performance Measure Six: Attending and/or host at least one community event annually to support community education programs and enhance public awareness of NCAP's resources and management needs.

Objective Two: Engage with law enforcement to maintain and improve conditions of NCAP's water quality and submerged resources.

Integrated Strategy: Participate in cultural and natural resource education of local and state law enforcement officers.

Integrated Strategy: Develop communication and partnerships with law enforcement officers to assist in identifying and addressing emerging and ongoing resource threats.

Goal Two, Objective Two - Performance Measure One: Include/invite appropriate law enforcement representatives to participate in resource management opportunities to establish positive working relationships.

Goal Two, Objective Two - Performance Measure Two: Maintain ongoing communication with local law enforcement to understand, prevent, and deter potential threats to the resources.

Objective Three: Improve community education regarding implications of climate change in the aquatic preserve and of adaptation/resilience efforts.

Integrated Strategy: Engage local decision makers and community influencers in discussions about ways to reduce and adapt to the impacts of climate change.

Integrated Strategy: Track climate change interaction opportunities and promote behavior changing stewardship through education and other interventions.

Goal Two, Objective Three – Performance Measure One: Attend meetings of local/state government boards and agencies to provide updates and discuss relevant issues within NCAP as appropriate to factors of climate change as they are identified and encourage community interactions where appropriate.

4.4 / The Public Use Management Program

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

While access by the general public has always been a priority, the conservation of ORCP's sites is the primary management concern for ORCP. 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 ORCP'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 Nature Coast Aquatic Preserve

Tourism and Recreational Activities

The Nature Coast region is currently heralded as an interface between the development of South Florida and the undeveloped natural areas of the Big Bend region. Ecotourism is a major economic driver, with recreational opportunities like kayaking, boating, fishing, scalloping, snorkeling, birding, camping, and hiking in the region.

Birding

For many bird species, Florida is a stop along the Atlantic Flyway — a 3,000-mile-long pathway from the Arctic to the Caribbean. A variety of migratory bird species can be observed during the spring and fall, in addition to the resident bird species that can be seen year-round. Citrus, Hernando, and Pasco counties each have multiple viewing sites listed in FWC's Great Florida Birding and Wildlife Trail, a network of 510 wildlife viewing sites. Citrus County contains 21 viewing sites along the trail, Hernando County holds eight, and Pasco County hosts 10 sites (U.S. Fish and Wildlife Foundation of Florida , 2015).

Boating

Recreational boaters have access to 26 boat ramps in the NCAP area. Four of those boat ramps are located within the boundaries of the SMMAP. Fourteen boat ramps are in the Crystal River/Homosassa area. Two boat ramps in that region are part of a marinas, and the rest are standalone boat ramps. One boat ramp provides access at the Chassahowitzka River. Four standalone ramps provide access near Weeki Wachee, and one is located near Aripeka. Two ramps (one standalone and one marina) are near the town of Hudson. The remaining four ramps are near the town of New Port Richey: three are near the coast while one provides access further inland.

Camping

Florida State Parks offers camping via tent and RV at many parks throughout the state. Within the NCAP, camping is available at 12 sites in Citrus County, five sites in Hernando County, and three sites in Pasco County (Florida State Parks, 2021).

For-Hire Fishing

For-hire fishing is a major economic and recreational activity in the NCAP. Previous surveys of fishing guides have provided some information into what species are targeted during for-hire fishing activities (Camp, 2019). In Citrus County, spotted seatrout were targeted in over 37% of the for-hire fishing trips surveyed in 2019. This is much lower than in 2012, when spotted seatrout were targeted over 80% of the time and higher than in 2014 when they were targeted less than 20% of the time. Red drum was targeted just over 31% of the time in 2019, a decreased from over 50% the year before. Cobia, gag grouper, snook, sheepshead, white grunt, and tarpon were each targeted in less than 10% of 2019 trips surveyed. About 7% of trips surveyed had no species target. In Pasco County, spotted seatrout were targeted in over 25% of for-hire fishing trips, gag grouper at 24%, white grunt at 17%, red drum at 12%, tarpon and snook at 7%, and gray snapper at just over 1% (Camp & Hall, 2020a). In Hernando County, spotted seatrout were targeted in over 27% of trips, followed by gag grouper at 25%, red drum at 22%, white grunt at 9%, sheepshead at 5%, cobia at 3%, snook at 2%, and tarpon at less than 1% (Camp & Hall, 2020b).

Manatee Viewing

Kings Bay, which forms the headwaters of Crystal River in Citrus County, hosts the largest number of Florida manatees at a natural warm-water site. Florida manatees have limited ability to thermoregulate because of their low metabolic rate and high thermal conductance. Because of this, they migrate seasonally to natural warm-water sites like springs or artificial sites such as discharge areas for power plants (Sattelberger et al., 2017). Kings Bay is a designated manatee refuge, and a Manatee Recovery Plan has been established by the USFWS and the State of Florida. The plan places protections on warm-water sites, restricting boat speeds and recreational activities. During the winter season when manatees are most abundant (November 15 to March 31), protections include state protection zones and seven federal manatee sanctuaries. However, recent research has expressed concern that protected areas will soon reach carrying capacities to support the growing number of manatees that migrant to warm-water springs in the winter months. More than 500 manatees have been observed in Kings Bay in recent winter seasons. The annual average rate of increase of manatees in Kings Bay over the past 30 years was 7% or 4.81 animals each year (Sattelberger et al., 2017).

Both subspecies of West Indian Manatees were designated as federally endangered species in 1967 under the Endangered Species Preservation Act, but were recently reclassified to federally threatened in 2017. Manatees also receive protections under the U.S. Marine Mammal Protection Act of 1972 and the Florida Manatee Sanctuary Act. Citrus County also developed its own Manatee Protection Plan to reinforce the statewide Florida Manatee Recovery Plan. The Crystal River area receives protections as part of the Crystal River National Wildlife Refuge, established in 1983. Additional protections are afforded to manatees under the manatee refuge designations established in 2012 in the Kings Bay area — these protections are geared toward preventing manatee deaths from boat strikes (Kleen & Breland, 2014). Recent research suggests that manatee sanctuaries should be expanded in Kings Bay in the winter months, and boat speed should be more closely regulated in the summer (Sattelberger et al., 2017). Manatees return to the same wintering sites year after year — nearly 90% of manatees identified by scar patterns in Crystal River returned (Kleen & Breland, 2014). In Citrus County, manatees receive additional protections under the county's Comprehensive Plan. The plan contains criteria for marina/boat facility siting, law enforcement, shoreline/submerged land development, educational programs, habitat protection, manatee-human interactions, and governmental coordination (Citrus County Department of Development Services, 1998).



Recreational and Commercial Uses

Fishing, boating, and ecotourism industries in the area rely on the aquatic habitats in the NCAP area. Recreationally important sport fish, such as gag grouper, spotted seatrout, snook, redfish, tarpon, and gray snapper rely on the estuaries of the nature coast throughout their lifecycles. Benthic animals like stone crabs, bay scallops, and oysters are also prevalent in the area, as are forage species like pinfish and shrimp. Commercial fisheries that depend on the NCAP's seagrass generation more than \$12 million annually (FWC, 1999-2022). Coastal tourism and recreation in the NCAP generations more than \$250 million, supporting nearly 8,000 jobs and 500 businesses (NOAA, n.d. d). Recreational scalloping alone has contributed nearly \$2 million in both Citrus and Hernando counties each year since 2003 (Blassy, 2018). Important recreational and commercial fisheries have been described below.

Scallops

Only recreational harvesting of scallops is permitted in Florida. Scalloping season typically runs from July 1 to September 10 in Citrus and Hernando counties. In Pasco County, the season opens on July 16 and runs until July 25. This includes all state waters south of the Hernando – Pasco County line and north of the Anclote Key Lighthouse in Pinellas County, as well as all waters of the Anclote River (FWC, n.d. a). Harvesting is limited to two gallons of scallops in the shell, or one pint of scallop meat per person a day. No vessel may carry more than 10 gallons of whole scallops or ½ gallon of scallop meat at any time (Sweat & Vose, 2011).

Scallop populations began to decrease in some areas off Florida's west coast in the 1960s. By the 1990s, population numbers were so low that commercial harvesting was banned, and recreational harvesting was restricted, starting in 1994, to areas north and west of the Suwannee River between July 1 and September 10. After restoration programs by the University of South Florida (USF) and FWC saw success, recreational harvesting was reopened in 2002 between the Suwannee and Weeki Wachee Rivers during the July to September window (Stevens et al., 2004).

After seven years of closures, FWC reopened an area between the mouth of the Suwannee River and the Pasco/Hernando County line in 2002 for scalloping. The area was opened after the scallop abundance there was found to increase with a restoration program led by scallop researchers at the USF, Florida Sea Grant, and FWC Fish and Wildlife Research Institute (Sweat & Vose, 2011).

A survey of businesses was conducted by the Citrus County Tourism Development Office in 2002 to measure the impact of reopening the recreational scalloping season in the region. The survey found a revenue increase of \$577,142 for local businesses and \$867,196 for non-local businesses. The restored season resulted in 35 new jobs, \$636,300 in labor income, \$1,639,386 in total output, \$110,028 in indirect business taxes, and \$982,253 in value added (Stevens et al., 2004).

Stone Crabs

Florida's stone crab fishery is focused on the west coast of the state. The Crystal River region ranks third in terms of production in the state, contributing about 20% annually. Harvesters bait crabs with traps and then remove their claws while they are still alive. Crabs are returned to the water immediately after being declawed. The fishery in the Southeast U.S. is managed with a seven-month season, spanning from October 15 to May 15. A minimum claws size of 2 ³/₄ inches is required to limit the catch of young females who have not yet spawned. It generally takes one to two years for claws to regenerate, depending on the intermolt cycle the crab is in when claws are first removed (Muller et al., 2011).

A statewide survey of fish houses conducted by FWC found that an average of 31% of stone crab claws were likely harvested with forced breaks — a method found to lower the crab's likelihood of survival after being released. About 13% of claws showed evidence of regeneration, suggesting the crabs they were harvested from had claws removed previously (Muller et al., 2011).

A model evaluating stock assessment found that the fishery is likely being overfished, which can be confirmed by the lack of an increase in landings as the number of traps have doubled. Managers are especially concerned whether the fishery includes enough mature males. However, the stone crab fishery is considered resilient because females spawn at least once before reaching the legal size for claw removal. The closure of the fishery during spawning season and evidence suggesting that some crabs survive being declawed also contributes to fishery's resiliency. Previous stock assessments have focused on the region's commercial fishery and have yet to evaluate recreational fishing effort because of a lack of data (Muller et al., 2011).

Shrimp

Three species of penaeid shrimp are commercially important in the NCAP region: brown shrimp (*Farfantepenaeus aztecus*), pink shrimp (*Farfantepenaeus duorarum*), and white shrimp (*Litopenaeus setiferus*). All three species rely on nearshore waters and estuaries throughout their life cycles. Seagrass meadows are important habitats for penaeid shrimp during juvenile stages. Total annual commercial landing data from 2019 shows that all three species were harvested from the NCAP region. More than 50,000 pounds of pink shrimp were harvested from Hernando County. Between 10,000 and 50,000 pounds of white shrimp were harvested from Hernando County, between 5,000 and 10,000 pounds of white shrimp from Pasco County, and less than 1,000 pounds of white shrimp from Citrus County. Between 5,000 and 10,000 pounds of brown shrimp were harvested from Citrus County and less than 1,000 pounds from Hernando County (FWC, 2020). Dredging operations are used to shrimp in the NCAP area. Dredging equipment is designed to roll over seagrass and hardbottom without causing extensive damage (personal communication, Capt. William Toney, March 1, 2021). Research is needed to further investigate the impacts of shrimp trawling in the preserve. All dredging operations, including those used for commercial shrimping, should be monitored within the preserve to ensure the practice is not causing extensive damage to aquatic habitats.

Blue Crabs

Blue crab landings in Florida have declined overall since 1965, though a small increase in landings has been in recent years. In 2011, 6.8 million pounds of blue crabs were harvested from Florida's Gulf Coast,

and 3.7 million from the Atlantic Coast. The blue crab fishery is not only contained on the coast but extends inland to major waterways across the state. The commercial fishery relies on the use of traps, while the recreational fishery also includes dip nets and lines (Cooper et al., 2013).

Blue crabs depend on estuaries throughout their life cycle, especially during post settlement and reproduction phases (Cooper et al., 2013). High salinity is a necessity in the early stages of blue crabs' lives — optimal ranges span from 23 to 30 ppt. Salt marsh and seagrass habitats serve as nurseries for juvenile blue crabs, eventually heading to areas with less salinity before they reach their pubertal molt. After mating, mature females ride outgoing tides out of the estuary during the spring, summer, and fall months. This movement pattern has been documented along both the Gulf and Atlantic coasts. Crabs in the larval stage are also reliant on natural cycles like salinity regimes and coastal currents (Gandy et al., 2011). Habitat loss and degradation in the Gulf of Mexico is a threat to blue crabs, especially in areas where coastal environments have been converted or modified for development (Guillory et al., 2001).

Oysters

Historically, oyster reefs have been observed inshore among marsh islands and as linear reefs along the shoreline off the coasts of Citrus, Hernando, and Pasco Counties. Reefs were more abundant in the mid-19th century than they are today, and previously extended into the Crystal, Chassahowitzka, and Weeki Wachee Rivers (Radabaugh et al., 2019). Oysters have been identified in the lower reaches of Crystal River and the side channels of the Homosassa River. The variables influencing the distribution of oyster reef sites in these sites differ. In Crystal River, salinity most strongly determines where oyster reefs are located. Oysters were not abundant in areas where salinities averaged less than 5 ppt. In the Homosassa River, salinity was not a major factor in oyster distribution. Instead, oysters were not seen in areas where boat traffic was frequent, suggesting that boat wakes were the major limiting factor in this system (Anastasiou, 2019). The substrate favored by oysters differ in each area as well. In Crystal River, 71% of oyster reefs were growing on limestone substrate, while a mixture of sand and shell or mud and shell was favored by oysters in the Homosassa River (Anastasiou, 2019).

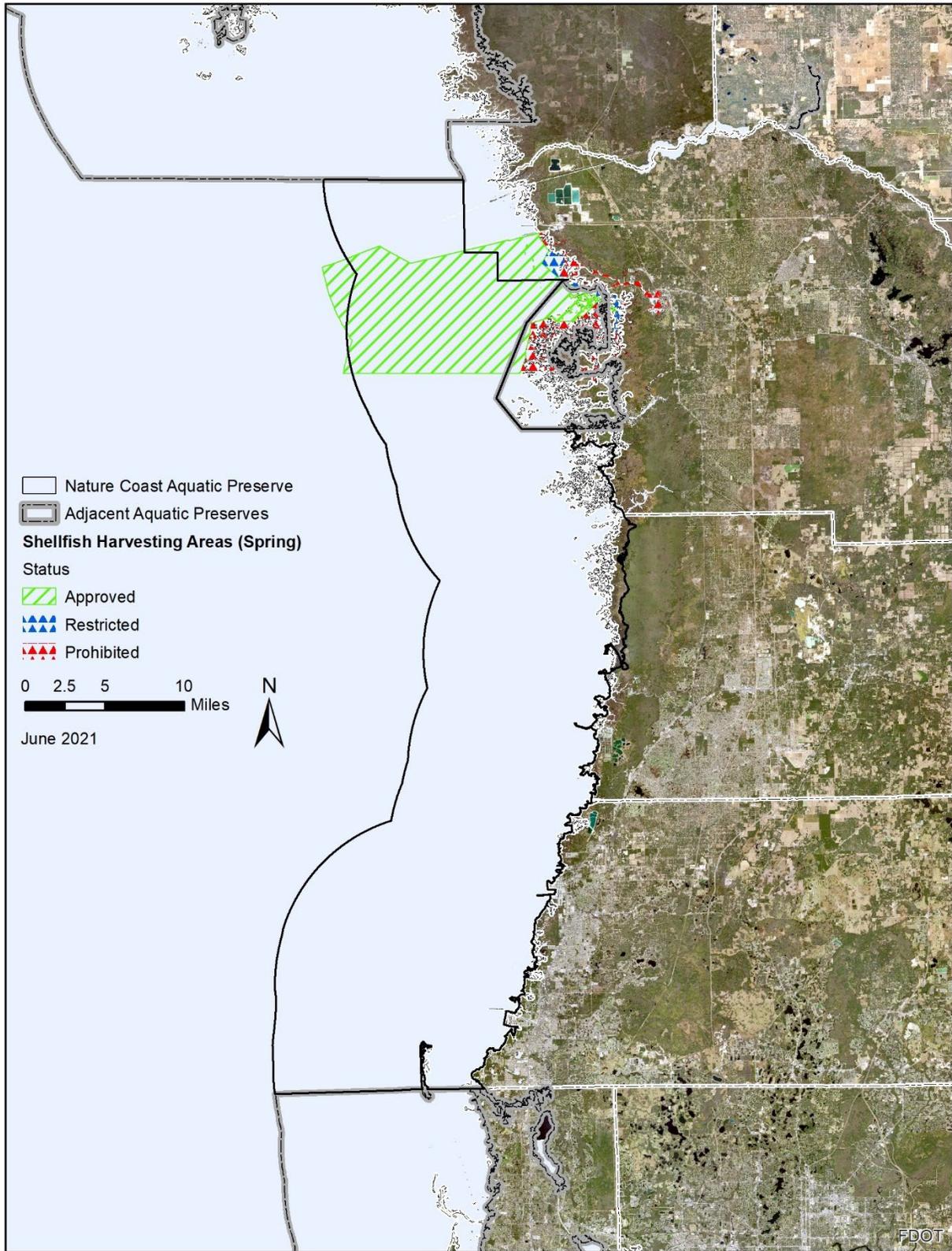
Oyster harvesting in the Springs Coast region peaked in the 1980s but began to decline in the 1990s after FDACS began closing shellfish harvesting areas in 1987 because of fecal coliform bacteria. Citrus County still contains open shellfish harvesting areas where wild oysters can be collected, which are monitored by FDACS (Radabaugh et al., 2019).

Public Use Impacts

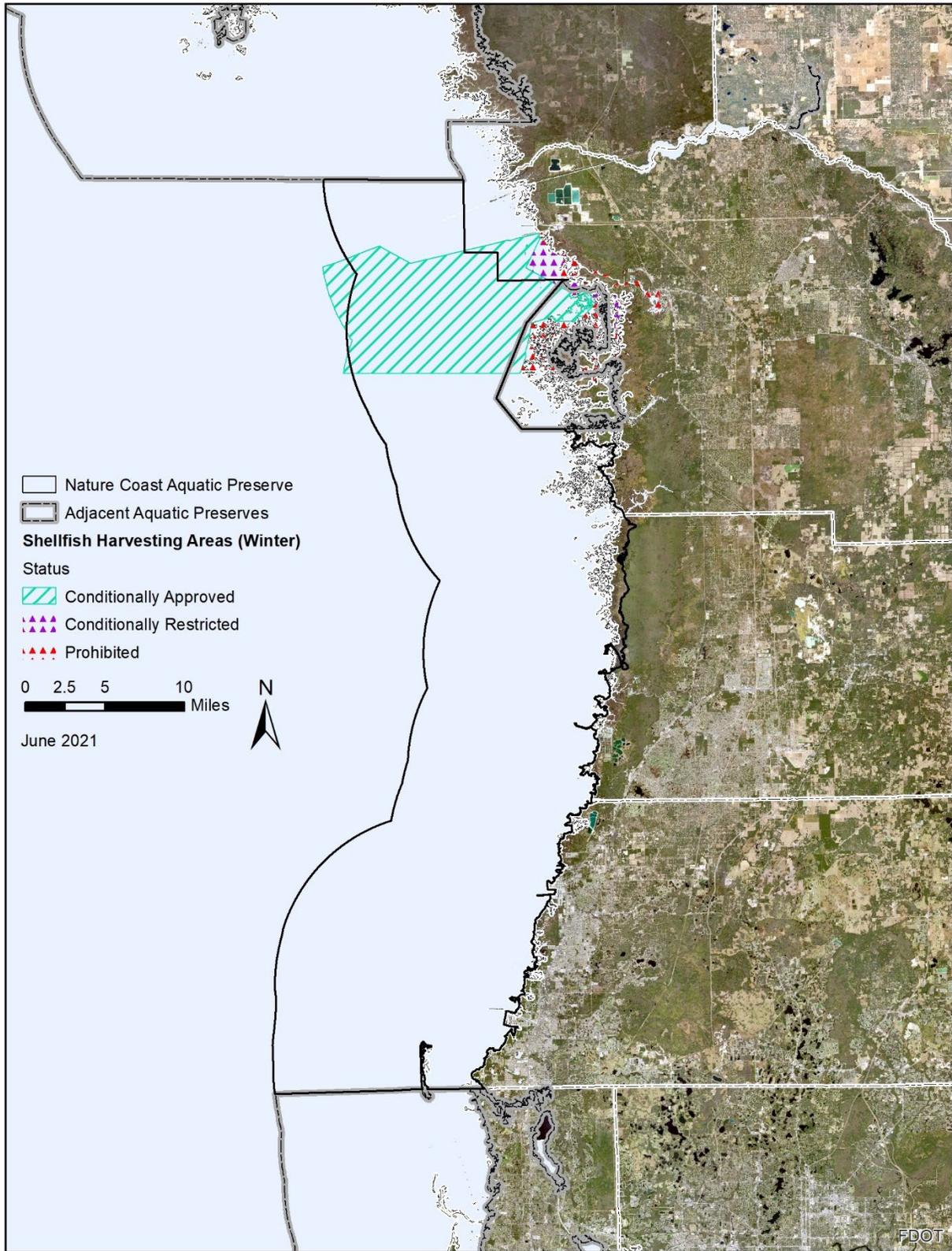
Seagrass Scarring

Seagrass scarring is a major issue in the NCA area. Noticeable propeller scarring has been observed at the mouth of the Pithlachascotee River, the St. Martins marker shoal, and near Anclote Key. Between 2007 and 2016, nearly 42,500 acres of continuous seagrass beds were lost. In exchange, nearly 60,000 acres of patchy seagrass was gained. Mapping offshore seagrass beds has proved difficult in the past using airborne mapping methods. FWC FWRI began using remote-sensing and high-resolution satellite imagery in 2012 to fill this gap (Yarbro & Carlson, 2018).

Research on community-based social marketing in Crystal River found that navigational aids were more effective in changing boating behavior than printed campaign materials. Boaters slowed their vessels at significantly further distances when aids were present. The number of boaters who slowed down also increased significantly. This could be explained by the proximity of the buoys to locations where seagrass scarring frequently occurred (Barry et al., 2020). However, even with navigational aids, only modest improvements in boater behavior were observed (Barry et al., 2020)



Map 14. Shellfish Harvesting Areas (Spring) within the Nature Coast Aquatic Preserve.



Map 15. Shellfish Harvesting Areas (Winter) within the Nature Coast Aquatic Preserve.

Boaters surveyed in Crystal River did not show a clear understanding of the benefits of seagrasses beyond the provision of habitat. While boaters place a high value on seagrass, many of them admitted to personally contributing to seagrass scarring in the region. Less experienced boaters were much more likely to rate scarring as important after they were exposed to education materials. But more experienced boaters were more likely to have scarred seagrass in the previous year. These findings point to a need for messages targeted to different audiences. Introductory-level messages could focus more generally on the benefits of seagrass, while advanced communications could include aerial imagery or information about the ecosystem services that are lost when scarring occurs (Barry et al., 2020).

FWC Marine Debris Program

FWC organizes a crab trap retrieval program for both blue crab and stone crab traps throughout the state. The program occurs during closed seasons for stone crabs and during a 10-day closure, every other year, for blue crabs. Commercial fishermen assist in removing gear. Gear that are attached to buoys with identifying information are linked back to the owner of the trap, and the owners are fined \$10 per trap. This program was organized to reduce the impacts of the large amount of crab traps lost each year (an estimated 3%-10% of gear is lost due to weather annually). Derelict trap removal events can be conducted outside the closed season windows by obtaining appropriate authorization from FWC. Derelict traps impact sensitive habitat, such as coral reefs and seagrass meadows. Marine animals can become entangled or trapped in wayward gear, and they present a navigational hazard for boaters. Stone crab traps are particularly impactful because they contain about 50 pounds of concrete to sink the gear to the ocean floor. FWC removes about 5,000 traps across the state each year (personal communication, Pamela Gruver, April 15, 2021).

NOAA Marine Debris Program

NOAA's Marine Debris Program (MDP) is a federal, nationwide program with a mission to investigate and prevent the adverse impacts of marine debris. Through six components: prevention, removal, research, monitoring and detection, response, and coordination, MDP supports projects and partnerships across the country with state and local agencies, tribes, NGO's, academia and industry. This support is provided through funding opportunities as well as informational resources such as the 'Abandoned and Derelict Vessel Info Hub.'

4.4.2 / Current Status of Public Use at Nature Coast Aquatic Preserve

The NCAP was designated in June 2020. DEP oversees management of the aquatic preserve. NCAP staff will work with Citrus, Hernando, and Pasco counties to ensure public use will be supported in the NCAP as appropriate. Public use activities outlined in this section have been prioritized by NCAP staff with input from the advisory committee and the public. The order in which they are viewed does not reflect their significance to this management plan or DEP.

4.4.3 / Public Use Issue

Issue Four: Human Dimensions

Florida's aquatic preserve program strives to protect living, productive waters throughout the state. These abundant resources draw people from around the world through recreation and tourism. Consequently, as population and tourism pressures rise, the resources within the NCAP may suffer from over and misuse. This aspect of the human dimension principle will need special consideration in the management of this aquatic preserve.

Promoting sustainable use by predicting future needs and identifying current and future impacts relating to the use of NCAP's resources are outlined in the management strategies below. Staff will provide input where appropriate to community decision makers regarding the potential conflict and future access needs to help reduce these impacts. Identifying heavily impacted areas and their impact sources to

reduce physical damage will be prioritized. By working with other entities like government and law enforcement representatives, damage to the resources within the Nature Coast Aquatic Preserve can be mitigated. This will ensure their sustainability for the enjoyment of future generations.

Goal Three: Promote diverse, sustainable use of the Nature Coast Aquatic Preserve's submerged natural resources.

Objective One: Anticipate impacts related to increased use and identify potential conflicts/impacts (environmental) like construction, pipelines, development and roadways, etc. and collaborate to mitigate or prevent habitat damage related to increased use/development.

Integrated Strategy: Provide input to state and local decision makers on future establishment of access points for both motorized and paddle craft points of entry

Integrated Strategy: Provide education to and support sustainable actions of user groups.

Integrated Strategy: Work with subject matter experts to identify specific actions that would prevent or reduce environmental impacts and deliver information to decision makers.

Integrated Strategy: Work with decision makers and involved parties to prevent or reduce impacts to preserve resources and water quality

Goal Three, Objective One - Performance Measure One: Develop, distribute and track quantities of educational materials to other government entities, ecotourism businesses and the public on NCAP subject matter. Update documents as needed or every five years. Track distribution locations, quantity and content of brochures distributed.

Objective Two: Coordinate and support law enforcement to reduce or prevent impacts to natural and cultural resources.

Integrated Strategy: Identify areas where resources are experiencing increased use and damage and exchange information with law enforcement.

Integrated Strategy: Aid law enforcement by working to improve criteria to increase enforceability of impacts to submerged resources.

Goal Three, Objective Two - Performance Measure One: Conduct annual interviews/focus groups with law enforcement staff and produce an internal report that will guide adaptive management covering emerging natural resource threats, greatest habitat marking needs, and specific changes that would increase enforceability of laws.

Goal Four: Identify impacted areas, assess impact severity, and begin to implement reduction and restoration efforts relating to propeller damage, vessel grounding and anchoring related activities occurring to submerged resources within the Nature Coast Aquatic Preserve.

Objective One: Assess and identify areas of impact within the Aquatic Preserve.

Integrated Strategy: Collaborate and/or apply for funding to conduct seasonal aerial mapping of shallow areas within the NCAP boundary

Integrated Strategy: Identify user groups and spatiotemporal areas of greatest impact.

Integrated Strategy: Seek resources to restore damaged seagrass areas, especially for areas where new protection and prevention measures are implemented.

Goal Four, Objective One - Performance Measure One: Produce educational materials from aerial mapping images of NCAP impacted areas and track where materials are distributed.

Objective Two: Reduce physical damage (e.g., propeller scarring, anchor drags) to the NCAP's submerged resources.

Integrated Strategy: Provide educational material on alternative methods (examples: pole and troll and less destructive anchoring and mooring methods, expansion of 'Scars Hurt' educational campaign).

Integrated Strategy: Identify and fill research gaps on effectiveness and feasibility of exclusion zones, pole and troll/no-motor zones, and/or limited access areas for resource protection.

Integrated Strategy: Utilize where appropriate, spatially explicit approaches such as rotating vessel exclusion zones, pole and troll areas, and pole/stick anchoring zones that prevent habitat damage (e.g., propeller scarring in seagrass, anchor damage to hardbottom) and promote habitat recovery from physical damage.

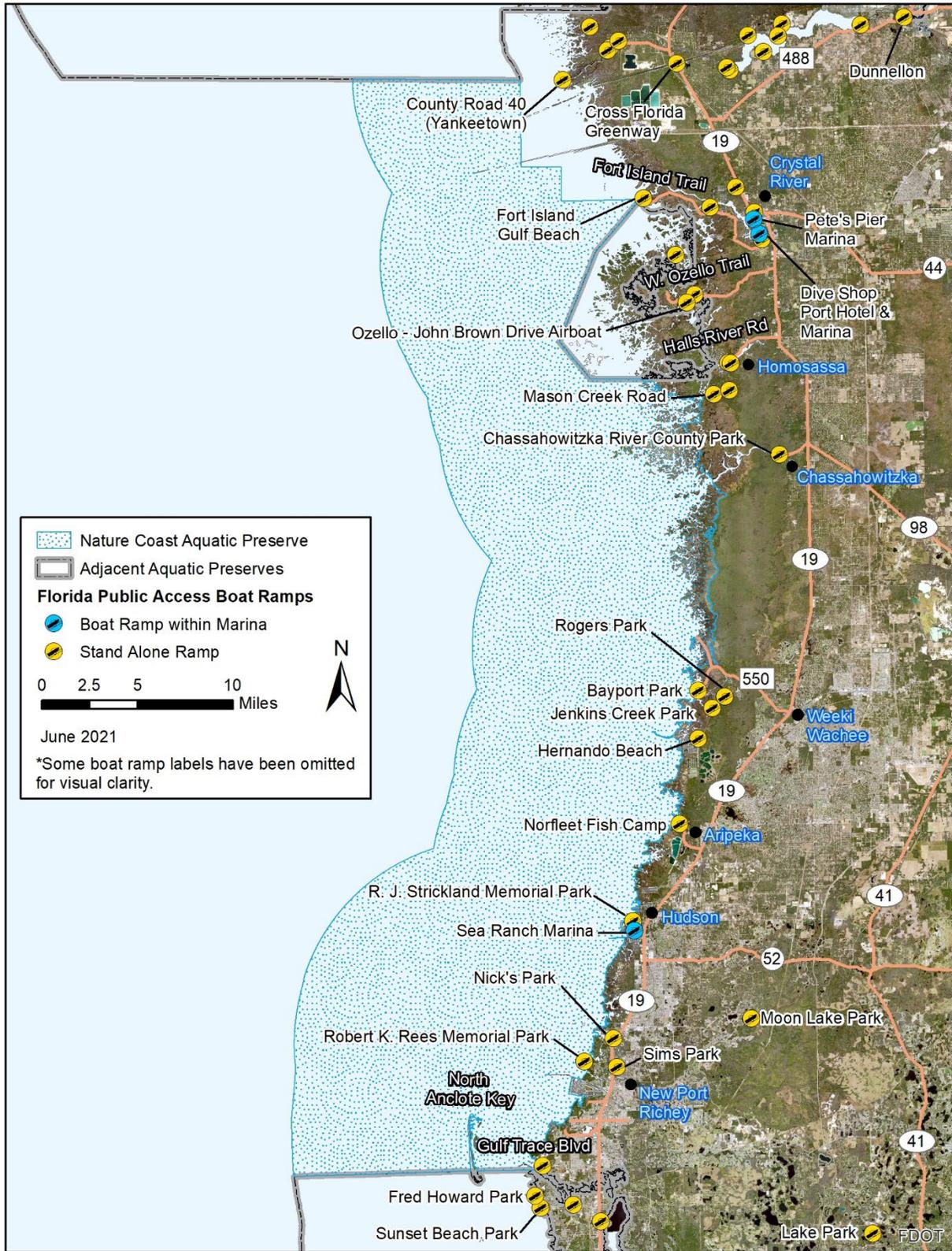
Integrated Strategy: Collaborate with groups such as law enforcement and waterway maintenance entities to inform appropriate actions to address boating impacts.

Integrated Strategy: Incorporate management practices that prevent or reduce the creation of propeller and anchor scars by improving navigation or establishing mooring areas within NCAP waterways.

Integrated Strategy: Identify scarring hotspots and determine the best practice to reduce scarring, may include education, pole and troll zones, for both creating and enforcing poling only zones and prioritizing increased enforcement.

Goal Four, Objective Two - Performance Measure One: Produce and / or utilize partner created publications to promote awareness and behavior changing stewardship within the NCAP. Track locations and quantities of educational material distribution.

Goal Four, Objective Two - Performance Measure Two: Generate a formal report by the year 2025 summarizing research on the effectiveness of spatial management strategies in mitigating resource damage and making recommendations for future action.



Map 16. Public access boat ramps in the Nature Coast Aquatic Preserve.



Chapter 5 / Administrative Plan

Successful implementation of the ecosystem science, public use, education, and resource management programs outlined in this management plan is dependent on an effective administration strategy and framework that provides for adequate staffing, facilities, funding, and cooperation with other agencies and citizen support. The objectives of the aquatic preserve's administrative program include the following: 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; and 4) to communicate and coordinate with all entities involved in research, education, commercial, and recreation utilization or management within the aquatic preserve.

Staffing

The Nature Coast Aquatic preserve is currently being managed through the Big Bend Seagrasses Aquatic Preserves office under a joint contract between the Florida Department of Environmental Protection and the University of Florida.

The plan's recommended actions, time frames, and cost estimates will guide the Office of Resilience and Coastal Protection's (ORCP) planning and budgeting activities over the period of this plan. These recommendations are based on the information that exists at the time the plan was prepared. A high degree of adaptability and flexibility must be built into this process to ensure that ORCP can adjust to changes in the availability of funds, unexpected events such as hurricanes, and changes in statewide issues, priorities and policies. Many of the strategies identified in this plan will be implemented using

existing staff and funding. However, a significant number of objectives and the strategies necessary to accomplish them cannot be completed during the life of the plan without additional resources.

Statewide priorities for management and restoration of submerged and coastal resources are evaluated each year as part of the process for planning ORCP's annual budget. When preparing ORCP's budget, it considers the needs and priorities of the entire aquatic preserve program, other programs within ORCP, and the projected availability of funding from all sources during the upcoming fiscal year. ORCP pursues supplemental sources of funds and staff resources whenever possible, including grants, volunteers, and partnerships with other entities. ORCP's ability to accomplish the specific actions identified in the plan will be determined largely by the availability of resources, which may vary from year to year. Consequently, the target schedules and estimated costs identified in Appendix D may need to be adjusted during the ten-year management planning cycle.



Chapter 6 / Facilities Plan

The Nature Coast Aquatic Preserve (NCAP) is currently sharing space with the Big Bend Seagrasses Aquatic Preserves office which is housed within the Crystal River Preserve State Park located on the north end of the city of Crystal River at 3266 North Sailboat Avenue, Crystal River, Florida, 34428. The facility includes staff office space and laboratory space totaling 5,300 square feet. The complex also includes a 1,250 square foot pole barn under which vessels are stored, and a small storage shed. The facility has a boat ramp on the Crystal River for agency and staff use only.

Upon the occasion of a hurricane or major storm event, all vehicles and vessels of NCAP will follow the procedures outlined in the Big Bend Aquatic Preserves Management Plan, which is updated annually.

Vehicles

NCAP acquired a 2020 Ford F-150 4x4 vehicle thanks to a donation from PEW Charitable Trusts.

Vessels

NCAP acquired a 2021 Aluminum 20-foot Sea Ark with a 2021 Yamaha 115 horsepower motor thanks to a donation from PEW Charitable Trust.

NCAP also has access to an 18' airboat and trailer which can be used for objectives such as water quality sampling and monitoring seagrass habitat in shallow areas. This was an existing DEP vessel that needed repairs to be operational. A new hull, powder coating and reconnection of engine were made possible through a donation from PEW Charitable Trust.

Appendix A / 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 ensure 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 267: Historical Resources

Florida Statutes, Chapter 370: Saltwater Fisheries

Florida Statutes, Chapter 372: Wildlife

Florida Statutes, Chapter 403: Environmental Control

(Statute authorizing the Florida Department of Environmental Protection (DEP) to create Outstanding Florida Waters is at 403.061 (27))

Florida Statutes, Chapter 597: Aquaculture

A.3 / Florida Administrative Code

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

Florida Administrative Code, Chapter 18-20: Florida Aquatic Preserves

<https://www.flrules.org/gateway/ChapterHome.asp?Chapter=18-20>

Florida Administrative Code, Chapter 18-21: Sovereignty Submerged Lands Management

<https://www.flrules.org/gateway/ChapterHome.asp?Chapter=18-21>

Florida Administrative Code, Chapter 62-302: Surface Water Quality Standards

(Rule designating Outstanding Florida Waters is at 62-302.700)

<https://www.flrules.org/gateway/ChapterHome.asp?Chapter=62-302>

Appendix B / Resource Data

B.1 / Glossary of Terms

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

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

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

aquifer – a body of porous rock or soil through which water passes and in which water gathers (Collin, 2004).

biodiversity – the range of species, subspecies or communities in a specific habitat such as a rainforest or a meadow (Collin, 2004).

biotic community – a community of organisms in a specific area (Collin, 2004).

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).

epifauna – the total animal life inhabiting a sediment surface or water surface; epibenthos (Lincoln et al., 2003).

estuary – a part of a river where it meets the sea and is partly composed of salt water (Collin, 2004).

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).

habitat – the type of environment in which a specific organism lives (Collin, 2004).

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

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

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

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

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

monitoring – a process of regular checking on the progress of something (Collin, 2004).

mosaic - an organism comprising tissues of two or more genetic types; usually used with reference to plants (Lincoln et al., 2003).

pollution – the presence of unusually high concentrations of harmful substances in the environment, as a result of human activity or a natural process (Collin, 2004).

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).

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. A similar term is "species at risk," which is a general term for listed species as well as unlisted ones that are declining in population. Canada uses the term in its new "Species at Risk Act." "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).

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

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

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

AA Roads. (n.d.). State Road 589. Retrieved from <https://www.aaroads.com/guides/fl-589/>

Allaby, M. (Ed.). (2005). *Oxford dictionary of ecology* (3rd ed.). Oxford University Press.

Allen, M., Dluzniewski, T., Johnson, E., Stanfill, A., Stevens & Trotter, A. (2022, February 22-23). Investigating drivers of seasonal shifts in fish habitat use in the Homosassa river system. [Conference presentation abstract]. Water Institute Symposium, Gainesville, FL.

Alsop, F. J. (2002, February 6). *Birds of Florida*. New York, NY: Dorling Kindersley Inc.

Amy H Remley Foundation. (2010). Restore the waters. Retrieved from www.amyhremleyfoundation.org

Anastasiou, C. (2019). Feasibility study for living shoreline projects in the Crystal River and Homosassa River estuaries. Prepared for Southwest Florida Water Management District.

Anthony, A., Atwood, J., August, P., Byron, C., Cobb, S., Foster, C., Fry, A. Gold, K. Hagos, L. Heffner, D. Q. Kellogg, K. Lellis-Dibble, J. J. Opaluch, C. Oviatt, A. Pfeiffer-Herbert, N. Rohr, L. Smith, T. Smythe, J. Swift, & N. Vinhateiro. (2009). Coastal lagoons and climate change: ecological and social ramifications in US Atlantic and Gulf coast ecosystems. *Ecology and Society*, 14(1).

Arnold, W. S., Blake, N. J., Harrison, M. M., Marelli, D. C., Parker, M. L., Peters, S. C., & Sweat, D. E (2005). Restoration of bay scallop (*Argopecten irradians* (Lamarck)) populations in Florida coastal waters: planting techniques and the growth, mortality and reproductive development of planted scallops. *Journal of Shellfish Research*, 24(4), 883-904.

Associated Press. (2012, May 29). Anclote power plant to be converted to natural gas. Tampa Bay Times. Retrieved from <https://www.tampabay.com/news/anclote-power-plant-to-be-converted-to-natural-gas/1222480/>

Atkins. (2017). Anclote River Watershed Management Master Plan. Southwest Florida Water Management District. Retrieved from https://www.pinellascounty.org/environment/watershed/pdf/Anclote_WMP_Project_Plan.pdf

Barber, L., Moll, J. & Heitzmann, D. (2020 November). *Florida-Friendly Landscaping Program* [Executive Summary Report]. UF/IFAS Extension. Retrieved from https://legistarweb-production.s3.amazonaws.com/uploads/attachment/pdf/1006837/FFL_Tri_County_Annual_Report_FY_2020.pdf

Barry, S., Ankersen, T., Camp, E., Clark, M., Griffiths, L., and Allen, M. (2022a). Feasibility assessment of special management areas to enhance recreational fisheries and habitat. (Final Report). Florida Sea Grant, PD-20-09.

Barry, S. C., Jacoby, C. A., & Frazer, T. K. (2017). Environmental influences on growth and morphology of *Thalassia testudinum*. *Marine Ecology Progress Series*, 570, 57-70.

Barry, S. C., Raskin, K. N., Hazell, J. E., Morera, M. C., & Monaghan, P. F. (2020). Evaluation of interventions focused on reducing propeller scarring by recreational boaters in Florida, USA. *Ocean & Coastal Management*, 186, 105089.

- Barry, S., Thomas, S., MacDonnell, C., Scharf, B., & Patterson, J. (2022b). Monitoring reveals similar recovery progress among sediment-tube-based propeller scar restoration approaches. Seminar presented at the World Seagrass Conference and 14th International Seagrass Biology Workshop, Annapolis, MD.
- Barshel, A., Sanders, S., Ankersen, T., Pistole, E., Allen, M., Hall-Scharf, B., and Kolasa, K. (2018). A strategic marine area plan for Hernando County. (n.d). Retrieved from https://www.flseagrant.org/wp-content/uploads/Hernando-County_Strategic-Marine-Area-Plan_Final-2_15_2018.pdf.
- Bean, E., Jarrett, L., Haldemann, B., Searcy, J.K., Jones, P. (2020). Guidance for amending urban soils with organic amendments. Report prepared for the Florida Department of Environmental Protection.
- Bean, E. and Radovanovic, J. (2021). *Evaluation of water use and water quality effects of amending soils and lawns*. Report prepared for Southwest Florida Water Management District.
- Beckwith, S. L. (1967). Chinsegut Hill-McCarty Woods, Hernando County, Florida. *Quarterly Journal of the Florida Academy of Sciences*, 30(4), 250-268.
- Behringer, D. and Patterson, J. (2021). *Sponge enhancement and restoration on the Florida Gulf Coast*.
- Bennett, N. J., Whitty, T. S., Finkbeiner, E., Pittman, J., Bassett, H., Gelcich, S., & Allison, E. H. (2018). Environmental stewardship: a conceptual review and analytical framework. *Environmental management*, 61(4), 597-614.
- Bester, C. (2022). *Lachnolaimus maximus*. Florida Museum. Retrieved from <https://www.floridamuseum.ufl.edu/discover-fish/species-profiles/lachnolaimus-maximus/>
- Binns, H. (2019, October 8). *Healthy seagrass forms underwater meadows that harbor diverse marine life*. PEW Charitable Trusts. Retrieved from <https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2019/10/healthy-seagrass-forms-underwater-meadows-that-harbor-diverse-marine-life>
- Blassy, N. (2018, July 20). *First scallop season opens in Pasco County after more than 20 years*. WUSF News. <https://wusfnews.wusf.usf.edu/news/2018-07-20/first-scallop-season-opens-in-pasco-county-after-more-than-20-years>
- Bortolus, A., Adam, P., Adams, J. B., Ainouche, M. L., Ayres, D., Bertness, M. D., Bouma, T. J., Bruno, J. F., Caçador, I., Carlton, J. T., Castillo, J. M., Costa, C. S. B., Davy, A. J., Deegan, L., Duarte, B., Figueroa, E., Gerwein, J., Gray, A. J., Grosholz, E. D., Hacker, S. D., Hughes, A. R., Mateos-Naranjo, E., Mendelsohn, I. A., Morris, J. T., Muñoz-Rodríguez, A. F., Nieva, F. J. J., Levin, L. A., Li, B., Liu, W., Pennings, S. C., Pickart, A., Redondo-Gómez, S., Richardson, D. M., Salmon, A., Schwindt, E., Silliman, B. R., Sotka, E. E., Stace, C., Sytsma, M., Temmerman, S., Turner, R. E., Valiela, I., Weinstein, M. P., and Weis, J. S.. (2019). *Supporting Spartina: Interdisciplinary perspective shows Spartina as a distinct solid genus*. *Ecology* 100(11):e02863. 10.1002/ecy.2863
- Bright, A. D., Cordell, K., Hoover, A. P., & Tarrant, M. A. (2003). *A Human Dimensions Framework: Guidelines for Conducting Social Assessments*. Retrieved from https://www.srs.fs.usda.gov/pubs/gtr/gtr_srs065.pdf
- Burrows, M. T., Schoeman, D. S., Buckley, L. B., Moore, P., Poloczanska, E. S., Brander, K. M., Brown, C., Bruno, J.F., Duarte, C.M., Halpern, B.S., Holding, J., Kappel, C.V., Kiessling, W., O'Connor, M.I., Pandolfi, J.M., Parmesan, C., Schwing, F.B., Sydeman, W.J., & Richardson, A. J. (2011). The pace of shifting climate in marine and terrestrial ecosystems. *Science*, 334(6056), 652-655.
- Camp, E. (2019). *For-hire angler travel and targeting report 2019: Citrus County*. Prepared for Florida Sea Grant.

- Camp, E. and Hall-Scharf, B. (2020a). *For-hire angler travel and targeting report 2020: Pasco County*. Prepared for Florida Sea Grant.
- Camp, E. and Hall-Scharf, B. (2020b). *For-hire angler travel and targeting report 2020: Hernando County*. Prepared for Florida Sea Grant.
- Camp, E. V., Staudhammer, C. L., Pine, W. E., Tetzlaff, J. C., & Frazer, T. K. (2014). Replacement of rooted macrophytes by filamentous macroalgae: effects on small fishes and macroinvertebrates. *Hydrobiologia*, 722(1), 159-170.
- Carballo J. L. & Bell J. J., 2017. Climate change and sponges: an introduction. *Climate Change, Ocean Acidification and Sponges*, pp 1-11. Retrieved from <https://news-oceanacidification-icc.org/2017/11/10/climate-change-and-sponges-an-introduction/>
- Chassahowitzka Wildlife Management Area. (2019). *Chassahowitzka Wildlife Management Strategy*. Prepared for Florida Fish and Wildlife Conservation Commission.
- Chassahowitzka Wildlife Management Area. (2021). *Chassahowitzka Wildlife Management Area Draft Management Plan 2021-2031*. Prepared for Florida Fish and Wildlife Conservation Commission.
- Choice, Z. D., Frazer, T. K., & Jacoby, C. A. (2014). Light requirements of seagrasses determined from historical records of light attenuation along the Gulf coast of peninsular Florida. *Marine pollution bulletin*, 81(1), 94-102.
- Citrus County Department of Development Services (1998). *Citrus County Comprehensive Plan*. Retrieved from https://myfwc.com/media/7358/citruscountympp_1997.pdf
- Citrus County. (2016). *Land Development Code: Citrus County*. Retrieved from https://citrusbocc.com/departments/growth_management/land_development_division/land_development_code/index.php
- Citrus County. (n.d.). *Parks and Beaches: Citrus County*. Retrieved from https://www.citrusbocc.com/departments/community_services/parks_recreation/parks_beaches/index.php
- Citrus County Schools. (2022). Marine Science Station. Retrieved from <https://mss.citrusschools.org>
- City of Crystal River (n.d. a). *History of Crystal River*. Retrieved <https://www.crystalriverfl.org/community/page/history-crystal-river>
- City of Crystal River (n.d. b). *Community Services: Hunter Spring Park*. Retrieved from <https://www.crystalriverfl.org/comserv/page/hunter-springs-park>
- Cofer, R. (1979). Bootleggers in the backwoods: Prohibition and the Depression in Hernando County. *Tampa Bay History*, 1(1), 4.
- Cogger, C. G. (2005). Potential compost benefits for restoration of soils disturbed by urban development. *Compost science & utilization*, 13(4), 243-251.
- Cooper, W., Gandy, R., and Crowley, C. (2013). *A stock assessment for blue crab, Callinectes sapidus, in Florida waters through 2011*. Report prepared by the Florida Fish and Wildlife Conservation Commission. Retrieved from <https://myfwc.com/media/13334/bc-2012.pdf>
- Copeland, R., Scott, T.M., & Lloyd, J.M. (1991). *Florida's ground water quality monitoring program: Hydrogeological framework* (Special Publication, No. 32). Tallahassee, FL: Florida Geological Survey
- Coulter, M.C., Rodgers, J.A., Ogden, J.C., & Depkin, F.C. (1999). *Wood Stork (Mycteria americana)*, version 2.0. In *The Birds of North America*. (Poole, A.F. & Gill, F.B. (Ed(s)). Ithaca, NY: Cornell Lab of Ornithology. Retrieved from <https://doi.org/10.2173/bna.409>
- Davis, J. E. (2017). *The Gulf: the making of an American sea*. New York, NY: Liveright Publishing.

- Defeo, O., McLachlan, A., Schoeman, D.S., Schlacher, T.A., Dugan, J., Jones, A. Lastra, M., and Scapini, F. (2009). Threats to sandy beach ecosystems: A review. *Estuarine, Coastal, and Shelf Sciences* 81: 1 – 12.
- DeHaven, M. (2004). *Comprehensive shellfish harvesting area survey of Withlacoochee Bay, Levy County, Florida*. Tallahassee, FL: Florida Department of Agriculture and Consumer Services.
- Dluzniewski, T. (2019). Integrating drivers of seasonal shifts in fish assemblages of the Homosassa River system [Masters Thesis proposal, University of Florida].
- Doody, J.P. (2008). *Saltmarsh conservation, management, and restoration: Coastal systems and continental margins*. New York, NY: Springer.
- Duke Energy. (2020, October 1). *Crystal River Nuclear Power Plant: Accelerated decommissioning*. Retrieved from <https://www.duke-energy.com/Our-Company/About-Us/Power-Plants/Crystal-River>
- Echevarria, M., Naar, J. P., Tomas, C., & Pawlik, J. R. (2012). Effects of *Karenia brevis* on clearance rates and bioaccumulation of brevetoxins in benthic suspension feeding invertebrates. *Aquatic toxicology*, 106, 85-94.
- Ecological Society of America. (2004). *Invasion*. Retrieved from <https://www.esa.org/esa/wp-content/uploads/2012/12/invasion.pdf>
- Ewel, K.C., Twilley, R.R., & Eong Ong, J. (1998). Different kinds of mangrove forests provide different goods and services. *Global Ecology and Biogeography Letters*, 7(1), 83-94.
- Feldman, T. D. (1987). Fire control and ecological succession in McCarty Woods, Hernando County, Florida. *Florida Geographer*, 21.
- Ferguson, E. (2004). *A vascular plant inventory of Jay B. Starkey Wilderness Park, Pasco County, Florida*. [Unpublished thesis]. University of South Florida.
- FLIP. (2011). *Florida invasive plant mobile field guide*. Retrieved from <http://www.plantatlas.usf.edu/flip/>
- Florida 2070. (2017). *What is Your Vision for Florida's Future?* Retrieved from <http://1000friendsofflorida.org/florida2070>
- Florida Department of Agriculture and Consumer Services. (n.d. a). *Casuarina spp.* Retrieved from <https://www.fdacs.gov/Agriculture-Industry/Pests-and-Diseases/Plant-Pests-and-Diseases/Noxious-Weeds/Casuarina-spp.-Australian-Pines>
- Florida Department of Agriculture and Consumer Services. (n.d. b). *Withlacoochee State Forest*. Retrieved from <https://www.fdacs.gov/Forest-Wildfire/Our-Forests/State-Forests/Withlacoochee-State-Forest>
- Florida Department of Agriculture and Consumer Services. (2020, June 30). *Florida Statewide Agricultural Irrigation Demand: 2018-2045*. Retrieved from <https://www.fdacs.gov/content/download/92578/file/FSAID-VII-Water-Use-Estimates-Final-Report.pdf>
- Florida Department of Environmental Protection. (n.d.). *Septic Upgrade Incentive Program*. Retrieved from <https://floridadep.gov/sites/default/files/Septic%20Upgrade%20Incentive%20Program%20Information.pdf>
- Florida Department of Environmental Protection. (2008). *Crystal River Archaeological State Park Unit Management Plan*. Retrieved from <https://floridadep.gov/CRArchaeologicalSP-UMP.pdf>

- Florida Department of Environmental Protection. (2017). *St. Martins Marsh Aquatic Preserve Management Plan*. Retrieved from <http://publicfiles.dep.state.fl.us/CAMA/plans/St-Martins-Marsh-AP-Management-Plan.pdf>
- Florida Department of Environmental Protection. (2018a) *Anclote Key Preserve State Park*. Retrieve from <https://www.floridastateparks.org/parks-and-trails/anclote-key-preserve-state-park>
- Florida Department of Environmental Protection. (2018b). *Crystal River/Kings Bay Basin Management Action Plan*. Retrieved from <https://floridadep.gov/sites/default/files/Crystal%20River%20Kings%20Bay%20Final%202018.pdf>
- Florida Department of Environmental Protection. (2018c June). *Homosassa and Chassahowitzka Springs Groups Basin Management Action Plan*. Retrieved from <https://floridadep.gov/sites/default/files/Homosassa%20Chassahowitzka%20Final%202018.pdf>
- Florida Department of Environmental Protection. (2018d). *Pinellas County and Boca Ciega Bay Aquatic Preserves Management Plan*. Retrieved from <http://publicfiles.dep.state.fl.us/CAMA/plans/Pinellas-County-Boca-Ciega-Bay-AP-Management-Plan.pdf>
- Florida Department of Environmental Protection. (2018e). *Weeki Wachee Basin Management Action Plan*. Retrieved from <https://floridadep.gov/sites/default/files/Weeki%20Wachee%20Final%202018.pdf>
- Florida Department of Environmental Protection. (2020a). *Clean Marina Program*. Retrieved from <https://floridadep.gov/rcp/clean-marina/content/clean-marina-program>
- Florida Department of Environmental Protection. (2020b). *Salt Marshes*. Retrieved from <https://floridadep.gov/rcp/saltmarshes>
- Florida Department of Environmental Protection. (2021). *Onsite Sewage Program*. Retrieved from <https://floridadep.gov/water/onsite-sewage>
- Florida Department of Health. (2021). *Florida Water Management Inventory (FLWMI)*. Retrieved from <https://gis.floridahealth.gov/flwmi>
- Florida Fish and Wildlife Conservation Commission. (n.d. a). *Bay Scallops*. Retrieved from <https://myfwc.com/fishing/saltwater/recreational/bay-scallops/>
- Florida Fish and Wildlife Conservation Commission. (n.d. b). *Brown Pelican*. Retrieved from <https://myfwc.com/wildlifehabitats/profiles/birds/shorebirdsseabirds/brown-pelican/>
- Florida Fish and Wildlife Conservation Commission. (n.d. c). *Catch a Florida Memory*. Retrieved from <https://catchafloridamemory.com/>
- Florida Fish and Wildlife Conservation Commission. (n.d. d) *Citrus Wildlife Management Area*. Retrieved from <https://myfwc.com/recreation/cooperative/citrus/>
- Florida Fish and Wildlife Conservation Commission. (n.d. e). *Florida Horseshoe Crab Watch – Linked with Limulus*. Retrieved from <https://myfwc.com/research/saltwater/crustaceans/horseshoe-crabs/citizen-watch>
- Florida Fish and Wildlife Conservation Commission. (n.d. f). *Flying Eagle Wildlife Management Area*. Retrieved from <https://myfwc.com/recreation/cooperative/flying-eagle>
- Florida Fish and Wildlife Conservation Commission. (n.d. g). *Half Moon Wildlife Management Area*. Retrieved from <https://myfwc.com/recreation/lead/half-moon>
- Florida Fish and Wildlife Conservation Commission. (n.d. h). *High School Fishing Program*. Retrieved from <https://myfwc.com/education/programs/high-school-fishing/>

- Florida Fish and Wildlife Conservation Commission. (n.d. i). *Hogfish*. Retrieved from <https://myfwc.com/fishing/saltwater/recreational/hogfish/>
- Florida Fish and Wildlife Conservation Commission. (n.d. j). *Homosassa Wildlife Management Area*. Retrieved from <https://myfwc.com/recreation/cooperative/homosassaWMA>
- Florida Fish and Wildlife Conservation Commission. (n.d. k). *Monofilament Recovery and Recycling Program*. Retrieved from <https://mrrp.myfwc.com/>
- Florida Fish and Wildlife Conservation Commission. (n.d. l). *Pinfish*. Retrieved from <https://myfwc.com/wildlifehabitats/profiles/saltwater/porgy/pinfish/>
- Florida Fish and Wildlife Conservation Commission. (n.d. m). *Red Drum*. Retrieved from <https://myfwc.com/wildlifehabitats/profiles/saltwater/drums/red-drum/>
- Florida Fish and Wildlife Conservation Commission. (n.d. n). *Snook*. Retrieved from <https://myfwc.com/wildlifehabitats/profiles/saltwater/snook/snook>
- Florida Fish and Wildlife Conservation Commission. (n.d. o). *Snook Fishing*. Retrieved from <https://myfwc.com/fishing/saltwater/recreational/snook>
- Florida Fish and Wildlife Conservation Commission. (n.d. p). *Spotted Sea Trout*. Retrieved from <https://myfwc.com/wildlifehabitats/profiles/saltwater/drums/spotted-seatROUT/>
- Florida Fish and Wildlife Conservation Commission. (n.d. q). *Striped Mullet*. Retrieved from <https://myfwc.com/wildlifehabitats/profiles/saltwater/mullet/striped-mullet/>
- Florida Fish and Wildlife Conservation Commission. (n.d. r). *Stone Crabs*. Retrieved from <https://myfwc.com/research/saltwater/crustaceans/stone-crabs/faq>
- Florida Fish and Wildlife Conservation Commission. (n.d. s). *Stone Crab Fishing*. Retrieved from <https://myfwc.com/fishing/saltwater/recreational/stone-crab/>
- Florida Fish and Wildlife Conservation Commission. (n.d. t). *Tarpon*. Retrieved from <https://myfwc.com/wildlifehabitats/profiles/saltwater/tarpon/tarpon/>
- Florida Fish and Wildlife Conservation Commission. (n.d. u) *White Pelicans*. Retrieved from <https://myfwc.com/wildlifehabitats/profiles/birds/shorebirdsseabirds/american-white-pelican/>
- Florida Fish and Wildlife Conservation Commission. (n.d. v) *Bald eagle management*. Retrieved from <http://myfwc.com/wildlifehabitats/managed/bald-eagle/>
- Florida Fish and Wildlife Conservation Commission. (2003a). *Florida breeding bird atlas: A collaborative study of Florida's birdlife*. Retrieved from https://myfwc.com/media/19687/bba_dcco.pdf
- Florida Fish and Wildlife Conservation Commission. (2003b). *Wilson's Plover*. In Florida's breeding bird atlas: A collaborative study of Florida's birdlife. Retrieved from https://myfwc.com/media/19814/bba_wipl.pdf
- Florida Fish and Wildlife Conservation Commission. (2013). *The Florida Boating and Angling Guide Series*. Retrieved from https://ocean.floridamarine.org/boating_guides
- Florida Fish and Wildlife Conservation Commission. (2019). *Harmful Algal Bloom/Red Tide Task Force*. Retrieved from <https://myfwc.com/research/redtide/taskforce/>
- Florida Fish and Wildlife Conservation Commission. (2020). *Florida's Inshore and Nearshore Species: 2020 Status and Trends* [In House Report]. Retrieved from <https://myfwc.com/media/29278/status-trends-full-report.pdf>
- Florida Fish and Wildlife Conservation Commission. (2021a). *Florida's Nonnative Fish and Wildlife*. Retrieved from <https://myfwc.com/wildlifehabitats/nonnatives/>

- Florida Fish and Wildlife Conservation Commission. (2021b). *Imperiled Species Profiles*. Retrieved from <https://myfwc.com/wildlifehabitats/profiles/#!categoryid=&subcategoryid=&status=Imperiled>
- Florida Fish and Wildlife Conservation Commission. (2021c). *Help plan the future of the Janet Butterfield Brooks Wildlife and Environmental Area*. Retrieved from <https://myfwc.com/news/all-news/brooks-wea-1021/>
- Florida Fish and Wildlife Conservation Commission. (1999-2022). *Commercial Fisheries Landings Summaries*. Retrieved from <https://public.myfwc.com/FWRI/PFDM/ReportCreator.aspx>
- Florida Geological Survey. (2004). *Springs of Florida* [Bulletin No. 66]. Tallahassee, FL.
- Florida Historical Society. (2015). The Cross Florida Barge Canal. Retrieved from <https://myfloridahistory.org/frontiers/article/95>
- Florida Natural Areas Inventory. (2010). *Guide to the natural communities of Florida: 2010 edition*. Tallahassee, FL. Retrieved from <https://www.fnai.org/species-communities/natcom-guide>
- Florida Legislature, Office of Economic and Demographic Research. (2020, December 30). *Florida: An Economic Overview*. Retrieved from http://edr.state.fl.us/Content/presentations/economic/FIEconomicOverview_12-30-20.pdf
- Florida Legislature, Office of Economic and Demographic Research. (2021a). *Citrus County Profile*. Retrieved from <http://edr.state.fl.us/content/area-profiles/county/citrus.pdf>
- Florida Legislature, Office of Economic and Demographic Research. (2021b). *Hernando County*. Retrieved from <http://edr.state.fl.us/content/area-profiles/county/hernando.pdf>
- Florida Legislature, Office of Economic and Demographic Research. (2021c). *Area Profile: Pasco County*. Retrieved from <http://edr.state.fl.us/content/area-profiles/county/pasco.pdf>
- Florida Sea Grant. (n.d.). *Florida Friendly Fishing Guide Certification*. Retrieved from <https://www.flseagrant.org/florida-friendly-fishing-guide-certification/>
- Florida Sea Grant. (2015). *Be Seagrass Safe*. Retrieved from <https://beseagrasssafe.com/>
- Florida State Parks. (n.d. a). *Crystal River Preserve State Park*. Retrieved from <https://www.floridastateparks.org/parks-and-trails/crystal-river-preserve-state-park>
- Florida State Parks. (n.d. b). *Ellie Schiller Homosassa Springs Wildlife State Park* [Brochure]. Retrieved from <https://www.floridastateparks.org/sites/default/files/media/file/hsw-brochure-sm.pdf>
- Florida State Parks. (n.d. c). *Werner-Boyce*. Retrieved from <https://www.floridastateparks.org/parks-and-trails/werner-boyce-salt-springs-state-park>
- Florida State Parks. (n.d. d). *Weeki Wachee Springs State Park*. Retrieved from <https://www.floridastateparks.org/learn/history-weeki-wachee>
- Florida State Parks. (n.d. e). *Yulee Sugar Mill*. Retrieved from <https://www.floridastateparks.org/parks-and-trails/yulee-sugar-mill-ruins-historic-state-park>
- Florida State Parks. (2021). *Statewide Map*. Retrieved from <https://www.floridastateparks.org/statewide-map>
- Florida State Parks Foundation. (n.d.). *Why Florida State Parks and Trails are Important to Florida's Economic Health*. Retrieved from <https://floridastateparksfoundation.org/Impact>
- Fodrie, F. J., Heck Jr, K. L., Powers, S. P., Graham, W. M., & Robinson, K. L. (2010). Climate-related, decadal-scale assemblage changes of seagrass-associated fishes in the northern Gulf of Mexico. *Global Change Biology*, 16(1), 48-59.
- Frederick, P. C. (1997). *Tricolored Heron: Egretta Tricolor (The Birds of North America)*. Philadelphia, PA: The Academy of Natural Sciences.

- Gandy, R.L., Crowley, C.E., Machniak, A.M., and Crawford, C.R. (2011 February). *Review of the biology and population dynamics of the blue crab, Callinectes sapidus, in relation to salinity and freshwater inflow*. Prepared for the Florida Fish and Wildlife Conservation Commission. Retrieved from https://www.swfwmd.state.fl.us/sites/default/files/documents-and-reports/appendix/Section_11.16.pdf
- Glodzik, K. (2018). *Impacts of saltwater intrusion and hydrologic change to salt marsh and coastal forest of Florida's Big Bend*. [Doctoral Dissertation, University of Florida]. Digital Collections, George A. Smathers Libraries.
- Grimmelbein, L., Barry, S., Casebolt, S., Cummings, K., Hyman, A., Frazer, T., & Kowalewski, M. (2022, April 7-8). *High live-dead fidelity of seagrass associated mollusk assemblages along the northern Gulf coast of Florida at both regional and local scales*. Geological Society of America, Joint 56th Annual North-Central/71st Annual Southeastern Section Meeting, Cincinnati, OH, USA, https://www.geosociety.org/GSA/Events/Section_Meetings/GSA/Sections/nc/2022mtg/home.aspx
- Gruninger, T., Reynolds, L., & Barry, S. (2019, November 3-7). *The influence of structure on ecosystem processes among seagrass meadows*. 25th Biennial Coastal and Estuarine Research Federation Conference, Mobile, AL, USA, <https://www.cerf.science/cerf-2019>
- Guillory, V., Perry, H., Steele, P., Wagner, T., Keithly, W., Pellegrin, B., Petterson, J., Floyd, T., Buckson, B., Hartman, L., Holder, E., & Moss, C. (2001). *The blue crab fishery of the Gulf of Mexico, United States: a regional management plan*. Gulf States Marine Fisheries Commission. <https://www.gsmfc.org/publications/GSMFC%20Number%20096.pdf>
- Hale, J. A., Frazer, T. K., Tomasko, D. A., & Hall, M. O. (2004). Changes in the distribution of seagrass species along Florida's Central Gulf Coast: Iverson and Bittaker revisited. *Estuaries*, 27(1), 36-43.
- Hardin A., Casebolt, S., Hyman, A., Barry, S., Cummings, K., Frazer, T., & Kowalewski, M. 2022. *Historical ecology of seagrass meadows along the gulf coast of Florida: environmental trends in body size and predation archived in seagrass-associated mollusk death assemblages*. Geological Society of America, Joint 56th Annual North-Central/71st Annual Southeastern Section Meeting, Cincinnati, OH, USA. https://www.geosociety.org/GSA/Events/Section_Meetings/GSA/Sections/nc/2022mtg/home.aspx
- Harris, K. (2017). *Potential impacts of accelerated sea-level rise and hurricane-induced storm surge in western Pasco County, Florida* [Thesis]. University of South Florida, Digital Commons.
- Hemminga, M. A., & Duarte, C. M. (2000). *Seagrass ecology*. Cambridge, U.K.: Cambridge University Press.
- Hernando County. (n.d. a). Fickett Hammock Preserve. Retrieved from <https://www.hernandocounty.us/Home/Components/FacilityDirectory/FacilityDirectory/14/103>
- Hernando County. (n.d. b). Parks. Retrieved from <https://www.hernandocounty.us/Home/Components/FacilityDirectory/FacilityDirectory/20/103>
- Hernando County. (n.d. c). Springs Coast Environmental Center. Retrieved from <https://www.hernandoschools.org/departments/springs-coast-environmental-center/index>
- Hine, A. C., Evans, M. W., Davis, R. A., & Belknap, D. F. (1987). Depositional response to seagrass mortality along a low-energy, barrier-island coast; west-central Florida. *Journal of Sedimentary Research*, 57(3), 431-439.
- Hine, A. C., Brooks, G. R., Davis Jr, R. A., Duncan, D. S., Locker, S. D., Twichell, D. C., & Gelfenbaum, G. (2003). The west-central Florida inner shelf and coastal system: a geologic conceptual overview and introduction to the special issue. *Marine Geology*, 200(1-4), 1-17.

- Historic Hernando Preservation Society. (n.d.). *Early Hernando County History, A Hernando County Timeline (to 1887)*. Retrieved from <http://www.fivay.org/hernando1.html>
- History of Pasco County. (2018) Stilt Houses in the Gulf of Mexico. Retrieved from http://www.fivay.org/stilt_houses.html
- Holzwart, K.R. K., Deak, J. Miller, E. Johnson, L. Simonton, Dluzniewski, T., Stanfill, A. & Taylor, A. (2022). Common Snook (*Centropomus undecimalis*) establishment in and use of Nature Coast springs systems. *Florida Scientist* 85(1):26-43.
- Homosassa River Alliance. (n.d.). *Scallop Shells*. Retrieved from <https://www.homosassariveralliance.org/scallops-homosassa-river.php>
- Homan, L., & Reilly, T. (2001). *Images of America: Citrus County*. Mt. Pleasant, SC: Arcadia Publishing.
- Hutchinson, D. L., & Mitchem, J. M. (1996). The Weeki Wachee Mound, an early contact period mortuary locality in Hernando County West-Central Florida. *Southeastern Archaeology*, 47-65.
- Hyman, A.C., Frazer, T.K., Jacoby C.A., Frost J.R., & Kowalewsk, M. 2019. Long-term persistence of structured habitats: seagrass meadows as enduring hotspots of biodiversity and faunal stability. *Proceedings of the Royal Society B*. 286: 20191861.
- Irvine, A. B. (1983). Manatee metabolism and its influence on distribution in Florida. *Biological Conservation*, 25(4), 315-334.
- Jacoby, J., Walters, L., Baker, S., & Blyler, K. (2003). *A primer on invasive species in coastal and marine waters* (SGEB 60). Gainesville, FL: University of Florida, Sea Grant, Florida. Retrieved from <http://nsgl.gso.uri.edu/flsgp/flsgpg05001.pdf>
- Johnson, E.R., L.B. Simonton, T.B. Dluzniewski, A.P. Stanfill, and A.E. Taylor. (2019). Springs Coast Fish Community Assessment Project, Southwest Florida Water Management District Grant Project No. 17PO0000503. Prepared for the Southwest Florida Water Management District.
- Johnson, R. A., Gulick, A. G., Constant, N., Bolten, A. B., Smulders, F. O., Christianen, M. J., Nava, M.I., Kolasa, K. & Bjorndal, K. A. (2020). Seagrass ecosystem metabolic carbon capture in response to green turtle grazing across Caribbean meadows. *Journal of Ecology*, 108(3), 1101-1114.
- Khakzad, S., & Griffith, D. (2016). The role of fishing material culture in communities' sense of place as an added-value in management of coastal areas. *Journal of Marine and Island Cultures*, 5(2), 95-117.
- Kleen, J. M., & Breland, A. D. (2014). Increases in seasonal manatee (*Trichechus manatus latirostris*) abundance within Citrus County, Florida. *Aquatic Mammals*, 40(1).
- Knott, D.M., Fuller, P.L., Benson, A.J., & Neilson, M.E. (2019). *Penaeus monodon*. U.S. Geological Survey, Nonindigenous Aquatic Species Database. Retrieved from <https://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=1209>
- Koss, R. S. (2010). Volunteer health and emotional wellbeing in marine protected areas. *Ocean & Coastal Management*, 53(8), 447-453.
- Langston, A. K., Kaplan, D. A., & Putz, F. E. (2017). A casualty of climate change? Loss of freshwater forest islands on Florida's Gulf Coast. *Global Change Biology*, 23(12), 5383-5397.
- Lauretta, M. V., Pine III, W. E., Walters, C. J., & Frazer, T. K. (2019). Plant-mediated community structure of spring-fed, coastal rivers. *PloS one*, 14(12), e0219236.
- Littles, C. J., Pilyugin, S. and Frazer, T. (2015). A combined inverse method and multivariate approach for exploring population trends of Florida manatees. *Marine Mammal Science*, 32(1), 122-140.
- Littles C. J., Bonde R. K., Butler S. M., Jacoby C. A., Notestein, S.K., Reid, J.P., Slone, D.H., & Frazer, T.K. (2019). Coastal habitat change and marine megafauna behavior: Florida manatees

- encountering reduced food provisions in a prominent winter refuge. *Endangered Species Research*, 38, 29-43.
- Lusk, M. G., Toor, G. S., Yang, Y. Y., Mechtensimer, S., De, M., & Obreza, T. A. (2017). A review of the fate and transport of nitrogen, phosphorus, pathogens, and trace organic chemicals in septic systems. *Critical Reviews in Environmental Science and Technology*, 47(7), 455-541.
- Lusk, M. & Albertin, A. (2018, May 29). *After the Flush*. [PowerPoint slides]. IFAS Extension, University of Florida.
https://www.volusia.org/core/fileparse.php/6149/urlt/LuskandAlbertin_SepticSystems101_Volusia-County_May2018.pdf
- Lusk, M., Albertin, A., Elmore, W., Lester, W., & Moll, J. (2020). Septic systems and springs water quality: an overview for Florida. *EDIS*, 2020(5).
- Manson, F.J., Loneragan, N.R., Skilleter, G.A., & Phinn, S.R. (2005). An evaluation of the evidence for linkages between mangroves and fisheries: A synthesis of the literature and identification of research directions. *Oceanography and Marine Biology: An Annual Review*, 43, 485-515.
- Marella, R.L. & Dixon, J.F. (2018). *Data tables summarizing the source-specific estimated water withdrawals in Florida by water source, category, county, and water management district, 2015*. U.S. Geological Survey data release. Retrieved from <https://doi.org/10.5066/F7N29W5M>
- Mattson R. A., Frazer T. K., Hale J., Blitch S., & Ahijevych L. (2007). Seagrass status and trends in the northern Gulf of Mexico, 1940–2002 (Report 2006-5287). United States Geological Survey. Retrieved from <https://pubs.er.usgs.gov/publication/sir20065287>
- McGuire, M., & Stevely, J. (2009). Invasive species of Florida's coastal waters: the Asian green mussel (*Perna viridis*). *EDIS*, 2009(8).
- Mcleod, E., Chmura, G. L., Bouillon, S., Salm, R., Björk, M., Duarte, C. M., Lovelock, C.E., Schlesinger, W.H. & Silliman, B. R. (2011). A blueprint for blue carbon: toward an improved understanding of the role of vegetated coastal habitats in sequestering CO₂. *Frontiers in Ecology and the Environment*, 9(10), 552-560.
- Meylan, A., & Redlow, A. (2006). *Eretmochelys Imbricata, Hawksbill Turtle*. Chelonian Research Foundation. Retrieved from <https://chelonian.org/vol3-2/>
- Miller, J.A. (1986). *Hydrogeological framework of the Floridan Aquifer System in Florida and in parts of Georgia, Alabama, and South Carolina* (U.S. Geological Survey Professional Paper 1403-F). Washington, DC: United States Government Printing Office.
- Mitchem, J. M., & Hutchinson, D. L. (1986). Interim Report on Excavations at the Tatham Mound, Citrus County, Florida: season II. Florida State Museum, Department of Anthropology. Retrieved from https://www.academia.edu/1101996/Interim_Report_on_Excavations_at_the_Tatham_Mound_Citrus_County_Florida_Season_II
- Mote Marine Laboratory. (1991). *Anclote Power Plant monitoring studies* [Final Report]. Florida Power Corporation. St. Petersburg, FL.
- Muller, R.G., Chagaris, D., Bert, T., Crawford, C., and Gandy, R. (2011). *The 2011 stock assessment update for the Stone Crab, Menippe spp., fishery in Florida* [Executive Summary]. Florida Fish and Wildlife Conservation Commission. Retrieved from <https://myfwc.com/research/saltwater/crustaceans/stone-crabs/stock-assessments/>
- Mulholland, P. J., Best, G. R., Coutant, C. C., Hornberger, G. M., Meyer, J. L., Robinson, P. J., Stenberg, J.R., Turner, E., Vera-Herrera, F., & Wetzel, R. G. (1997). Effects of climate change on freshwater ecosystems of the south-eastern United States and the Gulf Coast of Mexico. *Hydrological Processes*, 11(8), 949-970.

- National Marine Fisheries Service & U.S. Fish and Wildlife Service. (2008). *Recovery Plan for the Northwest Atlantic Population of the Loggerhead Sea Turtle (Caretta caretta)*, Second Revision. Silver Spring, MD.
- National Marine Fisheries Service, U.S. Fish and Wildlife Service, & SEMARNAT. (2011). *Bi-National Recovery Plan for the Kemp's Ridley Sea Turtle (Lepidochelys kempii)*, Second Revision. Silver Spring, Maryland.
- National Oceanic and Atmospheric Administration Fisheries (n.d. a). *Blue Crab*. Retrieved from <https://www.fisheries.noaa.gov/species/blue-crab>
- National Oceanic and Atmospheric Administration Fisheries. (n.d. b). *Cobia*. Retrieved from <https://www.fisheries.noaa.gov/species/cobia>
- National Oceanic and Atmospheric Administration (n.d. c). *Eastern Oyster*. Retrieved from <https://www.fisheries.noaa.gov/species/eastern-oyster>
- National Oceanic and Atmospheric Administration. (n.d. d). *Enow Explorer*. Retrieved from <https://coast.noaa.gov/enowexplorer/#/>
- National Oceanic and Atmospheric Administration. (n.d. e). *Gag Grouper*. Retrieved from <https://www.fisheries.noaa.gov/species/gag-grouper>
- National Oceanic and Atmospheric Administration. (n.d. f). *Marine Debris Program*. Retrieved from <https://marinedebris.noaa.gov/>
- National Oceanic and Atmospheric Administration. (2020). *Stock SMART*. Retrieved from <https://www.st.nmfs.noaa.gov>
- National Oceanic and Atmospheric Administration. (2021). *Climate at a Glance: County Time Series*. Retrieved from <https://www.ncdc.noaa.gov/cag/>
- National Water Quality Monitoring Council. (2021). *Masaryktown Canal at U.S. 41 Near Masaryktown FL (USGS-02310225)* site data in the Water Quality Portal. Retrieved from waterqualitydata.us/provider/NWIS/USGS-FL/USGS-02310225
- Neufeldt, V., & Sparks, A.N. (1990). *Webster's new world dictionary* (3rd ed.). Cleveland, OH: Webster's New World Dictionaries.
- Nico, L. & Neilson, M. (2021). *Sarotherodon melanotheron Rüppell, 1852*: U.S. Geological Survey, Nonindigenous Aquatic Species Database. Retrieved from <https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=477>
- Nol, E., & Humphrey, R. C. (1994). *American Oystercatcher: Haematopus palliatus*. In *The Birds of North America*. Ithaca, NY: Cornell Lab of Ornithology.
- Norman, S., Dean, J., & Ellis, G. (2018a). *Historical ecology of the Withlacoochee embayment*. State of Florida. Retrieved from https://www.academia.edu/37712785/Historical_Ecology_of_the_Withlacoochee_Embayment_Historic_Preservation_Grant_SM18_0029_Final_Report
- Norman, S., Dean, J., & Ellis, G. (2018b). *Rapid midden assessment – site delineation in Crystal Bay, Florida*. Department of the Interior. Retrieved from <https://ncptt.nps.gov/blog/rapid-midden-assessment/>
- Norman, S., Dean, J., & Ellis, G. (2019). *Trout Creek paleoenvironmental study*. State of Florida. Retrieved from file:///C:/Users/maefl/Downloads/Trout_Creek_Paleoenvironmental_Study.pdf
- O'Donoghue, J. M., & Sassaman, K. E. (2013). *Phase I archaeological survey of Weeki Wachee springs state park, Hernando County, Florida* (Technical Report 18). University of Florida. Retrieved from <https://lsa.anthro.ufl.edu/files/TechReport18.pdf>

- Pasco County (n.d. a) *Bear Creek – Pithlachascotee River Watershed*. Retrieved from <https://www.pascocountyfl.net/1857/Bear-Creek---Pithlachascotee-Watershed>
- Pasco County. (n.d. b). *Data USA*. <https://datausa.io/profile/geo/pasco-county-fl>
- Pasco County. (n.d. c). *Double Hammock Watershed*. Retrieved from <https://www.pascocountyfl.net/2288/Double-Hammock-Watershed>
- Pasco County. (n.d. d). *Parks*. Retrieved from <https://www.pascocountyfl.net/3315/Parks-Preserves-and-Trails>
- Pasco County. (n.d. e). *Pasco County Palms Preserve*. Retrieved from <https://www.pascocountyfl.net/3794/Pasco-Palms-Preserve>
- Pasco County. (2013). *Comprehensive Plan*. Retrieved from <https://www.pascocountyfl.net/1807/Comprehensive-Plan>
- Pasco County Genealogical Society. (1994). *Pasco County Florida History*. Retrieved from <https://sites.rootsweb.com/~flpcgs/history.html>
- Pasco County Schools. (n.d.). *Environmental Education Programs*. Retrieved from <https://connectplus.pasco.k12.fl.us/do/eec/>
- Perillo, G.M.E., Wolanski, E., Cahoon, D.R., & Brinson, M.M. (Eds.). (2009). *Coastal wetlands: An integrated ecosystem approach*. New York, NY: Elsevier.
- Pilny, P.E., Grantham, C.T., Schuster, J.N., & Stankey, D.L. (1988). *Soil survey of Citrus County, Florida*. United States Department of Agriculture. Retrieved from https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/florida/FL017/0/Citrus.pdf
- Post, W. (1981). The influence of rice rats *Oryzomys palustris* on the habitat use of the seaside sparrow *Ammospiza maritima*. *Behavioral Ecology and Sociobiology*, 35-40.
- Post, W., Greenlaw, J. S., Merriam, T. L., & Wood, L. A. (1983). Comparative ecology of northern and southern populations of the Seaside Sparrow. *The Seaside Sparrow: Its Biology and Management. Occasional Papers of the North Carolina Biological Survey*. Raleigh, NC: 123-136.
- Price, W.A. (1954). Dynamic environments: Reconnaissance mapping, geologic and geomorphic, of continental shelf of Gulf of Mexico. *Gulf Coast Association Geological Societies Transactions*, 4, 75-107.
- Puri, H.S. & Vernon, R. (1964). *Summary of the geology of Florida and a guidebook to classic exposures* (Special Publication. No. 5). Tallahassee, FL: Florida Geological Survey.
- Purtlebaugh, C. H., Martin, C. W., & Allen, M. S. (2020). Poleward expansion of common snook *Centropomus undecimalis* in the northeastern Gulf of Mexico and future research needs. *PLoS one*, 15(6), e0234083.
- Raabe, E. A., & Stumpf, R. P. (2016). Expansion of tidal marsh in response to sea-level rise: Gulf Coast of Florida, USA. *Estuaries and Coasts*, 39(1), 145-157.
- Radabaugh, K. R., Geiger, S. P., & Moyer, R. P. (Eds.). (2019). *Oyster Integrated Mapping and Monitoring Program Report for the State of Florida* (Technical Report No. 22). Prepared for the Florida Fish and Wildlife Conservation Commission.
- Randall, A. & Ballard, V. (2020). The 2020 hurricane season just became the most active in history with Theta. *South Florida Sun Sentinel*. Retrieved from <https://www.sun-sentinel.com/news/weather/hurricane/fl-ne-2020-hurricane-season-active-history-atlantic-20201109-gxiclv7vtffxbkvhogblznl5q-story.html>
- Reynolds, P. L., Duffy, E., & Knowlton, N. (2018). *Seagrass and seagrass beds*. Ocean Find Your Blue. Retrieved from <https://ocean.si.edu/ocean-life/plants-algae/seagrass-and-seagrass-beds>

- Rodgers, J.A., Jr., Kale, H.W., II., & Smith, H.T. (Eds.). (1978). *Rare and Endangered Biota of Florida. Vol. 2, Birds*. Gainesville, FL: University Press of Florida.
- Rodgers, J. A., & Smith, H. T. (1995). *Little Blue Heron: Egretta caerulea*. In *Birds of the World*. Ithaca, NY: Cornell Lab of Ornithology. Retrieved from <https://birdsoftheworld.org/bow/species/libher/cur/history>
- Rodgers, J. A. (1997). Pesticide and heavy metal levels of waterbirds in the Everglades agricultural area of south Florida. *Florida Ornithological Society*, 25(2): 33-.84. Retrieved from https://sora.unm.edu/sites/default/files/FFN_25-2p33-41Rodgers%5B1%5D.pdf
- Saintilan, N., Wilson, N. C., Rogers, K., Rajkaran, A., & Krauss, K. W. (2014). Mangrove expansion and salt marsh decline at mangrove poleward limits. *Global change biology*, 20(1), 147-157.
- Sattelberger, D. C., Kleen, J. M., Allen, A. C., & Flamm, R. O. (2017). Seasonal warm-water refuge and sanctuary usage by the Florida manatee (*Trichechus manatus latirostris*) in Kings Bay, Citrus County, Florida. *GIScience & Remote Sensing*, 54(1), 1-19.
- Save Crystal River. (n.d.). Save Crystal River for Future Generations. Retrieved from <https://www.savecrystalriver.com/beginnings-contact/>
- Scheidt, J., Lerche, I., & Paleologos, E. (2005). Environmental and economic risks from sinkholes in west-central Florida. *Environmental Geosciences*, 12(3), 207-217.
- Schmid, J.R. & Barichivich, W.J. (2006). *Lepidochelys kempii* – Kemp's ridley. *Biology and Conservation of Florida Turtles*. 128-141.
- Schofield, P.J. and Neilson, M.E. (2021). *Neopomacentrus cyanomos* (Bleeker, 1856). U.S. Geological Survey, Nonindigenous Aquatic Species Database. Retrieved from <https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=2936>
- Schofield, P.J., Nico, L. & Neilson, M. (2021). *Belonesox belizanus* Kner, 1860: U.S. Geological Survey, Nonindigenous Aquatic Species Database. Retrieved from <https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=843>
- Schreiber, R. W., & Risebrough, R. W. (1972). Studies of the brown pelican. *The Wilson Bulletin*, 119-135.
- Scott, T.M., Upchurch, S. B., & Means, G. (2014). Surficial geology of Citrus County, Florida. *Geology of Citrus County, Florida*, 38.
- Silvano, R. A., & Valbo-Jørgensen, J. (2008). Beyond fishermen's tales: contributions of fishers' local ecological knowledge to fish ecology and fisheries management. *Environment, Development and Sustainability*, 10(5), 657-675.
- Simberloff, D. (1994). *Why is Florida being invaded? An assessment of invasive non-indigenous species in Florida's public lands, Florida* (Technical report no. TSS-94-100). Tallahassee, FL: Department of Environmental Protection.
- Simpson, G. G. (1928). Pleistocene mammals from a cave in Citrus County, Florida. *American Museum novitates*; no. 328.
- Solomon, B.D., Corey-Luse, C.M., & Halvorsen, K.E. (2004). The Florida manatee and eco-tourism: Toward a safe minimum standard. *Ecological Economics*, Vol. 50, p 101-115.
- Southwest Florida Water Management District. (n.d. a). *Chassahowitzka River and Coastal Swamps*. Retrieved from www.swfwmd.state.fl.us/recreation/chassahowitzka-river-and-coastal-swamps
- Southwest Florida Water Management District. (n.d. b). Cypress Creek Preserve. Retrieved from <https://www.swfwmd.state.fl.us/recreation/cypress-creek-preserve>
- Southwest Florida Water Management District. (n.d. c). *Half Moon-Gum Slough*. Retrieved from

- <https://www.swfwmd.state.fl.us/recreation/half-moon-gum-slough>
- Southwest Florida Water Management District. (n.d. d). *Hillsborough River Watershed Excursion*. Retrieved from <https://www4.swfwmd.state.fl.us/hill/watershed>
- Southwest Florida Water Management District. (n.d. e). *Potts Preserve*. Retrieved from <https://www.swfwmd.state.fl.us/recreation/potts-preserve>
- Southwest Florida Water Management District. (n.d. f). *Two-Mile Prairie State Forest*. Retrieved from <https://www.swfwmd.state.fl.us/recreation/two-mile-prairie>
- Southwest Florida Water Management District. (n.d. g). *Weeki Wachee Preserve*. Retrieved from <https://www.swfwmd.state.fl.us/watersheds/springscoast/weekiwachee-preserve>
- Southwest Florida Water Management District. (2000). *Crystal River/Kings Bay surface water improvement and management plan*. Retrieved from <https://www.swfwmd.state.fl.us/sites/default/files/medias/documents/Crystal%20River%20Kings%20Bay%20Plan.pdf>
- Southwest Florida Water Management District. (2001a) *Springs Coast comprehensive watershed management plan*. Tampa, Florida.
- Southwest Florida Water Management District. (2001). *Withlacoochee River comprehensive watershed management plan*. Retrieved from <https://www.lake.wateratlas.usf.edu/upload/documents/WithCWM.pdf>
- Southwest Florida Water Management District. (2008) *Conner Preserve Land Use and Management Plan*. Tampa, FL. Retrieved from <https://www.swfwmd.state.fl.us/sites/default/files/medias/documents/ConnerPreserve.pdf>
- Southwest Florida Water Management District. (2015). *Crystal River / Kings Bay Surface Water Improvement and Management (SWIM) Plan*. Retrieved from <https://www.swfwmd.state.fl.us/sites/default/files/medias/documents/Crystal%20River%20Kings%20Bay%20Plan.pdf>
- Southwest Florida Water Management District. (2015-2019). *Springs Management Plan*. Retrieved from https://www.swfwmd.state.fl.us/sites/default/files/medias/documents/Springs_Management_Plan.pdf
- Southwest Florida Water Management District. (2016). *Surface water improvement and management program: 2016 annual report*. Tampa, FL.
- Southwest Florida Water Management District. (2018a) *Annutteliga Hammock*. Retrieved from <https://www.swfwmd.state.fl.us/recreation/annutteliga-hammock>
- Southwest Florida Water Management District. (2018b). *Chassahowitzka Watershed*. Retrieved from <https://www.swfwmd.state.fl.us/projects/springs/chassahowitzka>
- Southwest Florida Water Management District. (2018c). *Flying Eagle Preserve*. Retrieved from <https://www.swfwmd.state.fl.us/recreation/flying-eagle-preserve>
- Southwest Florida Water Management District. (2018d). *The 1960s - The District's Beginning*. *Water Matters Magazine*. Retrieved from <https://www.swfwmd.state.fl.us/blog/watermatters-magazine/49/the-1960s-the-districts-beginning>
- Southwest Florida Water Management District. (2018e). *Weeki Wachee Watershed*. Retrieved from <https://www.swfwmd.state.fl.us/projects/springs/weeki-wachee>
- Southwest Florida Water Management District. (2021). *Springs Coast Steering Committee*. Retrieved from <https://www.swfwmd.state.fl.us/projects/springs/springs-coast-public-meetings>

- Spalding, M. D., Brumbaugh, R. D., & Landis, E. (2016). *Atlas of ocean wealth*. Nature Conservancy. Retrieved from <https://www.nature.org/content/dam/tnc/nature/en/documents/Atlas-of-Ocean-Wealth.pdf>
- Spencer, S. (1984). *Geology of Citrus County, Florida* (Open File Report 5). Tallahassee, FL: Florida Geological Survey.
- Stevens, T., Adams, C., Hodges, A., & Mulkey, W. D. (2004). Economic impact on the re-opened scalloping area for Citrus County, Florida—2003. *EDIS*, 2004(12).
- Stevenson, H.M., & Anderson, B.H. (1994). *The Birdlife of Florida*. Gainesville, FL: University Press.
- Stewart, J.W. (1980). *Areas of natural recharge to the Floridan Aquifer in Florida*. University of Florida Digital Collections, George A. Smathers Libraries. Retrieved from <http://ufdc.ufl.edu/UF90000358/00001/1x?vo=11>
- Stewart K. & Johnson C. (2006). *Dermochelys coriacea* – Leatherback Sea Turtle. *Biology and Conservation of Florida Turtles*. 144-157.
- Sullivan, C. R., Smyth, A. R., Martin, C. W., & Reynolds, L. K. (2021). How does mangrove expansion affect structure and function of adjacent seagrass meadows?. *Estuaries and Coasts*, 44(2), 453-467.
- Sweat, D., & Vose, F. (2011). Recreational harvesting of the Florida Bay Scallop, Citrus County. *EDIS*, 2011(8).
- Tampa Bay Water. (2003). An ecological characterization of aquatic and wetland habitats in the Anclote River estuary and adjacent inshore and offshore waters of west-central Florida. Retrieved from https://www.tampabay.wateratlas.usf.edu/upload/documents/ecological_char101003.pdf
- Tellier, M. S., Bertelsen, R., Hunt, J. H., Butler, M., & Matthews, T. R. (2008). Monitoring the flora and fauna of the nearshore hardbottom habitats of the Florida Keys. (Final Report, FWRI File Code F2196-05-08-F). Florida Fish and Wildlife Conservation Commission. Retrieved from https://app.myfwc.com/crossdoi/fundedprojects/matthews_final_report_f2196-05-08-f.pdf
- Toor, G. S., & Lusk, M. (2011). Reclaimed water use in the landscape: what's in reclaimed water and where does it go?. *EDIS*, 2011(2).
- Town of Yankeetown. (2015). *Ordinance No. 2015-02A*. Retrieved from https://yankeetownfl.gov/office2.com/vertical/sites/%7BE9D8B3C9-8B09-4342-8F48-B60BABFAF7FD%7D/uploads/Ordinances_2015-02_2015-02A_-_Septic_Systems.pdf
- United States Department of Agriculture. (n.d.). County Map Layers. Accessed July 13, 2020. <https://datagateway.nrcs.usda.gov/GDGOrder.aspx>
- United States Department of Agriculture. (1988). *Soil Survey of Citrus County*. Washington, D.C.
- United States Geological Survey. (n.d.). *Geologic Units in Florida*. Retrieved from <https://mrdata.usgs.gov/geology/state/fips-unit.php?code=fUS12>
- University of Florida/IFAS Extension. (2021a). *Donor marsh at Duke Energy Mariculture Center making donations*. Retrieved from <https://blogs.ifas.ufl.edu/ncbs/2021/donor-marsh-donations/>
- University of Florida/IFAS Extension. (2021b). *Green Industries Best Management Practices*. Retrieved from <https://sfyl.ifas.ufl.edu/charlotte/green-industries-best-management-practices>
- University of Florida/IFAS Extension. (2021c). *H2OSAV*. Retrieved from <https://h2osav.buildgreen.org/>
- Upchurch, S. B. (2014). Karst features in Citrus County, Florida. *Geology of Citrus County, Florida*, 29.
- U.S Fish & Wildlife Service. (n.d. a). Chassahowitzka. Retrieved from <https://www.fws.gov/refuge/Chassahowitzka/about.html>

- U.S. Fish & Wildlife Service. (n.d. b). Crystal River National Wildlife Refuge. Retrieved from https://www.fws.gov/refuge/Crystal_River/
- U.S. Fish & Wildlife Service. (1986). *Revised recovery plan for the U.S. breeding population of the wood stork*. U.S. Fish & Wildlife Service. Retrieved from https://ecos.fws.gov/docs/recovery_plan/970127.pdf
- U.S. Fish and Wildlife Service. (2012). *Chassahowitzka National Wildlife Refuge comprehensive conservation plan*. U.S. Fish and Wildlife Service. Retrieved from https://data.amerigeoss.org/it/dataset/chassahowitzka-national-wildlife-refuge-comprehensive-conservation-plan/resource/6d0e0eb4-822e-4b67-8aed-4cb2dbc04cf8?view_id=7a3e6dac-1d9c-4685-82ce-c249f6f125c9
- U.S. Fish and Wildlife Service. (2015). *Endangered Species Glossary*. Retrieved from www.fws.gov/endangered/about/glossary.html
- U.S. Fish and Wildlife Service. (2020, October 7). *Service Finalizes Listing the Eastern Black Rail as Threatened Under the Endangered Species Act* [Press Release]. Retrieved from <https://www.fws.gov/press-release/2020-10/eastern-black-rail-threatened-under-esa>
- U.S. Fish and Wildlife Foundation of Florida. (2015). *Florida Birding Trail*. Retrieved from <https://floridabirdingtrail.com/>
- Vázquez-Burney, R., Bays, J., Messer, R., & Harris, J. (2015). Floating wetland islands as a method of nitrogen mass reduction: results of a 1 year test. *Water Science and Technology*, 72(5), 704-710.
- Wakeford, A. (2001). *State of Florida conservation plan for Gulf sturgeon (Acipenser oxyrinchus desotoi)*. Florida Marine Research Institute. Retrieved from <https://aquadocs.org/bitstream/handle/1834/18092/TR8.pdf?sequence=1&isAllowed=y>
- Walton Jr, T. L. (2007). Projected sea level rise in Florida. *Ocean Engineering*, 34(13), 1832-1840.
- White, W. (1970). *Geomorphology of the Florida peninsula* (Bulletin No. 51). Florida Department of Natural Resources. University of Florida Digital Collections, George A. Smathers Libraries. Retrieved from <https://ufdc.ufl.edu/UF00000149/00001/images>
- Yarbro, L. A., & Carlson Jr, P. R. (2018). *Integrated Mapping and Monitoring for the State of Florida Mapping and Monitoring Report Version 2.0*. (Summary Report No. 3). Florida Fish and Wildlife Research Institute. Retrieved from <https://myfwc.com/media/11867/executive-summary.pdf>

B.3 / Species Lists

B.3.1 / Native Species

Legend: FT = Federally- and State-Designated Threatened • FE = Federally-and State-Designated Endangered • ST = State-Designated Threatened • SE = State-Designated Endangered • (S/A) = listed due to similarity of appearance • BGEPA = Bald and Golden Eagle Protection Act

Common Name	Species Name	Status
Submerged Aquatic Vegetation		
Mermaid's wine glass	<i>Acetabularia crenulata</i>	
	<i>Anadyomene stellata</i>	
	<i>Avrainvillea levis</i>	
	<i>Batophora oerstedii</i>	
	<i>Caulerpa ashmeadii</i>	
	<i>Caulerpa cupressoides</i>	
	<i>Caulerpa langinosa</i>	
	<i>Caulerpa mexicana</i>	
	<i>Caulerpa pasploidis</i>	
	<i>Caulerpa prolifera</i>	
	<i>Caulerpa racemosa</i>	
	<i>Caulerpa sertariodes</i>	
	<i>Codium isthmocladum</i>	
	<i>Dictyota sp.</i>	
	<i>Digenia simplex</i>	
	<i>Gracilaria sp.</i>	
	<i>Halimeda incrassate</i>	
Shoal grass	<i>Halodule wrightii</i>	
Engelmann's seagrass, star grass	<i>Halophila engelmannii</i>	
	<i>Laurencia sp.</i>	
	<i>Oscillatoria sp.</i>	
	<i>Padina spp.</i>	
	<i>Penicillus capitatus</i>	
	<i>Penicillus dumetosus</i>	
	<i>Penicillus pyriformis</i>	
<i>Rhypocephalus phoenix</i>		
<i>Sargassum sp.</i>		
Manatee grass	<i>Syringodium filiforme</i>	
Turtle grass	<i>Thalassia testudinum</i>	
	<i>Udotea spp.</i>	
	<i>Ulva spp.</i>	
Intertidal and Coastal Vascular Plants		
Red maple	<i>Acer rubrum</i>	
Inland giant leather fern	<i>Acrostichum danaeifolium</i>	
Peppervine	<i>Ampelopsis arborea</i>	
Marlberry	<i>Ardisia escallonioides</i>	
Black mangrove	<i>Avicennia germinans</i>	
Saltwater false willow	<i>Baccharis angustifolia</i>	

Common Name	Species Name	Status
Silverling	<i>Baccharis glomulerifolia</i>	
Sea myrtle, eastern baccharis	<i>Baccharis halimifolia</i>	
Saltwort	<i>Batis maritima</i>	
Rattan vine, supplejack	<i>Berchemia scandens</i>	
Toothed midsorus fern	<i>Blechnum serrulatum</i>	
Seaside oxeye daisy	<i>Borrchia frutescens</i>	
Gray nicker	<i>Caesalpinia bonduc</i>	
American beautyberry	<i>Callicarpa americana</i>	
Trumpet creeper, trumpet vine	<i>Campsis radicans</i>	
Sandywoods sedge	<i>Carex dasycarpa</i>	
American hornbeam	<i>Carpinus caroliniana</i>	
Sugarberry	<i>Celtis laevigata</i>	
Longleaf chasmanthium	<i>Chasmanthium laxum</i>	
Shiny woodoats	<i>Chasmanthium nitidum</i>	
Snowberry, milkberry	<i>Chiococca alba</i>	
Sawgrass	<i>Cladium jamaicense</i>	
Buttonwood	<i>Conocarpus erectus</i>	
Swamp dogwood	<i>Cornus foemina</i>	
Coinvine	<i>Dalbergia ecastaphyllum</i>	
Cowitch vine	<i>Decumaria barbara</i>	
Common persimmon	<i>Diospyros virginiana</i>	
Salt grass	<i>Distichlis spicata</i>	
Smooth elephants foot	<i>Elephantopus nudatus</i>	
Carolina scalystem	<i>Elytraria caroliniensis</i>	
Coralbean	<i>Erythrina herbacea</i>	
Marsh frimby	<i>Fimbristylis spadicea</i>	
Hairy frimby	<i>Fimbristylis puberula</i>	
Florida privet, Florida swampprivet	<i>Forestiera segregate</i>	
Carolina jessamine	<i>Gelsemium sempervirens</i>	
Marshelder, sumpweed, Jesuit's bark	<i>Iva frutescens</i>	
Forked rush	<i>Juncus dichotomus</i>	
Common rush	<i>Juncus effusus</i>	
Shore rush	<i>Juncus marginatus</i>	
Manyhead rush	<i>Juncus polycephalos</i>	
Black needlerush	<i>Juncus roemerianus</i>	
Needlepod rush	<i>Juncus scirpoides</i>	
Southern red cedar	<i>Juniperus virginiana</i>	
Virginia saltmarsh mallow	<i>Kosteletzkya pentacarpos</i>	
White mangrove	<i>Laguncularia racemose</i>	
Carolina sealavendar	<i>Limonium carolinianum</i>	
Sweetgum	<i>Liquidambar styraciflua</i>	
Christmasberry, Carolina desertthorn	<i>Lycium carolinianum</i>	
Wand lythrum	<i>Lythrum lineare</i>	
Sweetbay	<i>Magnolia virginiana</i>	
Shoregrass	<i>Monanthochloe littoralis</i>	
Wax myrtle, southern bayberry	<i>Myrica cerifera</i>	

Common Name	Species Name	Status
Woodsgrass	<i>Oplismenus hirtellus</i>	
Devilwood	<i>Osmanthus americanus</i>	
Cinnamon fern	<i>Osmunda cinnamomea</i>	
Royal fern	<i>Osmunda regalis</i>	
Seashore paspalum	<i>Paspalum vaginatum</i>	
Swamp bay	<i>Persea palustris</i>	
Laurel oak	<i>Quercus laurifolia</i>	
Water oak	<i>Quercus nigra</i>	
Virginia live oak	<i>Quercus virginiana</i>	
Rubbervine	<i>Rhabdadenia biflora</i>	
Needle palm	<i>Rhapidophyllum hystrix</i>	C
Red mangrove	<i>Rhizophorus mangle</i>	
Bluestem palmetto	<i>Sabal minor</i>	
Cabbage palm	<i>Sabal palmetto</i>	
Smallflower mock buckthorn	<i>Sageretia minutiflora</i>	
Annual glasswort	<i>Salicornia bigelovii</i>	
Perennial glasswort	<i>Salicornia virginica</i>	
Perennial glasswort	<i>Sarcocornia ambigua</i>	
Seapurslane	<i>Sesuvium portulacastrum</i>	
Saffron plum	<i>Sideroxylon celastrinum</i>	
False mastic	<i>Sideroxylon foetidissimum</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>	
Sarsaparilla vine	<i>Smilax pumila</i>	
Bristly greenbrier	<i>Smilax tamnoides</i>	
Smooth cordgrass, oystergoass	<i>Spartina alterniflora</i>	
Saltmeadow hay, saltmeadow cordgrass	<i>Spartina patens</i>	
Giant cordgrass, rough cordgrass	<i>Spartina cynosuroides</i>	
Gulf cordgrass	<i>Spartina spartinae</i>	
Perennial saltmarsh aster	<i>Symphyotrichum tenuifolium</i>	
Widespread maiden fern	<i>Thelypteris kunthii</i>	
Widespread maiden fern	<i>Thelypteris normalis</i>	
Marsh fern	<i>Thelypteris palustris</i>	
Poison ivy	<i>Toxicodendron radicans</i>	
American elm	<i>Ulmus americana</i>	
Walter's viburnum	<i>Viburnum obovatum</i>	
Summer grape	<i>Vitis aestivalis</i>	
Graybark grape	<i>Vitis cinerea</i>	
Muscadine	<i>Vitis rotundifolia</i>	
Calloose grape	<i>Vitis shuttleworthii</i>	
Netted chain fern	<i>Woodwardia areolate</i>	
Virginia chain fern	<i>Woodwardia virginica</i>	
Coontie	<i>Zamia pumila</i>	C

Common Name	Species Name	Status
Upland/Adjacent Lands Vascular plants		
Slender threeseed mercury	<i>Acalypha gracilens</i>	
Oppositeleaf spotflower	<i>Acmella oppositifolia</i>	
Brittle maidenhair fern	<i>Adiantum tenerum</i>	SE
Beach false foxglove	<i>Agalinis fasciculata</i>	
Saltmarsh false foxglove	<i>Agalinis maritima</i>	
Purple false foxglove	<i>Agalinis purpurea</i>	
Incised groove-bur	<i>Agrimonia incisa</i>	SE
Southern colicroot	<i>Aletris obovate</i>	
Common ragweed	<i>Ambrosia artemisiifolia</i>	
False indigobush	<i>Amorpha fruticose</i>	
Stiff bluestar	<i>Amsonia rigida</i>	
Splitbeard bluestem	<i>Andropogon ternarius</i>	
Chalky bluestem	<i>Andropogon virginicus glaucus</i>	
Green silkscale	<i>Anthaenantia villosa</i>	
Devils' walking stick	<i>Aralia spinosa</i>	
Greendragon	<i>Arisaema dracontium</i>	
Wiregrass	<i>Aristida beyrichiana</i>	
Big threeawn	<i>Aristida condensate</i>	
Bottlebrush threeawn	<i>Aristida spiciformis</i>	
Virginia snakeroot	<i>Aristolochia serpentaria</i>	
Florida indian plantain	<i>Arnoglossum floridanum</i>	
Butterfly milkweed, butterflyweed	<i>Asclepias tuberosa</i>	
Whorled milkweed	<i>Asclepias verticillate</i>	
Slimleaf pawpaw, narrowleaf pawpaw	<i>Asimina angustifolia</i>	
Ebony spleenwort	<i>Asplenium platyneuron</i>	
Florida milkvetch	<i>Astragalus obcordatus</i>	
Smooth yellow false foxglove	<i>Aureolaria flava</i>	
Fernleaf yellow false foxglove	<i>Aureolaria pedicularia</i>	
Common carpetgrass	<i>Axonopus fissifolius</i>	
Big carpetgrass	<i>Axonopus furcatus</i>	
Blue waterhyssop	<i>Bacopa caroliniana</i>	
Herb-of-grace	<i>Bacopa monnieri</i>	
Pineland wild indigo	<i>Baptisia lecontei</i>	
Tarflower	<i>Bejaria racemose</i>	
Florida greeneyes	<i>Berlandiera subacaulis</i>	
Beggarticks, spanish needles	<i>Bidens alba</i>	
Spanish needles	<i>Bidens bipinnata</i>	
Smooth beggarticks	<i>Bidens laevis</i>	
Smallfruit beggarticks	<i>Bidens mitis</i>	
Crossvine	<i>Bignonia capreolata</i>	
False nettle	<i>Boehmeria cylindrica</i>	
American bluehearts	<i>Buchnera americana</i>	
Capillary hairsedge	<i>Bulbostylis ciliatifolia</i>	
Scarlet calamint	<i>Calamintha coccinea</i>	
Bearded grasspink	<i>Calopogon barbatus</i>	

Common Name	Species Name	Status
Tuberous grasspink	<i>Calopogon tuberosus</i>	
Hedge false bindweed	<i>Calystegia sepium</i>	
Florida bellflower	<i>Campanula floridana</i>	
Florida paintbrush	<i>Carphephorus corymbosus</i>	
Vanillaleaf, vanilla plant	<i>Carphephorus odoratissimus</i>	
Hairy chaffhead	<i>Carphephorus paniculatus</i>	
Water hickory	<i>Carya aquatica</i>	
Pignut hickory	<i>Carya glabra</i>	
Chinquapin	<i>Castanea pumila</i>	
Southern catalpa	<i>Catalpa bignonioides</i>	
New Jersey tea, redroot	<i>Ceanothus americanus</i>	
Slender sandbur	<i>Cenchrus gracillimus</i>	
Coastal sandbur	<i>Cenchrus incertus</i>	
Spadeleaf	<i>Centella asiatica</i>	
Spurred butterfly pea	<i>Centrosema virginianum</i>	
Common buttonbush	<i>Cephalanthus occidentalis</i>	
Coontail	<i>Ceratophyllum demersum</i>	
Eastern redbud	<i>Cercis canadensis</i>	
Partridge pea	<i>Chamaecrista fasciculata</i>	
Sensitive pea	<i>Chamaecrista nictitans</i>	
Fringetree	<i>Chionanthus virginicus</i>	
Cottony golden aster	<i>Chrysopsis gossypina</i>	
Maryland golden aster	<i>Chrysopsis mariana</i>	
Scrubland golden aster	<i>Chrysopsis subulate</i>	
Citrus	<i>Citrus</i> spp.	
Pine hyacinth	<i>Clematis baldwinii</i>	
Netleaf leather-flower	<i>Clematis reticulata</i>	
Butterfly pea	<i>Clitoria mariana</i>	
Tread-softly	<i>Cnidioscolus stimulosus</i>	
Whitemouth dayflower	<i>Commelina erecta</i>	
Blue mistflower, ageratum	<i>Conoclinium coelestinum</i>	
American squawroot	<i>Conopholis americana</i>	
Canadian horseweed	<i>Conzya canadensis</i>	
Florida tickseed	<i>Coreopsis floridana</i>	
Leavenworth's tickseed	<i>Coreopsis leavenworthii</i>	
Roughleaf dogwood	<i>Cornus asperifolia</i>	
Flowering dogwood	<i>Cornus florida</i>	
May haw, Michaux's hawthorne	<i>Crataegus michauxii</i>	
String-lily, seven-sisters	<i>Crinum Americanum</i>	
Slender scratchdaisy	<i>Croptilon divaricatum</i>	
Pursh's rattlebox	<i>Crotalaria purshii</i>	
Rabbitbells	<i>Crotalaria rotundifolia</i>	
Silver croton	<i>Croton argyranthemus</i>	
Rushfoil, Michaux's croton	<i>Croton michauxii</i>	
Compact dodder	<i>Cuscata compacta</i>	
Bermudagrass	<i>Cynodon dactylon</i>	

Common Name	Species Name	Status
Baldwin's flatsedge	<i>Cyperus crocerus</i>	
Wiry flatsedge	<i>Cyperus filiculmis</i>	
Plukenet's flatsedge	<i>Cyperus plukenetii</i>	
Pinebarren flatsedge	<i>Cyperus retrorsus</i>	
Whitetassels	<i>Dalea carnea</i>	
Hairy small-leaf ticktrefoil	<i>Desmodium ciliare</i>	
Florida ticktrefoil	<i>Desmodium floridanum</i>	
Sand ticktrefoil	<i>Desmodium lineatum</i>	
Panicledleaf ticktrefoil	<i>Desmodium paniculatum</i>	
Dixie ticktrefoil	<i>Desmodium tortuosum</i>	
Coastalplain balm	<i>Dicerandra linearifolia</i>	
Needleleaf witchgrass	<i>Dichantherium aciculare</i>	
Variable witchgrass	<i>Dichantherium commutatum</i>	
Cypress witchgrass	<i>Dichantherium ensifolium ensifolium</i>	
Cypress witchgrass	<i>Dichantherium ensifolium unciphyllum</i>	
Eggleaf witchgrass	<i>Dichantherium ovale</i>	
Hemlock witchgrass	<i>Dichantherium portoricense</i>	
Roughhair witchgrass	<i>Dichantherium strigosum</i>	
Carolina ponysfoot	<i>Dichondra caroliniensis</i>	
Slender crabgrass	<i>Digitaria filiformis</i>	
Virginia buttonweed	<i>Diodia virginiana</i>	
Dwarf sundew	<i>Drosera brevifolia</i>	
Pink sundew	<i>Drosera capillaris</i>	
Oblong twinflower	<i>Dyschoriste oblongifolia</i>	
Burrhead	<i>Echinodorus</i> spp.	
Tall elephantsfoot	<i>Elephantopus elatus</i>	
Florida tasselflower	<i>Emilia fosbergii</i>	
Green-fly orchid	<i>Epidendrum conopseum</i>	C
Elliott's lovegrass	<i>Eragrostis elliotii</i>	
Coastal lovegrass	<i>Eragrostis virginica</i>	
Burnweed	<i>Erectites hieracifolia</i>	
Oakleaf fleabane	<i>Erigeron quercifolius</i>	
Early whitetop fleabane	<i>Erigeron vernus</i>	
Pipewort	<i>Eriocaulon compressum</i>	
Wild buckwheat	<i>Eriogonum tomentosum</i>	
Rattlesnakemaster	<i>Eryngium aquaticum</i>	
Baldwin's eryngo	<i>Eryngium baldwinii</i>	
Rattlesnakemaster, button eryngo	<i>Eryngium yuccifolium</i>	
American strawberrybush	<i>Euonymus americanus</i>	
White thoroughwort	<i>Eupatorium album</i>	
Dogfennel	<i>Eupatorium capillifolium</i>	
Yankeeweed	<i>Eupatorium compositifolium</i>	
False fennel	<i>Eupatorium leptophyllum</i>	
Semaphore thoroughwort	<i>Eupatorium milkanoides</i>	
Mohr's thoroughwort	<i>Eupatorium mohrii</i>	
Common boneset	<i>Eupatorium perfoliatum</i>	

Common Name	Species Name	Status
False hoarhound	<i>Eupatorium rotundifolium</i>	
Saltmarsh fingergrass	<i>Eustachys glauca</i>	
Seaside gentian	<i>Eustoma exaltatum</i>	
Flat-topped goldenrod, slender goldenrod	<i>Euthamia caroliniana</i>	
Flattop goldenrod	<i>Euthamia graminifolia</i>	
Silver dwarf morningglory	<i>Evolvulus sericeus</i>	
Narrowleaf yellowtops	<i>Flaveria linearis</i>	
White ash	<i>Fraxinus americana</i>	
Carolina ash	<i>Fraxinus caroliniana</i>	
Southern umbrellasedge	<i>Fuirena scirpoidea</i>	
Lanceleaf blanketflower	<i>Gaillardia aestivalis</i>	
Elliott's milkpea	<i>Galactia elliotii</i>	
Soft milkpea	<i>Galactia mollis</i>	
Eastern milkpea	<i>Galactia regularis</i>	
Downy milkpea	<i>Galactia volubilis</i>	
Coastal bedstraw	<i>Galium hispidulum</i>	
Stiff marsh bedstraw	<i>Galium tinctorium</i>	
Dwarf huckleberry	<i>Gaylussacia Dumosa</i>	
Blue huckleberry	<i>Gaylussacia frondose</i>	
Rose mock vervain	<i>Glandularia canadensis</i>	
Loblolly bay	<i>Gordonia lasianthus</i>	
Rough hedgehyssop	<i>Gratiola hispida</i>	
Shaggy hedgehyssop	<i>Gratiola Pilosa</i>	
Branched hedgehyssop	<i>Gratiola ramosa</i>	
Bearded skeletongrass	<i>Gymnopogon ambiguous</i>	
Chapman's skeletongrass	<i>Gymnopogon chapmanianus</i>	
Toothpetal false reinorchid	<i>Habenaria floribunda</i>	
Bog orchid	<i>Habenaria quinqueseta</i>	
Carolina silverbell	<i>Halesia caroliniana</i>	
Southeastern sneezeweed	<i>Helenium pinnatifidum</i>	
Swamp sunflower	<i>Helianthus angustifolius</i>	
Rayless sunflower, stiff sunflower	<i>Helianthus radula</i>	
Seaside heliotrope, salt heliotrope	<i>Heliotropium curassavicum</i>	
Crested coralroot	<i>Hexalectris spicata</i>	
Crimoneyed rosemallow	<i>Hibiscus moscheutos</i>	
Coastalplain hawkweed	<i>Hieracium megacephalon</i>	
Marsh pennywort	<i>Hydrocotyle umbellata</i>	
Sky flower	<i>Hydrolea corymbosa</i>	
Coastalplain St. John's-wort	<i>Hypericum Brachyphyllum</i>	
Roundpod St. John's-wort	<i>Hypericum cistifolium</i>	
Peelbark St. John's-wort	<i>Hypericum fasciculatum</i>	
St. Andrew's-cross	<i>Hypericum hypericoides</i>	
Dwarf St. John's wort	<i>Hypericum mutilum</i>	
Myrtleleaf St. John's-wort	<i>Hypericum myrtifolium</i>	
Fourpetal St. John's wort	<i>Hypericum tetrapetalum</i>	
Common yellow stargrass	<i>Hypoxis curtissi</i>	

Common Name	Species Name	Status
Fringed yellow stargrass	<i>Hypoxis juncea</i>	
Musky mint, clustered bushmint	<i>Hyptis alata</i>	
Carolina holly	<i>Ilex ambigua</i>	
Dahoon holly	<i>Ilex cassine</i>	
Possumhaw	<i>Ilex decidua</i>	
Gallberry, inkberry	<i>Ilex glabra</i>	
American holly	<i>Ilex opaca</i>	
Yaupon holly	<i>Ilex vomitoria</i>	
Wild indigo, Carolina indigo	<i>Indigofera caroliniana</i>	
Saltmarsh morningglory	<i>Ipomoea sagittate</i>	
Prairie iris, blueflag	<i>Iris hexagona</i>	
Virginia willow, sweetspire	<i>Itea virginica</i>	
Wicky, hairy laurel	<i>Kalmia hirsute</i>	
Dwarf dandelion	<i>Krigia virginica</i>	
Carolina redroot	<i>Lachnanthes caroliana</i>	
Whitehead bogbutton	<i>Lachnocaulon anceps</i>	
Small's bogbutton	<i>Lachnocaulon minus</i>	
Thymeleaf pinweed	<i>Lechea minor</i>	
Pineland pinweed	<i>Lechea sessiliflora</i>	
Little duckweed		
Virginia pepperweed	<i>Lepidium virginicum</i>	
Narrowleaf lespedeza	<i>Lespedeza angustifolia</i>	
Hairy lespedeza	<i>Lespedeza hirta</i>	
Tall lespedeza	<i>Lespedeza stuevei</i>	
Chapman's gayfeather, Chapman's blazing star	<i>Liatris chapmanii</i>	
Pinkscale gayfeather	<i>Liatris elegans</i>	
Slender gayfeather	<i>Liatris gracilis</i>	
Few flowered gayfeather, fewflower blazing star	<i>Liatris pauciflora</i>	
Shortleaf gayfeather	<i>Liatris tenuifolia</i>	
Gopher apple	<i>Licania michauxii</i>	
Eastern glasswort	<i>Lilaeopsis chinensis</i>	
Pine lily	<i>Lilium catesbaei</i>	ST
Blue toadflax	<i>Linaria canadensis</i>	
Savannah false pimpernel	<i>Lindernia grandiflora</i>	
Florida yellow flax	<i>Linum floridanum</i>	
Cardinal flower	<i>Lobelia cardinalis</i>	ST
Glades lobelia	<i>Lobelia glandulosa</i>	
White lobelia	<i>Lobelia paludosa</i>	
Coral honeysuckle	<i>Lonicera sempervirens</i>	
Seaside primrose-willow	<i>Ludwigia maritima</i>	
Smallfruit primrose-willow	<i>Ludwigia macrocarpa</i>	
Marsh seedbox	<i>Ludwigia palustris</i>	
Creeping primrose-willow	<i>Ludwigia repens</i>	
Savannah primrose-willow	<i>Ludwigia virgata</i>	
Foxtail club-moss	<i>Lycopodium alopecuroides</i>	

Common Name	Species Name	Status
Southern club-moss	<i>Lycopodium appressa</i>	
Slender club-moss	<i>Lycopodium carolinianum</i>	
Rose-rush	<i>Lygodesmia aphylla</i>	
Rusty staggerbush	<i>Lyonia ferruginea</i>	
Coastalplain staggerbush	<i>Lyonia fruticose</i>	
Fetterbush	<i>Lyonia lucida</i>	
Wild bushbean	<i>Macroptilium lathyroides</i>	
Southern magnolia	<i>Magnolia grandiflora</i>	
Florida spiny pod	<i>Matelea floridana</i>	SE
Axilflower	<i>Mecardonia acuminata</i>	
Snow squarestem	<i>Melanthera nivea</i>	
White sweetclover	<i>Melilotus albus</i>	
Climbing hempvine	<i>Mikania scandens</i>	
Littleleaf sensitive briar	<i>Mimosa microphylla</i>	
Sensitive briar	<i>Mimosa quadrivalvis angustata</i>	
Partridgeberry	<i>Mitchella repens</i>	
Lax hornpod	<i>Mitreola petiolate</i>	
Red mulberry	<i>Morus rubra</i>	
Hairgrass, muhly grass, hairawn muhly	<i>Muhlenbergia capilaris filipes</i>	
Southern waternymph	<i>Najas guadalupensis</i>	
Tropical puff	<i>Neptunia pubescens</i>	
Swamp tupelo	<i>Nyssa sylvatica biflora</i>	
Pinebarren aster	<i>Oclemena reticulata</i>	
Cutleaf evening-primrose, willow primrose	<i>Oenothera laciniata</i>	
Clustered mile graines	<i>Oldenlandia uniflora</i>	
Tuna cactus	<i>Opuntia ficus-india</i>	
Pricklypear	<i>Opuntia humifusa</i>	
Eastern hophornbeam	<i>Ostrya virginiana</i>	
Common yellow woodsorrel	<i>Oxalis corniculata</i>	
Water cowbane, water dropwort	<i>Oxypolis filiformis</i>	
Coastalplain palafox	<i>Palafoxia integrifolia</i>	
Pineland nailwort	<i>Paronychia patula</i>	
Virginia creeper	<i>Parthenocissus quinquefolia</i>	
Crowngrass	<i>Paspalum bifidum</i>	
Florida paspalum	<i>Paspalum floridanum</i>	
Early paspalum	<i>Paspalum praecox</i>	
Thin paspalum	<i>Paspalum setaceum</i>	
Purple passionflower	<i>Passiflora incarnata</i>	
Buckroot	<i>Pediomelum canescens</i>	
Mayflower beardtongue	<i>Penstemon multiflorus</i>	
Red bay	<i>Persea borbonia</i>	
Goldenfoot fern, golden polypody	<i>Phlebodium aureum</i>	
Florida false sunflower	<i>Phoebanthus grandifloras</i>	
Red chokeberry	<i>Photinia pyrifolia</i>	
Common cane, roseau cane	<i>Phragmites australis</i>	
Fogfruit, capeweed	<i>Phyla nodiflora</i>	

Common Name	Species Name	Status
Cypresshead groundcherry	<i>Physalis Arenicola</i>	
Walter's groundcherry	<i>Physalis walteri</i>	
Slenderleaf false dragonhead	<i>Physostegia leptophylla</i>	
Eastern false dragonhead	<i>Physostegia purpurea</i>	
American pokeweed	<i>Phytolacca americana</i>	
Wild pennyroyal	<i>Piloblephis rigida</i>	
Blueflower butterwort	<i>Pinguicula caerulea</i>	ST
Yellow butterwort	<i>Pinguicula lutea</i>	ST
Small butterwort	<i>Pinguicula pumila</i>	
Sand pine	<i>Pinus clausa</i>	
Slash pine	<i>Pinus elliotii</i>	
Longleaf pine	<i>Pinus palustris</i>	
Pond pine	<i>Pinus serotina</i>	
Loblolly pine	<i>Pinus taeda</i>	
Blackseed needlegrass	<i>Piptochaetium avenaeceum</i>	
Pitted stripesteed	<i>Piriqueta caroliniana</i>	
Southern plantain	<i>Plantago virginica</i>	
Yellow fringed orchid	<i>Platanthera ciliaris</i>	ST
Resurrection fern	<i>Pleopeltis polypodioides</i>	
Stinking camphorweed	<i>Pluchea foetida</i>	
Sweetscent	<i>Pluchea odorata</i>	
Rosy camphorweed	<i>Pluchea rosea</i>	
Rose pogonia	<i>Pogonia ophioglossoides</i>	ST
Baldwin's milkwort	<i>Polygala baldunii</i>	
Drumheads	<i>Polygala cruciate</i>	
Orange milkwort	<i>Polygala lutea</i>	
Candyroot	<i>Polygala nana</i>	
Racemed milkwort	<i>Polygala polygama</i>	
Coastalplain milkwort	<i>Polygala setacea</i>	
Tall jointweed	<i>Polygonella gracilis</i>	
Octoberflower	<i>Polygonella polygama</i>	
Swamp smartweed	<i>Polygonum hydropiperoides</i>	
Dotted smartweed	<i>Polygonum punctatum</i>	
Rustweed	<i>Polypremum procumbens</i>	
Hairy shadow witch	<i>Ponthieva racemose</i>	
Eastern cottonwood	<i>Populus deltoids</i>	
Illinois pondweed	<i>Potamogeton illinoensis</i>	
Claspingleaf	<i>Potamogeton perfoliatus</i>	
Small pondweed	<i>Potamogeton pusillus</i>	
Marsh mermaidweed	<i>Proserpinaca palustris</i>	
Combleaf mermaidweed	<i>Proserpinaca pectinate</i>	
American plum	<i>Prunus americana</i>	
Chickasaw plum	<i>Prunus angustifolia</i>	
Carolina laurel cherry	<i>Prunus caroliniana</i>	
Black cherry	<i>Prunus serotina</i>	
Flatwoods plum	<i>Prunus umbellate</i>	

Common Name	Species Name	Status
Heller's cudweed	<i>Pseudognaphalium helleri</i>	
Sampson's snakeroot	<i>Psoralea psoralioides</i>	
Tailed bracken	<i>Pteridium aquilinum pseudocaudatum</i>	
Blackroot, rabbit tobacco	<i>Pterocaulon pycnostachyum</i>	
Wand blackroot	<i>Pterocaulon virgatum</i>	
Mock bishopsweed, herbwilliam	<i>Ptilimnium capillaceum</i>	
White oak	<i>Quercus alba</i>	
Chapman's oak	<i>Quercus chapmanii</i>	
Runner oak	<i>Quercus elliotii</i>	
Southern red oak	<i>Quercus falcata</i>	
Sand live oak	<i>Quercus geminate</i>	
Bluejack oak	<i>Quercus incana</i>	
Turkey oak	<i>Quercus laevis</i>	
Overcup oak	<i>Quercus lyrata</i>	
Sand post oak	<i>Quercus margaretta</i>	
Swamp chestnut oak	<i>Quercus michauxii</i>	
Dwarf live oak	<i>Quercus minima</i>	
Myrtle oak	<i>Quercus myrtifolia</i>	
Shumard's oak	<i>Quercus shumardii</i>	
Bluff oak	<i>Quercus sinuate</i>	
Wild radish	<i>Raphanus raphanistrum</i>	
Savannah meadowbeauty	<i>Rhexia alifanus</i>	
West indian meadowbeauty	<i>Rhexia cubensis</i>	
Yellow meadowbeauty	<i>Rhexia lutea</i>	
Pale meadow beauty	<i>Rhexia mariana</i>	
Nuttall's meadowbeauty	<i>Rhexia nuttallii</i>	
Fringed meadowbeauty	<i>Rhexia petiolate</i>	
Sweet pinxter azalea	<i>Rhododendron canescens</i>	
Indian azalea	<i>Rhododendron simsii</i>	
Swamp azalea	<i>Rhododendron viscosum</i>	
Winged sumac	<i>Rhus copallinum</i>	
Royal snoutbean	<i>Rhynchosia cytisoides</i>	
Michaux's snoutbean	<i>Rhynchosia michauxii</i>	
Dollarleaf	<i>Rhynchosia reniformis</i>	
Baldwin's beaksedge	<i>Rhynchospora baldwinii</i>	
Shortbristle beaksedge	<i>Rhynchospora breviseta</i>	
Loosehead beaksedge	<i>Rhynchospora chalarocephala</i>	
Chapman's beaksedge	<i>Rhynchospora chapmanii</i>	
Fringed beaksedge	<i>Rhynchospora ciliaris</i>	
Star-top rush, starrush whitetop	<i>Rhynchospora colorata</i>	
Short bristled horned beaksedge	<i>Rhynchospora corniculate</i>	
Curtiss' beaksedge	<i>Rhynchospora curtissii</i>	
Fascicled beaksedge	<i>Rhynchospora facicularis</i>	
Threadleaf beaksedge	<i>Rhynchospora filifolia</i>	
Globe beaksedge	<i>Rhynchospora globularis</i>	
Slender beaksedge	<i>Rhynchospora gracilentia</i>	

Common Name	Species Name	Status
Gray's beaksedge	<i>Rhynchospora grayi</i>	
Pinebarren beaksedge	<i>Rhynchospora intermedia</i>	
Giant whitetop	<i>Rhynchospora latifolia</i>	
Millet beaksedge	<i>Rhynchospora miliacea</i>	
Pineland beaksedge	<i>Rhynchospora perplexa</i>	
Plumed beaksedge	<i>Rhynchospora plumosa</i>	
Fairy beaksedge	<i>Rhynchospora pusilla</i>	
Fewflower beaksedge	<i>Rhynchospora rariflora</i>	
Swamp rose	<i>Rosa palustris</i>	
Sawtooth blackberry	<i>Rubus argutus</i>	
Sand blackberry	<i>Rubus cuneifolius</i>	
Northern dewberry	<i>Rubus flagellaris</i>	
Southern dewberry	<i>Rubus trivialis</i>	
Orange coneflower	<i>Rudbeckia fulgida</i>	
Blackeyed susan	<i>Rudbeckia hirta</i>	
Carolina wild petunia	<i>Ruellia caroliniensis</i>	
Hairyflower wild petunia	<i>Ruellia ciliatiflora</i>	
Ciliate wild petunia	<i>Ruellia ciliosa</i>	
Nightflowering petunia	<i>Ruellia noctiflora</i>	SE
Swamp dock	<i>Rumex verticillatus</i>	
Widgeongrass	<i>Ruppia maritima</i>	
Shortleaf rosegentian	<i>Sabatia brevifolia</i>	
Coastal rosegentian	<i>Sabatia calycina</i>	
Slender rosegentian	<i>Sabatia campanulate</i>	
Largeleaf rosegentian	<i>Sabatia macrophylla</i>	
Fourangle rosegentian	<i>Sabatia quadrangular</i>	
Rose of plymouth	<i>Sabatia stellaris</i>	
Sugarcane plumegrass	<i>Saccharum coarctatum</i>	
Sugarcane plumegrass	<i>Saccharum giganteum</i>	
Carolina willow, coastalplain willow	<i>Salix caroliniana</i>	
Black willow	<i>Salix nigra</i>	
Azure blue sage	<i>Salvia azurea</i>	
Lyreleaf sage	<i>Salvia lyrata</i>	
Water spangles	<i>Salvinia minima</i>	
Elderberry	<i>Sambucus canadensis</i>	
American elder	<i>Sambucus nigra canadensis</i>	
Water pimpernel	<i>Samolus ebracteatus</i>	
Pineland pimpernel	<i>Samolus parviflorus</i>	
Pineland pimpernel, seaside brookweed	<i>Samolus valerandi</i>	
Canadian blacksnakeroot	<i>Sanicula canadensis</i>	
Hooded pitcherplant	<i>Sarracenia minor</i>	ST
Parrot pitcherplant	<i>Sarracenia psittacine</i>	ST
Sassafras	<i>Sassafras albidum</i>	
Lizard's tail	<i>Saururus cernuus</i>	
Little bluestem	<i>Schizachyrium scoparium</i>	
Creeping bluestem	<i>Schizachyrium stoloniferum</i>	

Common Name	Species Name	Status
Slender bluestem	<i>Schizachyrium tenerum</i>	
Florida sensitive brier	<i>Schrankia microphylla</i>	
Three-square sedge	<i>Scirpus olneyi</i>	
Threesquare bulrush	<i>Scirpus pungens</i>	
Leafy sedge	<i>Scirpus robustus</i>	
Baldwin's nutrush	<i>Scleria baldwinii</i>	
Fringed nutrush	<i>Scleria ciliate</i>	
Fewflower nutrush	<i>Scleria ciliata pauciflora</i>	
Slenderfruit nutrush	<i>Scleria georgiana</i>	
Netted nutrush	<i>Scleria retulgris</i>	
Tall nutgrass	<i>Scleria triglomerata</i>	
Low nutrush	<i>Scleria verticillate</i>	
Florida scrub skullcap	<i>Scutellaria Arenicola</i>	
Small's skullcap	<i>Scutellaria multiglandulosa</i>	
Maryland wild sensitive plant	<i>Senna marilandica</i>	
Saw palmetto	<i>Serenoa repens</i>	
Dixie whitetopped aster	<i>Sericocarpus tortifolius</i>	
Yaupon blacksennea	<i>Seymeria cassioides</i>	
Piedmont blacksennea	<i>Seymeria pectinate</i>	
Gum bully	<i>Sideroxylon lanuginose</i>	
Florida bully	<i>Sideroxylon reclinatum</i>	
Starry rosinweed	<i>Silphium asteriscus</i>	
Kidneyleaf rosinweed	<i>Silphium compositum</i>	
White blue-eyed grass	<i>Sisyrinchium albidum</i>	
Narrowleaf blue-eyed grass	<i>Sisyrinchium angustifolium</i>	
Eastern blue-eyed grass	<i>Sisyrinchium atlanticum</i>	
Nash's blue-eyed grass	<i>Sisyrinchium nashi</i>	
Annual blue-eyed grass	<i>Sisyrinchium rosulatum</i>	
Hemlock waterparsnip	<i>Sium suave</i>	
American black nightshade	<i>Solanum Americanum</i>	
Florida horsenettle	<i>Solanum carolinense</i>	
Pinebarren goldenron	<i>Solidago fistulosa</i>	
Giant goldenrod	<i>Solidago gigantea</i>	
Chapman's goldenrod, anise-scented goldenrod	<i>Solidago odora</i>	
Wrinkleleaf goldenrod	<i>Solidago rugosa</i>	
Wand goldenrod	<i>Solidago stricta</i>	
Spiny sowthistle	<i>Sonchus asper</i>	
Slender indiagrass	<i>Sorghastrum elliottii</i>	
Yellow indiagrass	<i>Sorghastrum nutans</i>	
Lopsided indiagrass	<i>Sorghastrum secundum</i>	
Woodland false buttonweed	<i>Spermacoce assurgens</i>	
Bog moss species	<i>Sphagnum spp.</i>	
Florida ladies tresses	<i>Spiranthes floridana</i>	SE
Spring ladies tresses	<i>Spiranthes vernalis</i>	
Hidden dropseed	<i>Sporobolus clandestinus</i>	
Florida dropseed	<i>Sporobolus floridanus</i>	

Common Name	Species Name	Status
Pineywoods dropseed	<i>Sporobolus junceus</i>	
Seashore dropseed	<i>Sporobolus virginicus</i>	
Sweet shaggytuft	<i>Stenandrium dulce</i>	
St. Augustine grass	<i>Stenoaphrum secundatum</i>	
Water toothleaf, corkwood	<i>Stillingia aquatica</i>	
Queensdelight	<i>Stillingia sylvatica</i>	
Pink fuzzybean	<i>Strophostyles umbellate</i>	
Coastalplain dawnflower	<i>Stylisma patens</i>	
Sidebeak pencilflower	<i>Stylosanthes biflora</i>	
American snowbell	<i>Styrax americanus</i>	
Bigleaf snowbell	<i>Styrax grandifloras</i>	
Sea blite	<i>Suadea linearis</i>	
Scaleleaf aster	<i>Symphotrichum adnatum</i>	
Savannah aster	<i>Symphotrichum chapmanii</i>	
Easten silver aster	<i>Symphotrichum concolor</i>	
Rice button aster	<i>Symphotrichum dumosum</i>	
Common sweetleaf	<i>Symplocos tinctoria</i>	
Yellow hatpins	<i>Syngonanthus flavidulus</i>	
Pond-cypress	<i>Taxodium ascendens</i>	
Bald-cypress	<i>Taxodium distichum</i>	
Scurf hoarypea	<i>Tephrosia chrysophylla</i>	
Florida hoarypea	<i>Tephrosia florida</i>	
Sprawling hoarypea	<i>Tephrosia hispidula</i>	
Spiked hoarypea	<i>Tephrosia spicata</i>	
Wood sage	<i>Teucrium canadense</i>	
Carolina basswood	<i>Tilia americana caroliniana</i>	
White basswood	<i>Tilia americana heterophylla</i>	
Bartram's airplant	<i>Tillandsia bartramii</i>	
Spanish moss	<i>Tillandsia usneoides</i>	
Crippled crane-fly orchid	<i>Tipularia discolor</i>	ST
Coastal false asphodel	<i>Tofieldia racemose</i>	
Eastern poison oak	<i>Toxicodendron pubescens</i>	
Atlantic poison oak	<i>Toxicodendron toxicarium</i>	
Poison sumac	<i>Toxicodendron vernix</i>	
Climbing dogbane	<i>Trachelospermum difforme</i>	
Spiderwort	<i>Tradescantia</i> spp.	
Small's noseburn	<i>Tragia smallii</i>	
Wavyleaf noseburn	<i>Tragia urens</i>	
Nettleleaf noseburn	<i>Tragia urticifolia</i>	
Forked bluecurls	<i>Trichostema dichotomum</i>	
Carolina fluffgrass	<i>Tridens carolinianus</i>	
Field clover	<i>Trifolium campestre</i>	
White clover	<i>Trifolium repens</i>	
Trillium	<i>Trillium</i> spp.	
Venus's lookingglass	<i>Triodanis perfoliate</i>	
Perennial sandgrass	<i>Triplasis americana</i>	

Common Name	Species Name	Status
Purple sandgrass	<i>Triplasis purpurea</i>	
Winged elm	<i>Ulmus alata</i>	
Sparkleberry	<i>Vaccinium arboretum</i>	
Highbush blueberry	<i>Vaccinium corymbosum</i>	
Darrow's blueberry	<i>Vaccinium darrowii</i>	
Shiny blueberry	<i>Vaccinium myrsinites</i>	
Deerberry	<i>Vaccinium stamineum</i>	
Tapegrass	<i>Vallisneria americana</i>	
Brazilian vervain	<i>Verbena brasiliensis</i>	
Frostweed, white crownbeard	<i>Verbesina virginica</i>	
Tall ironweed	<i>Vernonia angustifolia</i>	
Giant ironweed	<i>Vernonia gigantea</i>	
Southern arrowwood	<i>Viburnum dentate</i>	
Possumhaw	<i>Viburnum nudan</i>	
Rusty blackhaw	<i>Viburnum rufidulum</i>	
Fourleaf vetch	<i>Vicia acutifolia</i>	
Vetch	<i>Vicia</i> spp.	
Hairy pod cowpea	<i>Vigna luteola</i>	
Common blue violet	<i>Viola floridana</i>	
Bog white violet	<i>Viola lanceolata</i>	
Early blue violet	<i>Viola palmata</i>	
Primroseleaf violet	<i>Viola primulifolia</i>	
Common blue violet	<i>Viola sororia</i>	
Prostrate blue violet	<i>Viola walteri</i>	
Southern rockbell	<i>Wahlenbergia marginate</i>	
Coastal plain yellow-eyed grass	<i>Xyris ambigua</i>	
Baldwin's yellow-eyed grass	<i>Xyris baldwiniana</i>	
Carolina yellow-eyed grass	<i>Xyris caroliniana</i>	
Curtiss' yellow-eyed grass	<i>Xyris difformis curtissii</i>	
Elliot's yellow-eyed grass	<i>Xyris elliotii</i>	
Savannah yellow-eyed grass	<i>Xyris flabelliformis</i>	
Tall yellow-eyed grass	<i>Xyris platylepis</i>	
Spanish bayonet, aloe yucca	<i>Yucca aloifolia</i>	
Adam's needle	<i>Yucca filamentosa</i>	
Hercules' club, prickly ash	<i>Zanthoxylum clava-herculis</i>	
Wild lime	<i>Zanthoxylum fagara</i>	
Atamasco lily, rainlily	<i>Zephyranthes atamasca</i>	
Treat's rainlily	<i>Zephyranthes treatiae</i>	ST
Crowpoison, Osceola's plume	<i>Zigadenus densus</i>	
Annual wild rice	<i>Zizania aquatica</i>	
Birds		
Cooper's hawk	<i>Accipiter cooperii</i>	
Sharp-shinned hawk	<i>Accipiter striatus</i>	
Spotted sandpiper	<i>Actitis macularia</i>	
Red-winged blackbird	<i>Agelaius phoeniceus</i>	

Common Name	Species Name	Status
Wood duck	<i>Aix sponsa</i>	
Saltmarsh sharp-tailed sparrow	<i>Ammodramus caudacutus</i>	
Henslow's sparrow	<i>Ammodramus henslowii</i>	
Leconte's sparrow	<i>Ammodramus leconteii</i>	
Scott's seaside sparrow	<i>Ammodramus maritimus peninsulae</i>	ST
Nelson's sharp-tailed sparrow	<i>Ammodramus nelson</i>	
Grasshopper sparrow	<i>Ammodramus savannarum</i>	
Northern pintail	<i>Anas acuta</i>	
American wigeon	<i>Anas americana</i>	
Northern shoveler	<i>Anas clypeata</i>	
Green-winged teal	<i>Anas crecca</i>	
Blue-winged teal	<i>Anas discors</i>	
Mottled duck	<i>Anas fulvigula</i>	
Mallard	<i>Anas platyrhynchos</i>	
American black duck	<i>Anas rubripes</i>	
Gadwall	<i>Anas strepera</i>	
Anhinga	<i>Anhinga anhinga</i>	
Greater white-fronted goose	<i>Anser albifrons</i>	
American pipit	<i>Anthus rubescens</i>	
Limpkin	<i>Aramus guarauna</i>	
Ruby-throated hummingbird	<i>Archilochus colubris</i>	
Great egret	<i>Ardea alba</i>	
Great blue heron	<i>Ardea Herodias</i>	
Great white heron	<i>Ardea herodias occidentalis</i>	
Ruddy turnstone	<i>Arenaria interpres</i>	
Short-eared owl	<i>Asio flammeus</i>	
Lesser scaup	<i>Aythya affinis</i>	
Redhead	<i>Aythya americana</i>	
Ring-necked duck	<i>Aythya collaris</i>	
Greater scaup	<i>Aythya marila</i>	
Canvasback	<i>Aythya valisineria</i>	
Tufted titmouse	<i>Baeolophus bicolor</i>	
Cedar waxwing	<i>Bombycilla cedrorum</i>	
American bittern	<i>Botaurus lentiginosus</i>	
Great horned owl	<i>Bubo virginianus</i>	
Cattle egret	<i>Bubulcus ibis</i>	
Bufflehead	<i>Bucephala albeola</i>	
Common goldeneye	<i>Bucephala clangula</i>	
Short-tailed hawk	<i>Buteo brachyurus</i>	
Red-tailed hawk	<i>Buteo jamaicensis</i>	
Red-shouldered hawk	<i>Buteo lineatus</i>	
Broad-winged hawk	<i>Buteo platypterus</i>	
Green-backed heron	<i>Butorides striatus</i>	
Green heron	<i>Butorides virescens</i>	
Sanderling	<i>Calidris alba</i>	
Dunlin	<i>Calidris alpina</i>	

Common Name	Species Name	Status
Red knot	<i>Calidris canutus</i>	
Stilt sandpiper	<i>Calidris himantopus</i>	
Western sandpiper	<i>Calidris mauri</i>	
Pectoral sandpiper	<i>Calidris melanotos</i>	
Least sandpiper	<i>Calidris minutilla</i>	
Semipalmated sandpiper	<i>Calidris pusilla</i>	
Chuck-will's-widow	<i>Caprimulgus carolinensis</i>	
Whip-poor-will	<i>Caprimulgus vociferus</i>	
Northern cardinal	<i>Cardinalis cardinalis</i>	
Turkey vulture	<i>Cathartes aura</i>	
Veery	<i>Catharus fuscescens</i>	
Hermit thrush	<i>Catharus guttatus</i>	
Gray-cheeked thrush	<i>Catharus minimus</i>	
Swainson's thrush	<i>Catharus ustulatus</i>	
Brown creeper	<i>Certhia americana</i>	
Chimney swift	<i>Chaetura pelagica</i>	
Piping plover	<i>Charadrius melodus</i>	FT
Snowy plover	<i>Charadrius nivosus</i>	ST
Semipalmated plover	<i>Charadrius semipalmatus</i>	
Killdeer	<i>Charadrius vociferus</i>	
Wilson's plover	<i>Charadrius wilsonia</i>	
Black tern	<i>Chlidonias niger</i>	
Common nighthawk	<i>Chordeiles minor</i>	
Northern harrier	<i>Circus cyaneus</i>	
Marian's marsh wren	<i>Cistothorus palustris marianae</i>	ST
Sedge wren	<i>Cistothorus platensis</i>	
Long-tailed duck	<i>Clangula hyemalis</i>	
Yellow-bellied cuckoo	<i>Coccyzus americanus</i>	
Black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>	
Northern flicker	<i>Colaptes auratus</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 brachyrhynchos</i>	
Fish crow	<i>Corvus ossifragus</i>	
Yellow rail	<i>Coturnicops noveboracensis</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>	
Magnolia warbler	<i>Dendroica magnolia</i>	
Palm warbler	<i>Dendroica palmarum</i>	
Yellow warbler	<i>Dendroica petechia</i>	
Pine warbler	<i>Dendroica pinus</i>	

Common Name	Species Name	Status
Blackpoll warbler	<i>Dendroica striata</i>	
Cape May warbler	<i>Dendroica tigrine</i>	
Black-throated green warbler	<i>Dendroica virens</i>	
Bobolink	<i>Dolichonyx oryzivorus</i>	
Pileated woodpecker	<i>Dryocopus pileatus</i>	
Gray catbird	<i>Dumetella carolinensis</i>	
Little blue heron	<i>Egretta caerulea</i>	ST
Reddish egret	<i>Egretta rufescens</i>	ST
Snowy egret	<i>Egretta thula</i>	
Tricolored heron	<i>Egretta tricolor</i>	ST
American swallow-tailed kite	<i>Elanoides forficatus</i>	
Acadian flycatcher	<i>Empidonax vireescens</i>	
White ibis	<i>Eudocimus albus</i>	
Rusty blackbird	<i>Euphagus carolinus</i>	
Merlin	<i>Falco columbarius</i>	
Peregrine falcon	<i>Falco peregrinus tundrius</i>	
Southeastern American kestrel	<i>Falco sparverius paulus</i>	ST
Magnificent frigatebird	<i>Fregata magnificens</i>	
American coot	<i>Fulica americana</i>	
Wilson's snipe	<i>Gallinago delicata</i>	
Common snipe	<i>Gallinago gallinago</i>	
Common moorhen	<i>Gallinula chloropus</i>	
Common loon	<i>Gavia immer</i>	
Common yellowthroat	<i>Geothlypis trichas</i>	
American oystercatcher	<i>Haematopus palliatus</i>	ST
Bald eagle	<i>Haliaeetus leucocephalus</i>	BPEPA
Worm-eating warbler	<i>Helmitheros vermivorus</i>	
Black-necked stilt	<i>Himantopus mexicanus</i>	
Barn swallow	<i>Hirundo rustica</i>	
Caspian tern	<i>Hydroprogne caspia</i>	
Wood thrush	<i>Hylocichla mustelina</i>	
Yellow-breasted chat	<i>Icteria virens</i>	
Baltimore oriole, northern oriole	<i>Icterus galbula</i>	
Least bittern	<i>Ixobrychus exilis</i>	
Dark-eyed junco	<i>Junco hyemalis</i>	
Loggerhead shrike	<i>Lanius ludovicianus</i>	
Herring gull	<i>Larus argentatus</i>	
Laughing gull	<i>Leucophaeus atricilla</i>	
Ring-billed gull	<i>Larus delawarensis</i>	
Bonaparte's gull	<i>Larus Philadelphia</i>	
Black rail	<i>Laterallus jamaicensis</i>	
Short-billed dowitcher	<i>Limnodromus griseus</i>	
Long-billed dowitcher	<i>Limnodromus scolopaceus</i>	
Marbled godwit	<i>Limosa fedoa</i>	
Hooded merganser	<i>Lophodytes cucullatus</i>	
Belted kingfisher	<i>Megaceryle alcyon</i>	

Common Name	Species Name	Status
Eastern screech-owl	<i>Megascops asio</i>	
Red-bellied woodpecker	<i>Melanerpes carolinis</i>	
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>	
Surf scoter	<i>Melanitta perspicillata</i>	
Swamp sparrow	<i>Melospiza georgiana</i>	
Song sparrow	<i>Melospiza melodia</i>	
Common merganser	<i>Mergus merganser</i>	
Red-breasted merganser	<i>Mergus serrator</i>	
Northern mockingbird	<i>Mimus polyglottos</i>	
Black-and-white warbler	<i>Mniotilta varia</i>	
Brown-headed cowbird	<i>Molothrus ater</i>	
Northern gannet	<i>Morus bassanus</i>	
Wood stork	<i>Mycteria americana</i>	FT
Great crested flycatcher	<i>Myiarchus crinitus</i>	
Long-billed curlew	<i>Numenius americanus</i>	
Whimbrel	<i>Numenius phaeopus</i>	
Yellow-crowned night-heron	<i>Nyctanassa violacea</i>	
Black-crowned night-heron	<i>Nycticorax nycticorax</i>	
Connecticut warbler	<i>Oporonis agilis</i>	
Orange-crowned warbler	<i>Oreothlypis celata</i>	
Ruddy duck	<i>Oxyura jamaicensis</i>	
Osprey	<i>Pandion haliaetus</i>	
Northern parula	<i>Parula americana</i>	
House sparrow	<i>Passer domesticus</i>	
Savannah sparrow	<i>Passerculus sandwichensis</i>	
Painted bunting	<i>Passerina ciris</i>	
Indigo bunting	<i>Passerina cyanea</i>	
American white pelican	<i>Pelecanus erythrorhynchos</i>	
Brown pelican	<i>Pelecanus occidentalis</i>	
Bachman's sparrow	<i>Peucaea aestivalis</i>	
Wilson's phalarope	<i>Phalaropus tricolor</i>	
Double-crested cormorant	<i>Phalacrocorax auritis</i>	
Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>	
Downy woodpecker	<i>Picoides pubescens</i>	
Hairy woodpecker	<i>Picoides villosus</i>	
Rufous-sided towhee, eastern towhee	<i>Pipilo erythrophthalmus</i>	
Scarlet tanager	<i>Piranga olivacea</i>	
Summer tanager	<i>Piranga rubra</i>	
Roseate spoonbill	<i>Platalea ajaja</i>	ST
Glossy ibis	<i>Plegadis falcinellus</i>	
Black-bellied plover	<i>Pluvialis squatarola</i>	
Horned grebe	<i>Podiceps auratus</i>	
Pied-billed grebe	<i>Podilymbus Podiceps</i>	
Carolina chickadee	<i>Poecile carolinensis</i>	
Blue-gray gnatcatcher	<i>Poliptila caerulea</i>	
Vesper sparrow	<i>Poocetes gramineus</i>	

Common Name	Species Name	Status
Purple gallinule	<i>Porphyrio martinicus</i>	
Sora	<i>Porzana Carolina</i>	
Purple martin	<i>Progne subis</i>	
Prothonotary warbler	<i>Protonotaria citrea</i>	
Boat-tailed grackle	<i>Quiscalus major</i>	
Common grackle	<i>Quiscalus quiscula</i>	
King rail	<i>Rallus elegans</i>	
Virginia rail	<i>Rallus limicola</i>	
Clapper rail	<i>Rallus longirostris</i>	
American avocet	<i>Recurvirostra americana</i>	
Ruby-crowned kinglet	<i>Regulus calendula</i>	
Golden-crowned kinglet	<i>Regulus satrapa</i>	
Bank swallow	<i>Riparia riparia</i>	
Black skimmer	<i>Rynchops niger</i>	ST
Eastern phoebe	<i>Sayornis phoebe</i>	
American woodcock	<i>Scolopax minor</i>	
Ovenbird	<i>Seiurus aurocapilla</i>	
Northern parula	<i>Setophaga americana</i>	
Florida prairie warbler	<i>Setophaga discolor paludicola</i>	
American redstart	<i>Setophaga ruticilla</i>	
Eastern bluebird	<i>Sialia sialis</i>	
White-breasted nuthatch	<i>Sitta carolinensis</i>	
Brown-headed nuthatch	<i>Sitta pusilla</i>	
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	
American goldfinch	<i>Spinus tristis</i>	
Chipping sparrow	<i>Spizella passerine</i>	
Field sparrow	<i>Spizella pusilla</i>	
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>	
Least tern	<i>Sternula antillarum</i>	ST
Forster's tern	<i>Sterna forsteri</i>	
Common tern	<i>Sterna hirundo</i>	
Barred owl	<i>Strix varia</i>	
Eastern meadowlark	<i>Sturnella magna</i>	
Tree swallow	<i>Tachycineta bicolor</i>	
Royal tern	<i>Thalasseus maximus</i>	
Sandwich tern	<i>Thalasseus sandvicensis</i>	
Carolina wren	<i>Thryothorus ludovicianus</i>	
Brown thrasher	<i>Toxostoma rufum</i>	
Lesser yellowlegs	<i>Tringa flavipes</i>	
Greater yellowlegs	<i>Tringa melanoleuca</i>	
Willet	<i>Tringa semipalmata</i>	
Solitary sandpiper	<i>Tringa solitaria</i>	
House wren	<i>Troglodytes aedon</i>	
Winter wren	<i>Troglodytes troglodytes</i>	
American robin	<i>Turdus migratorius</i>	
Gray kingbird	<i>Tyrannus dominicensis</i>	

Common Name	Species Name	Status
Eastern kingbird	<i>Tyrannus tyrannus</i>	
Common barn owl	<i>Tyto alba</i>	
Bachman's warbler	<i>Vermivora bachmanii</i>	FE
Yellow-throated vireo	<i>Vireo flavifrons</i>	
White-eyed vireo	<i>Vireo griseus</i>	
Red-eyed vireo	<i>Vireo olivaceus</i>	
Solitary vireo, blue-headed vireo	<i>Vireo solitarius</i>	
White-winged dove	<i>Zenaida asiatica</i>	
Mourning dove	<i>Zenaida macroura</i>	
White-throated sparrow	<i>Zonotrichia albicollis</i>	
Mammals		
Everglades short-tailed shrew	<i>Blarina peninsulæ</i>	
Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>	
Least shrew	<i>Cryptotis parva</i>	
Virginia opossum	<i>Didelphis virginiana</i>	
Big brown bat	<i>Eptescius fuscus</i>	
Southeastern pocket gopher	<i>Geomys pinetis</i>	
Southern flying squirrel	<i>Glaucomys volans</i>	
Red bat	<i>Lasiurus borealis</i>	
Hoary bat	<i>Lasiurus cinereus</i>	
Yellow bat	<i>Lasiurus intermedius</i>	
Seminole bat	<i>Lasiurus seminolus</i>	
River otter	<i>Lontra canadensis</i>	
Bobcat	<i>Lynx rufus</i>	
Striped skunk	<i>Mephitis mephitis</i>	
Pine vole	<i>Microtus pinetorum</i>	
House mouse	<i>Mus musculus</i>	
Florida long-tailed weasel	<i>Mustella frenata peninsulæ</i>	
Southeastern myotis	<i>Myotis austroriparius</i>	
Round-tailed muskrat	<i>Neofiber alleni</i>	
Wood rat	<i>Neotoma floridana</i>	
Florida mink	<i>Neovison vison lutensis</i>	
Gulf salt marsh mink	<i>Neovison vison halimnetes</i>	
Evening bat	<i>Nycticeius humeralis</i>	
Golden mouse	<i>Ochrotomys nuttalli</i>	
White-tailed deer	<i>Odocoileus virginianus</i>	
Marsh rice rat	<i>Oryzomys palustris</i>	
Cotton deermouse	<i>Peromyscus gossypinus</i>	
Old field mouse	<i>Peromyscus polionotus</i>	
Eastern pipistrelle	<i>Pipistrellus austroriparius</i>	
Florida mouse	<i>Podomys floridanus</i>	
Raccoon	<i>Procyon lotor</i>	
Eastern harvest mouse	<i>Reithrodontomys humulis</i>	
Eastern mole	<i>Scalopus aquaticus</i>	
Gray squirrel	<i>Sciurus carolinensis</i>	

Common Name	Species Name	Status
Cotton rat	<i>Sigmodon hispidus</i>	
Southeastern shrew	<i>Sorex longirostris</i>	
Homosassa shrew	<i>Sorex longirostris eonis</i>	SSC
Eastern spotted skunk	<i>Spilogale putorius</i>	
Eastern cottontail	<i>Sylvilagus floridanus</i>	
Marsh rabbit	<i>Sylvilagus palustris</i>	
Brazilian free-tailed bat	<i>Tadarida brasiliensis</i>	
Florida manatee	<i>Trichechus manatus latirostris</i>	FE
Atlantic bottle-nosed dolphin	<i>Tursiops truncatus</i>	
Gray fox	<i>Urocyon cinereoargenteus</i>	
Florida black bear	<i>Ursus americanus floridanus</i>	
Red fox	<i>Vulpes vulpes</i>	
Amphibians		
Mole salamander	<i>Ambystoma talpoideum</i>	
Tiger salamander	<i>Ambystoma tigrinum tigrinum</i>	
Two-toed amphiuma	<i>Amphiuma means</i>	
One-toed amphiuma	<i>Amphiuma pholeter</i>	
Oak toad	<i>Bufo quercicus</i>	
Southern toad	<i>Bufo terrestris</i>	
Southern dusky salamander	<i>Desmognathus auriculatus</i>	
Dwarf salamander	<i>Eurycea quadridigitata</i>	
Eastern narrow-mouthed toad	<i>Gastrophryne carolinensis</i>	
Striped newt	<i>Notophthalmus perstriatus</i>	
Central newt	<i>Notophthalmus viridescens louisianensis</i>	
Peninsula newt	<i>Notophthalmus viridescens piaropicola</i>	
Narrow-striped dwarf siren	<i>Pseudobranchius axanthus axanthus</i>	
Gulf hammock dwarf siren	<i>Pseudobranchius striatus lustricolus</i>	
Slender dwarf siren	<i>Pseudobranchius striatus spheniscus</i>	
Rusty mud salamander	<i>Pseudotriton montanus floridanus</i>	
Eastern spadefoot toad	<i>Scaphiopus holbrooki holbrooki</i>	
Eastern lesser siren	<i>Siren intermedia intermedia</i>	
Greater siren	<i>Siren lacertina</i>	
Reptiles		
Florida cottonmouth	<i>Agkistrodon piscivorous conanti</i>	
American alligator	<i>Alligator mississippiensis</i>	FT (s/a)
Six-lined racerunner	<i>Aspidoscelis sexlineata</i>	
Loggerhead sea turtle	<i>Caretta caretta caretta</i>	FT
Florida scarlet snake	<i>Cemophora coccinea coccinea</i>	
Green sea turtle	<i>Chelonia mydas</i>	FT
Florida snapping turtle	<i>Chelydra serpentina osceola</i>	
Southern black racer	<i>Coluber constrictor priapus</i>	
Eastern diamondback rattlesnake	<i>Crotalus adamanteus</i>	
Florida chicken turtle	<i>Deirochelys reticularia chrysea</i>	
Eastern chicken turtle	<i>Deirochelys reticularia reticularia</i>	

Common Name	Species Name	Status
Leatherback sea turtle	<i>Dermodochelys coriacea</i>	FE
Southern ringneck snake	<i>Diadophis punctatus punctatus</i>	
Corn snake	<i>Elaphe guttata guttata</i>	
Rat snake	<i>Elaphe obsoleta</i>	
Yellow rat snake	<i>Elaphe obsoleta quadrivittata</i>	
Gray rat snake	<i>Elaphe obsoleta spiloides</i>	
Atlantic hawksbill sea turtle	<i>Eretmodochelys imbricata imbricata</i>	FE
Peninsula mole skink	<i>Eumeces egregius onocrepis</i>	
Five-lined skink	<i>Eumeces fasciatus</i>	
Southeastern five-lined skink	<i>Eumeces inexpectatus</i>	
Broad-headed skink	<i>Eumeces laticeps</i>	
Eastern mud snake	<i>Farancia abacura abacura</i>	
Rainbow snake	<i>Farancia erytrogramma erytrogramma</i>	
Eastern hognose snake	<i>Heterodon platirhinos</i>	
Southern hognose snake	<i>Heterodon simus</i>	
Striped mud turtle	<i>Kinosternon baurii</i>	
Florida mud turtle	<i>Kinosternon subrubrum steindachneri</i>	
Short-tailed snake	<i>Lampropeltis extenuate</i>	ST
Florida kingsnake	<i>Lampropeltis getula floridana</i>	
Eastern kingsnake	<i>Lampropeltis getula getula</i>	
Scarlet kingsnake	<i>Lampropeltis triangulum elapsoides</i>	
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	FE
Alligator snapping turtle	<i>Macrochelys temminckii</i>	SSC
Ornate diamondback terrapin	<i>Malaclemys terrapin macrospilota</i>	
Eastern coachwhip	<i>Masticophis flagellum flagellum</i>	
Coral snake	<i>Micrurus fulvius fulvius</i>	
Gulf salt marsh snake	<i>Nerodia clarkii clarkia</i>	
Mangrove salt marsh snake	<i>Nerodia clarkii compressicauda</i>	
Banded water snake	<i>Nerodia fasciata fasciata</i>	
Florida water snake	<i>Nerodia fasciata pictiventris</i>	
Florida green water snake	<i>Nerodia floridana</i>	
Brown water snake	<i>Nerodia taxispilota</i>	
Rough green snake	<i>Opheodrys aestivus</i>	
Eastern slender glass lizard	<i>Ophisaurus attenuatus longicaudus</i>	
Island glass lizard	<i>Ophisaurus compressus</i>	
Eastern glass lizard	<i>Ophisaurus ventralis</i>	
Suwannee cooter	<i>Pseudemys concinna suwanniensis</i>	
Peninsula cooter	<i>Pseudemys floridana peninsularis</i>	
Florida red-bellied turtle	<i>Pseudemys nelson</i>	
Striped crayfish snake	<i>Regina alleni</i>	
Pine woods snake	<i>Rhadinaea flavilata</i>	
Ground skink, little brown skink	<i>Scincella lateralis</i>	
North florida swamp snake	<i>Seminatrix pygaea pygaea</i>	
Dusky pigmy rattlesnake	<i>Sistrurus miliarius barbouri</i>	
Loggerhead musk turtle	<i>Sternotherus minor minor</i>	
Common musk turtle, stinkpot	<i>Sternotherus odoratus</i>	

Common Name	Species Name	Status
Florida brown snake	<i>Storeria dekayi victa</i>	
Florida redbelly snake	<i>Storeria occipitomaculata obscura</i>	
Bluestripe ribbon snake	<i>Thamnophis sauritus nitae</i>	
Bluestripe garter snake	<i>Thamnophis sirtalis similis</i>	
Eastern garter snake	<i>Thamnophis sirtalis sirtalis</i>	
Florida softshelled turtle	<i>Trionyx ferox</i>	
Eastern earth snake	<i>Virginia valeria valeria</i>	
Fishes		
Scrawled cowfish	<i>Acanthostracion quadricornis</i>	
Lined sole	<i>Achirus lineatus</i>	
Atlantic sturgeon	<i>Acipenser oxyrinchus oxyrinchus</i>	FE
Gulf sturgeon	<i>Acipenser oxyrinchus desotoi</i>	FT
Diamond killifish	<i>Adinia xenica</i>	
Spotted eagle ray	<i>Aetobatus narinari</i>	
Orange filefish	<i>Aluterus schoepfii</i>	
Fringed pipefish	<i>Anarchopterus criniger</i>	
Striped anchovy	<i>Anchoa hepsetus</i>	
Bay anchovy	<i>Anchoa mitchilli</i>	
Ocellated flounder	<i>Ancylopsetta quadrocellata</i>	
American eel	<i>Anguilla rostrata</i>	
Sheepshead	<i>Archosargus probatocephalus</i>	
Hardhead catfish	<i>Ariopsis felis</i>	
Bronze cardinalfish	<i>Astrapogon alutus</i>	
Southern stargazer	<i>Astroscopus y-graecum</i>	
Gafftopsail catfish	<i>Bagre marinus</i>	
Silver perch	<i>Bairdiella chrysoura</i>	
Frillfin goby	<i>Bathygobius soporator</i>	
Gulf menhaden	<i>Brevoortia patronus</i>	
Grass porgy	<i>Calamus arctifrons</i>	
Blue runner	<i>Caranx crysos</i>	
Crevalle jack	<i>Caranx hippos</i>	
Bull shark	<i>Carcharhinus leucas</i>	
Blacktip shark	<i>Carcharhinus limbatus</i>	
Sand tiger shark	<i>Carcharias taurus</i>	
Common Snook	<i>Centropomus undecimalis</i>	
Rock sea bass	<i>Centropristis philadelphica</i>	
Black sea bass	<i>Centropristis striata</i>	
Atlantic spadefish	<i>Chaetodipterus faber</i>	
Florida blenny	<i>Chasmodes saburrae</i>	
Striped burrfish	<i>Chilomycterus schoepfii</i>	
Atlantic bumper	<i>Chloroscombrus chrysurus</i>	
Spotted whiff	<i>Citharichthys macrops</i>	
Bay whiff	<i>Citharichthys spilopterus</i>	
Darter goby	<i>Ctenogobius boleosoma</i>	
Sand seatrout	<i>Cynoscion arenarius</i>	

Common Name	Species Name	Status
Spotted seatrout	<i>Cynoscion nebulosus</i>	
Sheepshead minnow	<i>Cyprinodon variegatus</i>	
Southern stingray	<i>Dasyatis americana</i>	
Atlantic stingray	<i>Dasyatis sabina</i>	
Bluntnose stingray	<i>Dasyatis say</i>	
Round scad	<i>Decapterus punctatus</i>	
Irish pompano	<i>Diapterus auratus</i>	
Dwarf sand perch	<i>Diplectrum bivittatus</i>	
Sand perch	<i>Diplectrum formosum</i>	
Spottail pinfish	<i>Diplodus holbrookii</i>	
Gizzard shad	<i>Dorosoma cepedianum</i>	
Threadfin shad	<i>Dorosoma petenense</i>	
Sharksucker	<i>Echeneis naucrates</i>	
Whitefin sucker	<i>Echeneis neucratoides</i>	
Ladyfish	<i>Elops saurus</i>	
Atlantic goliath grouper	<i>Epinephelus itajara</i>	
Jackknife fish	<i>Equetus lanceolatus</i>	
Fringed flounder	<i>Etropus crossotus</i>	
Smallmouth flounder	<i>Etropus microstomus</i>	
Gray flounder	<i>Etropus rimosus</i>	
Silver jenny	<i>Eucinostomus gula</i>	
Tidewater mojarra	<i>Eucinostomus harengulus</i>	
Goldspotted killifish	<i>Floridichthys carpio</i>	
Marsh killifish	<i>Fundulus confluentus</i>	
Gulf killifish	<i>Fundulus grandis</i>	
Striped killifish	<i>Fundulus similis</i>	
Eastern mosquitofish	<i>Gambusia holbrooki</i>	
Skilletfish	<i>Gobiesox strumosus</i>	
Highfin goby	<i>Gobionellus oceanicus</i>	
Naked goby	<i>Gobiosoma bosc</i>	
Twoscale goby	<i>Gobiosoma longipala</i>	
Code goby	<i>Gobiosoma robustum</i>	
Ocellated moray	<i>Gymnothorax Saxicola</i>	
Smooth butterfly ray	<i>Gymnura micrura</i>	
Tomtate	<i>Haemulon aurolineatum</i>	
White grunt	<i>Haemulon plumierii</i>	
Slippery dick	<i>Halichoeres bivittatus</i>	
Scaled sardine	<i>Harengula jaguana</i>	
Bluntnose jack	<i>Hemicaranx amblyrhynchus</i>	
Least killifish	<i>Heterandria Formosa</i>	
Lined seahorse	<i>Hippocampus erectus</i>	
Dwarf seahorse	<i>Hippocampus zosterae</i>	
Zebratail blenny	<i>Hypleurochilus caudovittatus</i>	
American halfbeak	<i>Hyporhamphus meeki</i>	
Halfbeak	<i>Hyporhamphus unifasciatus</i>	
Warsaw grouper	<i>Hyporthodus nigrilus</i>	

Common Name	Species Name	Status
Feather blenny	<i>Hypsoblennius hentz</i>	
Hogfish	<i>Lachnolaimus maximus</i>	
Buffalo trunkfish	<i>Lactophrys trigonus</i>	
Long-horned cowfish	<i>Lactoria cornuta</i>	
Pinfish	<i>Lagodon rhomboides</i>	
Spot	<i>Leiostomus xanthurus</i>	
Longnose gar	<i>Lepisosteus osseus</i>	
Freckled skate	<i>Leucoraja lentiginose</i>	
Tripletail	<i>Lobotes surinamensis</i>	
Rainwater killifish	<i>Lucania parva</i>	
Gray snapper	<i>Lutjanus griseus</i>	
Dog snapper	<i>Lutjanus jocu</i>	
Mahogany snapper	<i>Lutjanus mahogoni</i>	
Lane snapper	<i>Lutjanus synagris</i>	
Tarpon	<i>Megalops atlanticus</i>	
Rough silverside	<i>Membras martinica</i>	
Inland silverside	<i>Menidia beryllina</i>	
Southern kingfish	<i>Menticirrhus americanus</i>	
Northern kingfish	<i>Menticirrhus saxatalis</i>	
Clown goby	<i>Microgobius gulosus</i>	
Green goby	<i>Microgobius thalassinus</i>	
Atlantic croaker	<i>Micropogonias undulatus</i>	
Fringed filefish	<i>Monacanthus ciliates</i>	
Striped mullet	<i>Mugil cephalus</i>	
White mullet	<i>Mugil curema</i>	
Fantail mullet	<i>Mugil gyrans</i>	
Red goatfish	<i>Mullus auratus</i>	
Smooth dogfish	<i>Mustelus canis</i>	
Yellowmouth grouper	<i>Mycteroperca interstitialis</i>	
Gag grouper	<i>Mycteroperca microlepis</i>	
Speckled worm eel	<i>Myrophis punctatus</i>	
Lesser electric ray	<i>Narcine bancroftii</i>	
Spinycheek scorpionfish	<i>Neomerinthe hemingwayi</i>	
Emerald parrotfish	<i>Nicholsina usta</i>	
Golden shiner	<i>Notemigonus crysoleucas</i>	
Shiner	<i>Notropis spp.</i>	
Yellowtail snapper	<i>Ocyurus chrysurus</i>	
Polka-dot batfish	<i>Ogcocephalus cubifrons</i>	
Leatherjacket	<i>Oligoplites saurus</i>	
Shrimp eel	<i>Ophichthus gomesii</i>	
Crested cusk-eel	<i>Ophidion josephi</i>	
Atlantic thread herring	<i>Opisthonema oglinum</i>	
Spotfin jawfish	<i>Opistognathus robinsi</i>	
Gulf toadfish	<i>Opsanus beta</i>	
Pigfish	<i>Orthopristis chrysoptera</i>	
Seaweed blenny	<i>Parablennius marmoreus</i>	

Common Name	Species Name	Status
Banded blenny	<i>Paraclinus fasciatus</i>	
Gulf flounder	<i>Paralichthys albigutta</i>	
Broad flounder	<i>Paralichthys squamilentus</i>	
Gulf butterfish	<i>Peprilus burti</i>	
Harvestfish	<i>Peprilus paru</i>	
Sailfin molly	<i>Poecilia latipinna</i>	
Black drum	<i>Pogonias cromis</i>	
French angelfish	<i>Pomacanthus paru</i>	
Bluefish	<i>Pomatomus saltatrix</i>	
Leopard sea robin	<i>Prionotus scitulus</i>	
Bighead sea robin	<i>Prionotus Tribulus</i>	
Smalltooth sawfish	<i>Pristis pectinate</i>	FE
Cobia	<i>Rachycentron canadum</i>	
Clearnose skate	<i>Raja eglantaria</i>	
Roundel skate	<i>Raja texana</i>	
Atlantic guitar fish	<i>Rhinobatos lentiginosus</i>	
Cownose ray	<i>Rhinoptera bonasus</i>	
Atlantic sharpnose shark	<i>Rhizoprionodon terraenovae</i>	
Spanish sardine	<i>Sardinella aurita</i>	
Red drum	<i>Sciaenops ocellatus</i>	
Spanish mackerel	<i>Scomberomorus maculatus</i>	
Cero mackerel	<i>Scomberomorus regalis</i>	
Barbfish	<i>Scorpaena brasiliensis</i>	
Lookdown	<i>Selene vomer</i>	
Pygmy sea bass	<i>Serraniculus pumilio</i>	
Belted sandfish	<i>Serranus subligarius</i>	
Bucktooth parrotfish	<i>Sparisoma radians</i>	
Southern puffer	<i>Sphoeroides nephelus</i>	
Bandtail puffer	<i>Sphoeroides spengleri</i>	
Guaguanche barracuda	<i>Sphyraena guachancho</i>	
Great barracuda	<i>Sphyraena barracuda</i>	
Northern sennet	<i>Sphyraena borealis</i>	
Bonnethead shark	<i>Sphyrna tiburo</i>	
Checkered blenny	<i>Starksia ocellata</i>	
Planehead filefish	<i>Stephanolepis hispidus</i>	
Pygmy filefish	<i>Stephanolepis setifer</i>	
Atlantic needlefish	<i>Strongylura marina</i>	
Redfin needlefish	<i>Strongylura notata</i>	
Timucu	<i>Strongylura timucu</i>	
Dusky flounder	<i>Syacium papillosum</i>	
Blackcheeked tonguefish	<i>Symphurus plagiusa</i>	
Dusky pipefish	<i>Syngnathus floridae</i>	
Chain pipefish	<i>Syngnathus lousianae</i>	
Sargassum pipefish	<i>Syngnathus pelagicus</i>	
Bull pipefish	<i>Syngnathus springeri</i>	
Inshore lizardfish	<i>Synodus foetens</i>	

Common Name	Species Name	Status
Florida pompano	<i>Trachinotus carolinus</i>	
Permit	<i>Trachinotus falcatus</i>	
Houndfish	<i>Tylosorus crocodilus</i>	
Southern hake	<i>Urophycis floridana</i>	
Spotted hake	<i>Urophycis regia</i>	
Insects		
	<i>Dicrotendipes</i> spp.	
True flies	<i>Diptera</i> spp.	
Beetles	<i>Coleoptera</i> spp.	
True bugs	<i>Hemiptera</i> spp.	
Seashore springtail	<i>Anurida maritima</i>	
Ants, bees, wasps	<i>Hymenoptera</i> spp.	
Butterflies, moths	<i>Lepidoptera</i> spp.	
Marine invertebrates		
Atlantic abra	<i>Abra aequalis</i>	
Striate glass-hair chiton	<i>Acanthochitona pygmaea</i>	
White miniature ark	<i>Acar domingensis</i>	
Channelled barrel-bubble	<i>Acteocina canaliculate</i>	
Cande's barrel-bubble	<i>Acteocina candeii</i>	
West indian sea cucumber	<i>Actinopyga agassizi</i>	
Bay scallop	<i>Aequipectin irradians</i>	
Texas venus	<i>Agriopoma texasianum</i>	
Aligena species	<i>Aligena</i> spp.	
Bigclaw snapping shrimp	<i>Alpheus heterochaelis</i>	
West indian alvania	<i>Alvania auberiana</i>	
Cockle	<i>Americardia</i> spp.	
	<i>Amphicteis gunneri floridus</i>	
Atlantic papermussel	<i>Amygdalum papyrium</i>	
Cut-ribbed ark	<i>Anadara floridana</i>	
Cockle	<i>Anadara</i> spp.	
Traverse ark	<i>Anadara transversa</i>	
Sybaritic tellin	<i>Angulus sybariticus</i>	
Texas tellin	<i>Angulus texanus</i>	
Delicate tellin	<i>Angulus tenellus</i>	
Many-colored tellin	<i>Angulus versicolor</i>	
Buttercup lucine	<i>Anodontia alba</i>	
Chalky buttercup lucine	<i>Anodontia philippiana</i>	
Pointed venus	<i>Anomalocardia cuneimeris</i>	
Common jingle	<i>Anomia simplex</i>	
Pilsbry tuskshell	<i>Antalis pilsbryi</i>	
Cockle	<i>Antigona</i> spp.	
Sea slug/spotted sea hare	<i>Aplysia dactylomela</i>	
Mossy ark	<i>Arca imbricata</i>	
Turkey wing	<i>Arca zebra</i>	

Common Name	Species Name	Status
Cancellate ark	<i>Arcopsis adamsi</i>	
Atlantic assimineea	<i>Assimineea succinea</i>	
Coral	<i>Astrangia</i> spp.	
Giant basket starfish	<i>Astrophyton muricatum</i>	
Lunar dovesnail	<i>Astyris lunata</i>	
Stiff penshell	<i>Atrina rigida</i>	
Half-naked penshell	<i>Atrina seminuda</i>	
Sawtooth penshell	<i>Atrina serrata</i>	
Riise's glassy bubble	<i>Atyis riiseanus</i>	
Ivory barnacle	<i>Balanus eburneus</i>	
Corbula sportella	<i>Basterotia corbuloidea</i>	
Square sportella	<i>Basterotia quadrata</i>	
Grass cerith	<i>Bittium varium</i>	
Impressed odostome	<i>Boonea impressa</i>	
Borniaclam	<i>Bornia longipes</i>	
Spiny slippersnail	<i>Bostrycapulus aculeata</i>	
Scorched mussel	<i>Brachidontes exustus</i>	
Biconic top-turris	<i>Brachycythara biconical</i>	
Sea fingers	<i>Briareum asbetinum</i>	
	<i>Bucephalus cuculus</i>	
Striate bubble	<i>Bulla striata</i>	
Lightning whelk	<i>Busycon sinistrum</i>	
Pear whelk	<i>Busycotypus spiratus</i>	
Bipartite caecum	<i>Caecum bipartitum</i>	
Cooper's caecum	<i>Caecum cooperi</i>	
Fine-line caecum	<i>Caecum multicostatum</i>	
Beautiful caecum	<i>Caecum pulchellum</i>	
Striate caecum	<i>Caecum strigosum</i>	
Box crab	<i>Calappa</i> spp.	
	<i>Callianassa jamaicensis</i>	
Greater blue crab	<i>Callinectes sapidus</i>	
Lesser blue crab	<i>Callinectes similis</i>	
Beautiful topsnail	<i>Calliostoma pulchrum</i>	
Mauve mouth drill	<i>Calotrophon ostrearum</i>	
Circular chinese hat	<i>Calyptrea centralis</i>	
Common nutmeg	<i>Cancellaria reticulata</i>	
Cancellate cantharus	<i>Cantharus cancellarius</i>	
Broad-ribbed carditid	<i>Carditamera floridana</i>	
Needle odostome	<i>Careliopsis styliiformis</i>	
Costate hornsail	<i>Cerithidea costata turrata</i>	
Ladder hornsail	<i>Cerithidea scalariformis</i>	
Yellow miniature cerith	<i>Cerithiopsis flava</i>	
Gem miniature cerith	<i>Cerithiopsis gemmulosa</i>	
Green's miniature cerith	<i>Cerithiopsis greenii</i>	
Variable cerith	<i>Cerithium lutosum</i>	
Flyspeck cerith	<i>Cerithium muscarum</i>	

Common Name	Species Name	Status
Corrugate jewelbox	<i>Chama congregata</i>	
Lace murex	<i>Chicoreus florifer dilectus</i>	
Cross barred venus	<i>Chione cancellate</i>	
Venerid bivalve	<i>Chione elevate</i>	
Atlantic petricolid	<i>Choristodon robustum</i>	
	<i>Chrysallida nioba</i>	
Suppressed vitrinella	<i>Circulus suppressus</i>	
Hermit crab	<i>Clibanarius</i> spp.	
Fancy shell hermit crab	<i>Clibanarius vittatus</i>	
Striate scalesnail	<i>Cochliolepis striata</i>	
Dwarf tiger lucine	<i>Codakia orbiculate</i>	
Rusty dovesnail	<i>Columbella rusticoides</i>	
Stearn's cone	<i>Conus stearnsi</i>	
Truncate corbula	<i>Corbula barrattiana</i>	
Contracted corbula	<i>Corbula contracta</i>	
Well-ribbed dovesnail	<i>Costoanachis lafresnayi</i>	
Gulf dovesnail	<i>Costoanachis semiplicata</i>	
Dovesnail	<i>Costoanachis</i> spp.	
Florida cave amphipod	<i>Crangonyx grandimanus</i>	
Hobb's cave amphipod	<i>Crangonyx hobbsi</i>	
Lunate crassinella	<i>Crassinella lunulate</i>	
Eastern or american oyster	<i>Crassostrea virginica</i>	
Depressed slippersnail	<i>Crepidula depressa</i>	
Slipper limpet	<i>Crepidula fornicate</i>	
Waxy mangelia	<i>Cryoturris cerinella</i>	
	<i>Cryoturris vincula</i>	
Tellin semele	<i>Cumingia tellinoides vanhyningi</i>	
Slender isopod	<i>Cyathura polita</i>	
Trilex vitrinella	<i>Cyclostremiscus pentagonus</i>	
Two-tooth barrel-bubble	<i>Cylichnella bidentata</i>	
Flamingo tongue snail	<i>Cyphoma gibbose</i>	
Florida marshclam	<i>Cyrenoida floridana</i>	
Angelwing	<i>Cyrtopleura costata</i>	
Hermit crab	<i>Dardanus</i> spp.	
Gold-line marginella	<i>Dentimargo aureocinctus</i>	
Tan marginella	<i>Dentimargo eburneolus</i>	
Black sea urchin	<i>Diadema antillarum</i>	
Atlantic giant cockle	<i>Dinocardium robustum</i>	
Tube worm	<i>Diopatra cuprea</i>	
Orange sea star	<i>Echinaster</i> spp.	
Interrupted periwinkle	<i>Echinolittorina interrupta</i>	
Sea urchin	<i>Echinometria</i> spp.	
Variable spike	<i>Elliptio icterina</i>	
Minor jackknife	<i>Ensis megistus</i>	
Textured sportella	<i>Ensitellops protextus</i>	
Sportella	<i>Ensitellops</i> spp.	

Common Name	Species Name	Status
Bladed wentletrap	<i>Epitonium albidum</i>	
Angulate wentletrap	<i>Epitonium angulatum</i>	
Semismooth wentletrap	<i>Epitonium apiculatum</i>	
Cande's wentletrap	<i>Epitonium candeanum</i>	
Humphrey's wentletrap	<i>Epitonium humphreysii</i>	
Brown-band wentletrap	<i>Epitonium rupicola</i>	
Mauger's erato	<i>Erato maugeriae</i>	
Gold-stripe eulima	<i>Eulima auricincta</i>	
Two-band eulima	<i>Eulima bifasciata</i>	
Channeled odostome	<i>Eulimastoma canaliculatum</i>	
Sharp-rib drill	<i>Eupleura sulcidentata</i>	
Flatback mud crab	<i>Eurypanopeus depressus</i>	
Alternate tellin	<i>Eurytellina alternata</i>	
Broad back mud crab	<i>Eurytium limosum</i>	
Pink shrimp	<i>Farfantepenaeus duorarum</i>	
Commercial shrimp	<i>Farfantepenaeus</i> spp.	
Eastern banded tulip	<i>Fasciolaria hunteria</i>	
True tulip	<i>Fasciolaria tulipa</i>	
Pitted murex	<i>Favartia cellulose</i>	
Golfball coral	<i>Favia fragum</i>	
	<i>Gammarus mucronatus</i>	
Atlantic gastrochaenid	<i>Gastrochaena hians</i>	
Amethyst gemclam	<i>Gemma gemma</i>	
Ribbed mussel	<i>Geukensia demissa</i>	
Snowflake marginella	<i>Gibberula lavalleeana</i>	
Santo Domingo carditid	<i>Glans dominguensis</i>	
Blood worm	<i>Glycera americana</i>	
Blood worm	<i>Glycera dibranchiate</i>	
Square glyph-turris	<i>Glyphoturris quadrata</i>	
Eroded crab	<i>Glyptoxanthus</i> spp.	
	<i>Grandidierella</i> spp.	
Hadria marginella	<i>Granulina hadria</i>	
Ivory tuskshell	<i>Graptacme eborea</i>	
Tanaid	<i>Halmyrapseudes bahamensis</i>	
Amber glassy-bubble	<i>Haminoea succinea</i>	
Capitellid thread worm	<i>Heteromastus filiformis</i>	
Giant eastern murex	<i>Hexaplex fulvescens</i>	
Yellow sea cucumber, Florida sea cucumber	<i>Holothuria floridana</i>	
Sheepswool sponge	<i>Hippiospongia lachne</i>	
Caridean shrimp	<i>Hippolyte pleuracantha</i>	
Hooked mussel	<i>Ischadium recurvum</i>	
	<i>Ischnochiton niveus</i>	
Brown-tip mangelia	<i>Kurtziella atrostyla</i>	
Punctate mangelia	<i>Kurtziella limonitella</i>	
Polychaete	<i>Laeonereis culveri</i>	
Common egg cockle	<i>Laevicardium laevigatum</i>	

Common Name	Species Name	Status
Yellow eggcockle	<i>Laevicardium mortoni</i>	
Painted eggcockle	<i>Laevicardium pictum</i>	
Sea slug	<i>Lamellaria</i> spp.	
	<i>Leitoscoloplos fragilis</i>	
Sea whip	<i>Leptogoria</i> spp.	
Spider crab	<i>Libinia</i> spp.	
Antillean fileclam	<i>Limaria pellucida</i>	
Atlantic horseshoe crab	<i>Limulus polyphemus</i>	
Miniature lucine	<i>Linga amiantus</i>	
White shrimp	<i>Litopenaeus setiferus</i>	
Mangrove periwinkle	<i>Littoraria angulifera</i>	
Marsh periwinkle	<i>Littoraria irrorate</i>	
Bantum hydrobe	<i>Littoridinops palustris</i>	
Crinkled pyram	<i>Longchaeus suturalis</i>	
File fleshy limpet	<i>Lucapinella limatula</i>	
Woven lucine	<i>Lucina nassula</i>	
Thick lucine	<i>Lucina pectinate</i>	
Pennsylvania lucine	<i>Lucina pennsylvanica</i>	
Blood ark	<i>Lunarca ovalis</i>	
Florida Lyonsia	<i>Lyonsia floridana</i>	
Green sea urchin	<i>Lytechinus variegatus</i>	
Short macoma	<i>Macoma brevifrons</i>	
Constricted macoma	<i>Macoma constricta</i>	
Calico clam	<i>Macrocallista maculate</i>	
Sunray venus	<i>Macrocallista nimbose</i>	
Decorator crab	<i>Macrocoeloma</i> spp.	
Fragile surfclam	<i>Mactra fragilis</i>	
Rose coral	<i>Mancina areolate</i>	
Gem cyclostreme	<i>Marevalvata tricarinata</i>	
Striate piddock	<i>Martesia striata</i>	
Ochlockonee moccasinshell	<i>Medionidus simpsonianus</i>	FE
	<i>Meioceras nitidum</i>	
Eastern melampus	<i>Melampus bidentatus</i>	
	<i>Melanella atypha</i>	
Conoidal eulima	<i>Melanella conoidea</i>	
Sharp eulima	<i>Melanella hypsela</i>	
Jamaica eulima	<i>Melanella jamaicensis</i>	
	<i>Melita nitida</i>	
Crown conch	<i>Melongena corona</i>	
Stone crab	<i>Menippe mercenaria</i>	
Southern quahog	<i>Mercenaria campechiensis</i>	
Hard-shell clam	<i>Mercenaria mercenaria</i>	
Striate tellin	<i>Merisca aequistriata</i>	
Brown eulima	<i>Microeulima hemphillii</i>	
Spotted decorator crab	<i>Microphrys</i> spp.	
Clinging crab	<i>Mithrax</i> spp.	

Common Name	Species Name	Status
False tip mussel	<i>Modiolus modiolus squamosus</i>	
Button snail	<i>Modulus modulus</i>	
Dward surfclam	<i>Mulinia lateralis</i>	
Lateral mussel	<i>Musculus lateralis</i>	
	<i>Mysella</i> spp.	
Sharp nassa	<i>Nassarius acutus</i>	
Striate nassa	<i>Nassarius consensus</i>	
Bruised nassa	<i>Nassarius vibex</i>	
Gaudy natica	<i>Natica canrena</i>	
Pile worms	<i>Neanthes succinea</i>	
Round worm	<i>Nematoda</i> spp.	
Kingsly mud crab	<i>Neopanope packardii</i>	
Stimpson mud crab	<i>Neopanope texana</i>	
False sharks's eye	<i>Neverita delessertiana</i>	
Shark's eye	<i>Neverita duplicate</i>	
Brown-line niso	<i>Niso aeglees</i>	
Ponderous ark	<i>Noetia ponderosa</i>	
Mottled triphora	<i>Nototriphora decorate</i>	
Pointed nutclam	<i>Nuculana acuta</i>	
Atlantic nutclam	<i>Nucula proxima</i>	
Caribbean reef octopus	<i>Octopus briareus</i>	
Ovoid odostome	<i>Odostomia laevigata</i>	
	<i>Olivella inusta</i>	
Variable dwarf olive	<i>Olivella mutica</i>	
	<i>Olivella perplexa</i>	
	<i>Olivella prefloralia</i>	
Tiny dwarf olive	<i>Olivella pusilla</i>	
Lettered olive	<i>Oliva sayana</i>	
Fine-lined hydrobe	<i>Onobops jacksoni</i>	
	<i>Onuphis eremita oculate</i>	
Giant montacutid	<i>Orobitella floridana</i>	
West indian sea star	<i>Oreaster reticulatus</i>	
Crested oyster	<i>Ostreola equestris</i>	
Antilles oxynoe	<i>Oxynoe antillarum</i>	
Hermit crab	<i>Pagurus</i> spp.	
Brackish green shrimp	<i>Palaemonetes intermedius</i>	
Grass shrimp	<i>Palaemonetes pugio</i>	
Common mud crab	<i>Panopeus herbstii</i>	
Spiny lobster	<i>Panulirus argus</i>	
Subovate softshell	<i>Paramya subovata</i>	
Brown gem clam	<i>Parastarte triquetra</i>	
Fat dovesnail	<i>Parvanachis obesa</i>	
Oyster dovesnail	<i>Parvanachis ostreicola</i>	
Many lined lucine	<i>Parvilucina crenelle</i>	
Interupted vitrinella	<i>Parviturboides interruptus</i>	
	<i>Pectinaria gouldii</i>	

Common Name	Species Name	Status
Miraculous pedipes	<i>Pedipes mirabilis</i>	
Anemone shrimp	<i>Periclimenes</i> spp.	
Tower pyram	<i>Peristichia toreta</i>	
Boring petricola	<i>Petricola lapicida</i>	
Hermit crab	<i>Petrochirus</i> spp.	
Apple murex	<i>Phyllonotus pomum</i>	
White-knobbed drillia	<i>Pilsbryspira leucocyma</i>	
Hairy crab	<i>Pilumnus</i> spp.	
Chalky pitar	<i>Pitar simpsoni</i>	
	<i>Pithos</i> spp.	
Threetooth carditid	<i>Pleuromeris tridentata</i>	
Sea rods	<i>Plexaura</i> spp.	
Shark eye shell	<i>Polinices duplicatus</i>	
Tinted cantharus	<i>Pollia tincta</i>	
Polychaete worm	<i>Polydora websteri</i>	
Fourtooth toothshell	<i>Polyschides tetraschistus</i>	
Small finger coral	<i>Porites furcate</i>	
Iridescent swimming crab	<i>Portunus gibbesii</i>	
Blotched swimming crab	<i>Portunus spinimanus</i>	
Big blue spring cave crayfish	<i>Procambarus horsti</i>	
Light-fleeing cave crayfish	<i>Procambarus lucifugus</i>	
Common Atlantic marginella	<i>Prunum apicinum</i>	
Little oat marginella	<i>Prunum avenaceum</i>	
	<i>Prunum succinea</i>	
Florida lucine	<i>Pseudomiltha floridana</i>	
Sea feathers, sea plumes	<i>Pseudopterogorgia</i> spp.	
	<i>Ptychodera bahamensis</i>	
Plicate mangelia	<i>Pyrgocythara plicosa</i>	
Mangelia	<i>Pyrgocythata</i> spp.	
Oyster turris	<i>Pyrgospira ostrearum</i>	
	<i>Rissoina elegantissima</i>	
Mussel	<i>Quincuncina kleiniana</i>	
Sea pansies	<i>Renilla</i> spp.	
Emerson's miniature cerith	<i>Retilaskeya emersonii</i>	
Pitted baby-bubble	<i>Rictaxis punctostriatus</i>	
Reddish mangelia	<i>Rubellatoma rubella</i>	
	<i>Sabellaria</i> spp.	
Incongruous ark	<i>Scapharca brasilliana</i>	
Catesby's risso	<i>Schwartziella catesbyana</i>	
Florida risso	<i>Schwartziella floridana</i>	
Rainbow tellin	<i>Scissula iris</i>	
	<i>Scoloplos fragilis</i>	
Adam's miniature cerith	<i>Seila adamsi</i>	
Cancellate semele	<i>Semele bellastrata</i>	
Atlantic semele	<i>Semele proficua</i>	
Nut semele	<i>Semelina nuculoides</i>	

Common Name	Species Name	Status
Scotch bonnet	<i>Semicassis granulata</i>	
White baby ear	<i>Sinum perspectivum</i>	
Skenea	<i>Skenea</i> spp.	
Blake's vitrinella	<i>Solariorbis blakei</i>	
Gabb's vitrinella	<i>Solariorbis infracarinata</i>	
Terminal vitrinella	<i>Solariorbis terminalis</i>	
Florida loggerhead sponge	<i>Sphaciospongia vesparium</i>	
Southern surfclam	<i>Spisula raveneli</i>	
Red-mouthed rock snail	<i>Stramonita haemastoma</i>	
Florida rock snail	<i>Stramonita haemastoma canaliculata</i>	
	<i>Strictispira acurugata</i>	
Florida fighting conch	<i>Strombus alatus</i>	
	<i>Stylochus frontalis</i>	
Lineate dovesnail	<i>Suturoglypta iontha</i>	
Minor snapping shrimp	<i>Synalpheus minus</i>	
Purplish tagelus	<i>Tagelus divisus</i>	
Miniature moon snail	<i>Tectonatica pusilla</i>	
High-spired vitrinella	<i>Teinostoma cryptospira</i>	
	<i>Teinostoma parvicallum</i>	
White-crest tellin	<i>Tellidora cristata</i>	
Sunrise tellin	<i>Tellina radiata</i>	
Speckeled tellin	<i>Tellinella listeri</i>	
Concave auger	<i>Terebra concave</i>	
Eastern auger	<i>Terebra dislocate</i>	
Fine-ribbed auger	<i>Terebra protexta</i>	
Lilac auger	<i>Terebra vinosa</i>	
Southern oyster drill	<i>Thais haemastoma</i>	
Bryozoan shrimp	<i>Thor floridanus</i>	
Gray pygmy-venus	<i>Timoclea grus</i>	
Slender barrel-bubble	<i>Tornatina inconspicua</i>	
Arrow shrimp	<i>Tozeuma</i> spp.	
Florida pricklycockle	<i>Trachycardium egmontianum</i>	
Yellow pricklycockle	<i>Trachycardium muricatum</i>	
	<i>Transenella conradina</i>	
Samana triphora	<i>Triphora albida</i>	
Mottled triphora	<i>Triphora decorate</i>	
	<i>Triphora modesta</i>	
	<i>Triphora nigrocincta</i>	
Horse conch	<i>Triplofusus giganteus</i>	
Tropical sea urchin	<i>Tripneustes ventricosus</i>	
Arrow dwarf triton	<i>Tritonoharpa lanceolata</i>	
Spider cave crayfish	<i>Troglocambarus maclanei</i>	
Caribbean truncatella	<i>Truncatella caribaeensis</i>	
Beautiful truncatella	<i>Truncatella pulchella</i>	
Chestnut turban	<i>Turbo castanea</i>	
	<i>Turbonilla arnoldoi</i>	

Common Name	Species Name	Status
Hawk turbonille	<i>Turbonilla buteonis</i>	
	<i>Turbonilla constricta</i>	
Dall's turbonille	<i>Turbonilla dalli</i>	
	<i>Turbonilla hemphilli</i>	
Delicate turbonille	<i>Turbonilla levis</i>	
Punctate turbonille	<i>Turbonilla puncta</i>	
	<i>Turbonilla punicea</i>	
	<i>Turbonilla Pyrrha</i>	
Turbonille	<i>Turbonilla</i> spp.	
Toyatan's turbonille	<i>Turbonilla toyatani</i>	
	<i>Turbonilla virga</i>	
Conrad's turbonille	<i>Turbonilla viridaria</i>	
Boring turretsnail	<i>Turritella acropora</i>	
Gulf marsh fiddler	<i>Uca longisignalis</i>	
Fiddler crab	<i>Uca</i> spp.	
Gulf oyster drill	<i>Urosalpinx perrugata</i>	
Tampa drill	<i>Urosalpinx tampaensis</i>	
Florida worm snail	<i>Vermicularia knorrii</i>	
Branching candle sponge	<i>Verongia longissimi</i>	
Florida rainbow	<i>Villosa amygdala</i>	
Conical eulima	<i>Vitreolina conica</i>	
Terminal vitrinella	<i>Vitrinella terminalis</i>	
Southern spindle-bubble	<i>Volvulella persimilis</i>	
Smooth risso	<i>Zebina browniana</i>	
	<i>Zebinella decussata</i>	
	<i>Zebinella elegantissima</i>	

B.3.2 / Listed Species

Legend: FT = Federally- and State-Designated Threatened • FE = Federally-and State-Designated Endangered • ST = State-Designated Threatened • SE = State-Designated Endangered • (S/A) = listed due to similarity of appearance • BGEPA = Bald and Golden Eagle Protection Act

Common Name	Species Name	Status
Plants		
Brittle maidenhair fern	<i>Adiantum tenerum</i>	SE
Incised groove-bur	<i>Agrimonia incisa</i>	SE
Green-fly orchid	<i>Epidendrum conopseum</i>	C
Cooley's water-willow	<i>Justicia cooleyi</i>	FE
Pine lily	<i>Lilium catesbaei</i>	ST
Cardinal flower	<i>Lobelia cardinalis</i>	ST
Florida spiny pod	<i>Matelea floridana</i>	SE
Blueflower butterwort	<i>Pinguicula caerulea</i>	ST
Yellow butterwort	<i>Pinguicula lutea</i>	ST
Yellow fringed orchid	<i>Platanthera ciliaris</i>	ST
Rose pogonia	<i>Pogonia ophioglossoides</i>	ST
Needle palm	<i>Rhapidophyllum hystrix</i>	C
Nightflowering petunia	<i>Ruellia noctiflora</i>	SE
Hooded pitcherplant	<i>Sarracenia minor</i>	ST
Parrot pitcherplant	<i>Sarracenia psittacina</i>	ST
Florida ladies tresses	<i>Spiranthes floridana</i>	SE
Crippled crane-fly orchid	<i>Tipularia discolor</i>	ST
Coontie	<i>Zamia pumila</i>	C
Treat's rainlily	<i>Zephyranthes treatiae</i>	ST
Birds		
Scott's seaside sparrow	<i>Ammodramus maritimus peninsulae</i>	ST
Burrowing owl	<i>Athene cunicularia</i>	ST
Ivory-billed woodpecker	<i>Campephilus principalis</i>	FE
Piping plover	<i>Charadrius melodus</i>	FT
Snowy plover	<i>Charadrius nivosus</i>	ST
Marian's marsh wren	<i>Cistothorus palustris marianae</i>	ST
Little blue heron	<i>Egretta caerulea</i>	ST
Reddish egret	<i>Egretta rufescens</i>	ST
Tricolored heron	<i>Egretta tricolor</i>	ST
Southeastern American kestrel	<i>Falco sparverius Paulus</i>	ST
American oystercatcher	<i>Haematopus palliatus</i>	ST
Eastern black rail	<i>Laterallus jamaicensis jamaicensis</i>	FT
Wood stork	<i>Mycteria americana</i>	FT
Roseate spoonbill	<i>Platalea ajaja</i>	ST
Red-cockaded woodpecker	<i>Picoides borealis</i>	FE
Black skimmer	<i>Rynchops niger</i>	ST
Least tern	<i>Sternula antillarum</i>	ST
Bachman's warbler	<i>Vermivora bachmanii</i>	FE

Mammals		
Florida manatee	<i>Trichechus manatus latirostris</i>	FE
Reptiles		
American alligator	<i>Alligator mississippiensis</i>	FT (s/a)
Loggerhead sea turtle	<i>Caretta caretta caretta</i>	FT
Green sea turtle	<i>Chelonia mydas</i>	FT
Leatherback sea turtle	<i>Dermochelys coriacea</i>	FE
Atlantic hawksbill sea turtle	<i>Eretmochelys imbricata imbricata</i>	FE
Short-tailed snake	<i>Lampropeltis extenuate</i>	ST
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	FE
Suwannee alligator snapping turtle	<i>Macrochelys suwanniensis</i>	T
Fishes		
Atlantic sturgeon	<i>Acipenser oxyrinchus oxyrinchus</i>	FE
Gulf sturgeon	<i>Acipenser oxyrinchus desotoi</i>	FT
Smalltooth sawfish	<i>Pristis pectinate</i>	FE
Marine invertebrates		
Ochlockonee moccasinshell	<i>Medionidus simpsonianus</i>	FE

B.3.3 / Invasive Non-native and/or Problem Species

Common Name	Species Name	Status
Plants		
Mimosa, silktree	<i>Albizia julibrissin</i>	I
Alligatorweed	<i>Alternanthera philoxeroides</i>	II
Tung oil tree	<i>Aleurites fordii</i>	II
Coral ardisia	<i>Ardisia crenata</i>	I
Scarlet milkweed	<i>Asclepias curassavicum</i>	Invasive
Pindo palm	<i>Butia capitata</i>	Invasive
Australian Pine	<i>Casuarina spp.</i>	L
Madagascar periwinkle	<i>Catharanthus roseus</i>	Invasive
Camphor tree	<i>Cinnamomum camphora</i>	I
Wild taro	<i>Colocasia esculenta</i>	I
Winged yam	<i>Dioscorea alata</i>	I
Air-potato	<i>Dioscorea bulbifera</i>	I
Common water hyacinth	<i>Eichhornia crassipes</i>	I
Hydrilla	<i>Hydrilla verticillate</i>	I
Cogon grass	<i>Imperata cylindrica</i>	I
Crape-myrtle	<i>Lagerstroemia indica</i>	Invasive
Dotted duckweed	<i>Landolita punctata</i>	Invasive
Lantana	<i>Lantana camara</i>	I
Japanese privet	<i>Ligustrum japonicum</i>	I
Glossy privet	<i>Ligustrum lucidum</i>	I
Chinese privet, hedge privet	<i>Ligustrum sinense</i>	I
Japanese honeysuckle	<i>Lonicera japonica</i>	I

Japanese climbing fern	<i>Lygodium japonicum</i>	I
Chinaberry	<i>Melia azedarach</i>	I
Eurasian water-milfoil	<i>Myriophyllum spicatum</i>	II
Nandina, heavenly bamboo	<i>Nandina domestica</i>	I
Sword fern	<i>Nephrolepis cordifolia</i>	I
Oleander	<i>Neria oleander</i>	Invasive
Violet wood sorrel	<i>Oxalis corymbosa</i>	Invasive
Skunk vine	<i>Paederia foetida</i>	I
Torpedo grass	<i>Panicum repens</i>	I
Bahiagrass	<i>Paspalum notadum sauriae</i>	Invasive
Red-leaf photina	<i>Photina glabra</i>	Invasive
Common cane, Roseau cane	<i>Phragmites australis</i>	Problem
Golden bamboo	<i>Phyllostachys aurea</i>	II
Water lettuce	<i>Pistia stratiotes</i>	I
Chinese brake fern	<i>Pteris vittate</i>	II
Kudzu	<i>Pueraria montana</i>	I
Tropical Mexican clover	<i>Richardia brasiliensis</i>	Invasive
Castor bean	<i>Ricinus communis</i>	II
Mexican petunia	<i>Ruellia brittoniana</i>	I
Chinese tallow	<i>Sapium sebiferum</i>	Invasive
Brazilian pepper	<i>Schinus terebinthifolius</i>	Invasive
Sicklepod, coffeeweed	<i>Senna obtusifolia</i>	Invasive
Rattlebox, purple sesban	<i>Sesbania punicea</i>	II
White-flowered wandering jew	<i>Tradescantia fluminensis</i>	II
Caesar weed	<i>Urena lobata</i>	Invasive
Chinese wisteria	<i>Wisteria sinensis</i>	II
Malanga, elephant ear	<i>Xanthosoma sagittifolium</i>	II
Birds		
Muscovy duck	<i>Cairina moschata</i>	Non-Native
Rock pigeon	<i>Columba livia</i>	Non-Native
Monk parakeet	<i>Myiostitta monachus</i>	Non-Native
House sparrow	<i>Passer domesticus</i>	Non-Native
Eurasian collared dove	<i>Streptopelia decaocto</i>	Non-Native
European starling	<i>Sturnus vulgaris</i>	Non-Native
Mammals		
Domestic dog	<i>Canis familiaris</i>	Non-Native
Coyote	<i>Canis latrans</i>	Non-Native
Nine-banded armadillo	<i>Dasyopus novemcinctus</i>	Non-Native
Domestic cat	<i>Felis silvestris</i>	Non-Native
Rhesus macaque	<i>Macaca mulatta</i>	Non-Native
House mouse	<i>Mus musculus</i>	Non-Native
Nutria	<i>Myocaster coypu</i>	Non-Native
Norway rat	<i>Rattus norvegicus</i>	Non-Native
Roof rat, black rat	<i>Rattus rattus</i>	Non-Native
Feral / Wild hog	<i>Sus scrofa</i>	Non-Native

Amphibians		
Cane toad	<i>Rhinella marina</i>	Non-Native
Cuban treefrog	<i>Osteopilus septentrionalis</i>	Non-Native
Fishes		
Pike killifish	<i>Belonesox belizanus</i>	Non-Native
Brown hoplo	<i>Hoplosternum littorale</i>	Non-Native
Swamp eel	<i>Monopterus albus</i>	Non-Native
Red lionfish	<i>Pterois volitans</i>	Non-Native
Sailfin catfish	<i>Pterygoplichthys multiradiatus</i>	Non-Native
Blue tilapia	<i>Oreochromis aureus</i>	Non-Native
Regal demoiselle	<i>Neopomacentrus cyanomus</i>	Non-Native
Blackchin tilapia	<i>Sarotherodon melanotheron</i>	Non-Native
Marine Invertebrates		
Indo-Pacific swimming crab	<i>Charybdis helleri</i>	Non-Native
Asian clam	<i>Corbicula fluminea</i>	Non-Native
Asian green mussel	<i>Perna viridus</i>	Potential Invader
Asian tiger shrimp	<i>Penaeus monodon</i>	Non-Native
Common periwinkle	<i>Littorina littorea</i>	Non-Native
Porcelain crab	<i>Petrolisthes armatus</i>	Non-Native
Mantis shrimp	<i>Pullosquilla litoralis</i>	Non-Native
Reptiles		
Brown anole	<i>Anolis sagrans</i>	Non-native

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.

B.5 / Archaeological and Historical Sites Associated with Nature Coast Aquatic Preserve

The list below was derived from shapefiles obtained from the Florida Department of State, Division of Historical Resources on February 2, 2021, and includes sites within .25 miles of the Nature Coast Aquatic Preserve.

Site ID	Site Name	Description	Location
CI00002	BUZZARD'S ISLAND	Prehistoric burial(s)	Within 0.25 miles of NCAP.
CI00026	SHELL ISLAND	Prehistoric mound(s)	Within NCAP.
CI00086	SCHOONER "GOOD HOPE" WRECK	Saltwater submerged site	Within NCAP.
CI00118	FORT ISLAND	Prehistoric shell midden	Within NCAP.
CI00227	NN	Prehistoric shell midden	Within NCAP.
CI00228A	NN	Prehistoric shell midden	Within 0.25 miles of NCAP.
CI00228B	NN	Prehistoric shell midden	Within NCAP.
CI00229	NN	Prehistoric shell midden	Within 0.25 miles of NCAP.
CI00230	NN	Prehistoric shell midden	Within 0.25 miles of NCAP.
CI00418	SALT RIVER NARROWS 1	Campsite (prehistoric)	Within 0.25 miles of NCAP.
CI00419	SALT RIVER NARROWS 2	Campsite (prehistoric)	Within 0.25 miles of NCAP.
CI00443	DR HUDSON OFFICE	Office	Within 0.25 miles of NCAP.
CI00453	HOY HOME	Private residence	Within 0.25 miles of NCAP.
CI00454	ROBERTS HAIR FASHION	Barber/Beauty shop	Within 0.25 miles of NCAP.
CI00455	CRYSTAL RIVER OLD CITY HALL	City hall	Within 0.25 miles of NCAP.
CI00456	OLD POST OFFICE	Office	Within 0.25 miles of NCAP.
CI00457	BARCO-HOOD BUILDING	Commercial and apartments	Within 0.25 miles of NCAP.
CI00458	SPARKMAN BUILDING	Commercial	Within 0.25 miles of NCAP.
CI00459	SPARKMAN BUILDING 2	Commercial	Within 0.25 miles of NCAP.
CI00460	CRYSTAL RIVER BANK	Bank	Within 0.25 miles of NCAP.
CI00461	611 CITRUS AVE	Commercial	Within 0.25 miles of NCAP.
CI00462	619 CITRUS AVE	Service station	Within 0.25 miles of NCAP.
CI00463	626 CITRUS AVE	Private residence	Within 0.25 miles of NCAP.
CI00464	631 CITRUS AVE	Grocery store	Within 0.25 miles of NCAP.

CI00465	638-640 CITRUS AVE	Lodge (club) building	Within 0.25 miles of NCAP.
CI00466	639 CITRUS AVE	Library	Within 0.25 miles of NCAP.
CI00467	BEAGLE HOUSE	Private residence	Within 0.25 miles of NCAP.
CI00468	652 CITRUS AVE	Private residence	Within 0.25 miles of NCAP.
CI00469	EUBANKS-EDWARDS HOME	Private residence	Within 0.25 miles of NCAP.
CI00484	HUNTER SPRINGS PARK BOAT SLIP	Boat slip	Within 0.25 miles of NCAP.
CI00485	HAWTHORNE HOME	Private residence	Within 0.25 miles of NCAP.
CI00486	119 NE 1ST AVE	Private residence	Within 0.25 miles of NCAP.
CI00488	543 NW 1ST AVE	Office	Within 0.25 miles of NCAP.
CI00492	214 NE 2ND AVE	Private residence	Within 0.25 miles of NCAP.
CI00493	220 NE 2ND AVE	Private residence	Within 0.25 miles of NCAP.
CI00499	16 NE 2ND ST	Private residence	Within 0.25 miles of NCAP.
CI00500	18 NE 2ND ST	Private residence	Within 0.25 miles of NCAP.
CI00501	19 NE 2ND ST	Private residence	Within 0.25 miles of NCAP.
CI00502	27 NE 2ND ST	Private residence	Within 0.25 miles of NCAP.
CI00503	35 NE 2ND ST	Private residence	Within 0.25 miles of NCAP.
CI00504	43 NE 2ND ST	Private residence	Within 0.25 miles of NCAP.
CI00505	103 NE 2ND ST	Private residence	Within 0.25 miles of NCAP.
CI00506	111 NE 2ND ST	Private residence	Within 0.25 miles of NCAP.
CI00507	VAN EVERY HOME	Private residence	Within 0.25 miles of NCAP.
CI00508	126 NE 2ND ST	Private residence	Within 0.25 miles of NCAP.
CI00509	143 NE 2ND ST	Private residence	Within 0.25 miles of NCAP.
CI00518	102 NE 3RD ST	Private residence	Within 0.25 miles of NCAP.
CI00519	118 NE 3RD ST	Private residence	Within 0.25 miles of NCAP.
CI00520	SEMINOLE CLUB	Lodge (club) building	Within 0.25 miles of NCAP.

CI00532	OLD FISH HOUSE	Fish house	Within 0.25 miles of NCAP.
CI00539	113-130 NE 4TH ST	Apartment	Within 0.25 miles of NCAP.
CI00540	LEWIS HOUSE	Private residence	Within 0.25 miles of NCAP.
CI00557	OCALA & GULF RAILROAD	Linear Resource	Within 0.25 miles of NCAP.
CI00592	WEST HOMOSASSA I	Prehistoric shell midden	Within 0.25 miles of NCAP.
CI00593	WEST HOMOSASSA II	Prehistoric shell midden	Within 0.25 miles of NCAP.
CI00594	WEST HOMOSASSA III	Prehistoric shell midden	Within 0.25 miles of NCAP.
CI00595	WEST HOMOSASSA IV	Prehistoric shell midden	Within NCAP.
CI00596	WEST HOMOSASSA V	Prehistoric shell midden	Within NCAP.
CI00597	SHELL ISLAND NORTH	Prehistoric shell midden	Within NCAP.
CI00598	SHELL ISLAND WEST	Prehistoric shell midden	Within NCAP.
CI00599	DOG ISLAND	Prehistoric shell midden	Within NCAP.
CI01068	NARROWS	Campsite (prehistoric)	Within 0.25 miles of NCAP.
CI01103	103 US 19 (SR 55)	Commercial	Within 0.25 miles of NCAP.
CI01360	USS Submarine Chaser 1057	Destroyed	Within 0.25 miles of NCAP.
CI01361	Estate of L.C. Yeoman	Private residence	Within 0.25 miles of NCAP.
CI01362	Estate of L.C. Yeoman 2-Story Cottage	Commercial and residence	Within 0.25 miles of NCAP.
CI01363	Estate of L.C. Yeoman Shed/2-Bay Garage	Commercial and residence	Within 0.25 miles of NCAP.
CI01510	Hunter Springs Park	Designed Historic Landscape	Within 0.25 miles of NCAP.
HE00003	INDIAN CREEK	Prehistoric burial mound(s)	Within 0.25 miles of NCAP.
HE00004	JOHNS ISLAND	Prehistoric shell midden	Within NCAP.
HE00007	BAYPORT 2	Artifact scatter-low density (< 2 per sq meter)	Within 0.25 miles of NCAP.
HE00009	PINE ISLAND		Within NCAP.
HE00015	MARSH ISLAND	Prehistoric shell midden	Within NCAP.
HE00036	NO NAME ISLAND I	Indeterminate	Within NCAP.
HE00037	NO NAME ISLAND II	Lithic scatter/quarry (prehistoric: no ceramics)	Within NCAP.
HE00333	BAYPORT	Land-terrestrial	Within NCAP.
HE00403	SPRINGSTEAD	Land-terrestrial	Within 0.25 miles of NCAP.
HE00578	Manuel West	Lithic scatter/quarry (prehistoric: no ceramics)	Within 0.25 miles of NCAP.

HE00787	Bayport Battlefield	Subsurface features are present	Within 0.25 miles of NCAP.
PA00002	OELSNER INDIAN MOUND	Habitation (prehistoric)	Within 0.25 miles of NCAP.
PA00003	ARROWHEAD FACTORY	Specialized site for procurement of raw materials	Within 0.25 miles of NCAP.
PA00010	ANCLOTE MOUND	Habitation (prehistoric)	Within NCAP.
PA00011	NEW PORT RICHEY MIDDEN	Land-terrestrial	Within 0.25 miles of NCAP.
PA00012	HOPE MOUND	Prehistoric burial mound(s)	Within 0.25 miles of NCAP.
PA00013	FINLEY HAMMOCK	Artifact scatter-low density (< 2 per sq meter)	Within NCAP.
PA00014	FINLEY HAMMOCK CAMP	Campsite (prehistoric)	Within NCAP.
PA00016	BAILEY'S BLUFF	Historic refuse / dump	Within NCAP.
PA00020	FLORAMAR	Prehistoric lithics only, but not quarry	Within NCAP.
PA00216	BAILEY'S BLUFF ROAD	Campsite (prehistoric)	Within 0.25 miles of NCAP.
PA00389	BEHIND THE OELSNER MOUNDS	Campsite (prehistoric)	Within 0.25 miles of NCAP.
PA00439	KEY VISTA	Campsite (prehistoric)	Within NCAP.
PA00451	Stauber Highway 1	Campsite (prehistoric)	Within 0.25 miles of NCAP.
PA00568	GILLIGAN'S ISLAND	Specialized site for procurement of raw materials	Within 0.25 miles of NCAP.
PA00569	NORTH OF ENERGY	Campsite (prehistoric)	Within 0.25 miles of NCAP.
PA00576	LONG LEAF	Specialized site for procurement of raw materials	Within 0.25 miles of NCAP.
PA00582	MYSTERY	Specialized site for procurement of raw materials	Within 0.25 miles of NCAP.
PA00597	GILLS/HOLIDAY PARK	Specialized site for procurement of raw materials	Within 0.25 miles of NCAP.
PA00641	BAILLIE FISH CAMP	Fish house	Within NCAP.
PA00642	GREY FISH CAMP	Fish house	Within NCAP.
PA00643	THIEL FISH CAMP	Fish house	Within NCAP.
PA00644	CASSON FISH CAMP	Fish house	Within NCAP.
PA00645	ALLGOOD FISH CAMP	Fish house	Within NCAP.
PA00646	JONES FISH CAMP	Destroyed	Within NCAP.
PA00647	JONES FISH CAMP	Fish house	Within NCAP.
PA00648	LITTLE FISH CAMP	Fish house	Within NCAP.
PA00649	STEVENSON, R D JR FISH CAMP	Destroyed	Within NCAP.
PA00650	STEVENSON, W M FISH CAMP	Fish house	Within NCAP.
PA00651	SWARTSEL FISH CAMP	Destroyed	Within NCAP.
PA00652	CUNNAGIN FISH CAMP	Fish house	Within NCAP.

PA00653	UZZLE FISH CAMP	Fish house	Within NCAP.
PA01201	HOLIDAY RECREATION COMPLEX	Specialized site for procurement of raw materials	Within 0.25 miles of NCAP.
PA01202	LUMBERJACK TRAIL	Campsite (prehistoric)	Within 0.25 miles of NCAP.
PA01237	ANCLOTE POWER PLANT NORTH	Specialized site for procurement of raw materials	Within 0.25 miles of NCAP.
PA01257	BUILDING #12846	Military	Within 0.25 miles of NCAP.
PA01258	BUILDING #12841	Military	Within 0.25 miles of NCAP.
PA01259	BUILDING #12842	Military	Within 0.25 miles of NCAP.
PA01260	BUILDING #12843	Military	Within 0.25 miles of NCAP.
PA01261	BUILDING #12844	Military	Within 0.25 miles of NCAP.
PA01262	BUILDING #12847	Military	Within 0.25 miles of NCAP.
PA01263	BUILDING #12849	Military	Within 0.25 miles of NCAP.
PA01264	BUILDING #12850	Military	Within 0.25 miles of NCAP.
PA01440	Nickle Site	Land-terrestrial	Within 0.25 miles of NCAP.
PA01990	Stauber Highway 2	Campsite (prehistoric)	Within 0.25 miles of NCAP.
PA02064	Williams Campsite #2438	Fish house	Within NCAP.
PA02370	Rocky Creek	Land-terrestrial	Within 0.25 miles of NCAP.
PA02371	Bullwinkle	Land-terrestrial	Within 0.25 miles of NCAP.
PA02372	4725 Ebbtide Lane	Private residence	Within 0.25 miles of NCAP.
PA02392	Mickler Barn	Destroyed	Within 0.25 miles of NCAP.
PA02418	Beau Lane Site	Land-terrestrial	Within 0.25 miles of NCAP.
PA02437	Leach Carter Cash House	Private residence	Within 0.25 miles of NCAP.
PA02483	Edgewater Motel	FMSF Building Complex	Within 0.25 miles of NCAP.
PA02486	Port Richey Mobile Home Park	FMSF Building Complex	Within 0.25 miles of NCAP.
PA02509	Edgewater Motel Building A	Hotel, Motel, Inn	Within 0.25 miles of NCAP.
PA02510	Edgewater Motel Building B	Hotel, Motel, Inn	Within 0.25 miles of NCAP.
PA02511	5414 Baylea Avenue	Private residence	Within 0.25 miles of NCAP.

PA02512	5404 Baylea Avenue	Private residence	Within 0.25 miles of NCAP.
PA02513	7810 US Highway 19	Commercial	Within 0.25 miles of NCAP.
PA02514	7812 US Hwy 19	Commercial	Within 0.25 miles of NCAP.
PA02515	7820 US Hwy 19 (Building A)	Commercial	Within 0.25 miles of NCAP.
PA02516	7820 US Hwy 19 (Building B)	Commercial	Within 0.25 miles of NCAP.
PA02517	7909 US Highway 19	Commercial	Within 0.25 miles of NCAP.
PA02519	8037 US Highway 19 (Building B)	Abandoned or vacant	Within 0.25 miles of NCAP.
PA02657	Belcher Mine Channel	Linear Resource	Within 0.25 miles of NCAP.
PA02939	Mobile Radar Pad #2	Military	Within 0.25 miles of NCAP.
PA02940	Mobile Radar Pad #1	Military	Within 0.25 miles of NCAP.
PA02941	Mobile Radar Pad #3	Military	Within 0.25 miles of NCAP.
PA02942	Emergency Power Building #12842B	Military	Within 0.25 miles of NCAP.
PA02943	Diesel Fuel Tank Storage Area #12842C	Military	Within 0.25 miles of NCAP.
PA02944	Switching Station USAF #12836	Military	Within 0.25 miles of NCAP.
PA02945	Anclote Missile Tracking Annex	Historical District	Within NCAP.
PA03061	5219 Miller Bayou Drive	Private residence	Within 0.25 miles of NCAP.
PI00042	SPONGE HARBOR	Artifact scatter-low density (< 2 per sq meter)	Within 0.25 miles of NCAP.
PI00043	BURNT MILL	Prehistoric mound(s)	Within 0.25 miles of NCAP.
PI00864	POINT ALEXIS 1	Artifact scatter-low density (< 2 per sq meter)	Within 0.25 miles of NCAP.
PI00865	POINT ALEXIS 3	Lithic scatter/quarry (prehistoric: no ceramics)	Within 0.25 miles of NCAP.
PI00866	POINT ALEXIS 4	Prehistoric shell midden	Within 0.25 miles of NCAP.

Appendix C / Public Involvement

C.1 / Meeting Schedule

Task	Date
Public Meeting	9/28/21
AC Meeting 1	9/30/21
AC Meeting 2	11/30/21
AC Meeting 3 Cancelled	1/29/22 1/18/22
AC Meeting 4	3/31/22
Public Meeting (Online)	5/19/22
Public Meeting (In-Person)	5/24/22
AC Meeting 5 (In-Person)	5/26/22
Additional Public Comment Deadline	6/9/22

C.2 / Advisory Committee

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

C.2.1 / List of members and their affiliations

List of Invitees and their affiliations. Note: Committee members may have had 'stand in' representation at Management Advisory Committee Meetings.

First Name	Last Name	Role	Organization
Thomas	Ankersen	Committee member	University of Florida
Steve	Brinkley	Committee member	Florida Fish and Wildlife Conservation Commission
Melissa	Charbonneau	Committee member	Pasco County
Kevin	Claridge	Committee member	Aquatic Preserve Society
Mark	Edwards	Committee member	Citrus County BOCC
Mike	Engiles	Committee member	Crystal River Watersports
Justin	Grubich	Committee member	Pew Charitable Trusts
Chris	Holland	Committee member	Duke Energy
Frank	Kapocsi	Committee member	Homosassa River Alliance

Joyce	Kleen	Committee member	U.S. Fish and Wildlife Service
Keith	Kolasa	Committee member	Hernando County
Michael	Kuhman	Committee member	Florida Department of Agriculture and Consumer Services
Enrique	Latimer	Committee member	Duke Energy
Anna	Laws	Committee member	Florida Fish and Wildlife Conservation Commission
Scott	Matthewman	Committee member	Florida Department of Environmental Protection
Maria	Merrill	Committee member	Florida Fish and Wildlife Conservation Commission
Charles	Morton	Committee member	Hernando Waterways Advisory Committee
Larry	Nall	Committee member	Florida Fish and Wildlife Conservation Commission
Joyce	Palmer	Committee member	U.S. Fish and Wildlife Service
Earl	Pearson	Committee member	Florida Department of Environmental Protection
James	Powell	Committee member	Clearwater Aquarium
Barbara	Roberts	Committee member	Florida Department of Environmental Protection
Brittany	Scharf	Committee member	University of Florida/IFAS/Extension
William	Toney	Committee member	Recreational Fishing Guide
Madison	Trowbridge	Committee member	Southwest Florida Water Management District
Marnie	Ward	Committee member	University of Florida/IFAS/Extension
Coleen	Weaver	Committee member	Pasco County BOCC

Savanna	Barry	Subject matter expert	University of Florida/IFAS/Extension
Anna	Braswell	Subject matter expert	University of Florida
Cheryl	Clark	Subject matter expert	Florida Department of Environmental Protection
Morgan	Edwards	Subject matter expert	University of Florida
Jamie	Hammond	Subject matter expert	University of Florida
Timothy	Jones	Subject matter expert	Florida Department of Environmental Protection
Laura	Reynolds	Subject matter expert	University of Florida
Michael	Shirley	Subject matter expert	Florida Department of Environmental Protection
Rob	Kramer	Member of the public	Wild Oceans
Bruce	Pohlot	Member of the public	International Game and Fish Association
Preston	Robertson	Member of the public	Florida Wildlife Federation
Joy	Hazell	Lead Facilitator	University of Florida/IFAS/Extension
Kristie	Perez	Co-Facilitator	University of Florida
Jocelyn	Peskin	Zoom Producer	University of Florida
Hanna	Brown	Plan Author	University of Florida / NOAA

C.3 / Public Meeting #1

C.3.1 / Florida Administrative Register Posting

Florida Administrative Register

Volume 47, Number 167, August 27, 2021

Section 3.4.4.A of the Handbook requires a minimum of 45 square feet of usable, safe, and sanitary outdoor play area per child, one year of age and older, and the outside play area must be able to accommodate one-half of the licensed capacity of the program. Section 3.4.4.B and C require a licensed urban child care facility to have an additional minimum of 45 square feet of usable indoor play space to substitute for 25% of the licensed capacity for outdoor play space, which must include equipment that provides physical activity. The total number of children using the play area may not exceed the outdoor capacity. Subsection 65C-22.001(6), F.A.C., states in pertinent part that child care programs must follow the standards found in the Handbook.

On July 14, 2021, Petitioner filed a written withdrawal of the petition. As such, this petition was dismissed.

A copy of the Order or additional information may be obtained by contacting: Agency Clerk, Department of Children and Families, 2415 North Monroe St., Ste. 100, Tallahassee, FL 32303 or Agency.Clerk@myflfamilies.com.

Section VI Notice of Meetings, Workshops and Public Hearings

BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND

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

DATE AND TIME: Tuesday, September 28, 2021, 6:00 p.m. – 8:00 p.m.

PLACE: This is an online meeting. Please register at <https://floridadep.gov/ncap-meeting>

GENERAL SUBJECT MATTER TO BE CONSIDERED: The Florida Department of Environmental Protection's Office of Resilience and Coastal Protection is holding a scoping meeting to present an overview of the Aquatic Preserve Program and seek public input prior to developing a management plan for the Nature Coast Aquatic Preserve. Members of the Nature Coast Aquatic Preserve Management Plan Advisory Committee have also been invited to attend and listen to comments, and may also participate in the discussion.

A copy of the agenda may be obtained by contacting: Joy Hazell at jhazell@ufl.edu.

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: Joy Hazell at jhazell@ufl.edu. 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).

BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND

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

DATE AND TIME: Thursday, September 30, 2021, 1:00 p.m. – 5:00 p.m.

PLACE: This is an online meeting. Please register at <https://floridadep.gov/ncap-adv-comm/>

GENERAL SUBJECT MATTER TO BE CONSIDERED: The Nature Coast Aquatic Preserve Management Plan Advisory Committee will meet to develop and prioritize issues and strategies for the Nature Coast Aquatic Preserve Management Plan.

A copy of the agenda may be obtained by contacting: Joy Hazell at jhazell@ufl.edu.

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: Joy Hazell at jhazell@ufl.edu. 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).

REGIONAL PLANNING COUNCILS

Tampa Bay Regional Planning Council

The Tampa Bay Regional Planning Council's Agency on Bay Management announces a public meeting to which all persons are invited.

DATE AND TIME: September 9, 2021, 9:00 a.m.

PLACE: This meeting will be held via a virtual communication platform. Persons wishing to participate in this meeting should dial: +1 786 635 1003. The meeting ID is: 828 9405 5418. The Passcode is: 1234. The Zoom Meeting Link is: <https://us02web.zoom.us/j/82894055418?pwd=Sk10eDVaak16MUw3c1F2d0VrNXdhZz09>

GENERAL SUBJECT MATTER TO BE CONSIDERED: To conduct the regular business of the Tampa Bay Regional Planning Council's Agency on Bay Management.

A copy of the agenda may be obtained by contacting: Wren Krahl, Wren@tbrpc.org.

Overview

On Tuesday, September 28, 2021, a public scoping meeting was held as a part of the Nature Coast Aquatic Preserve (NCAP) Management Plan development process. Joy Hazell, from the School of Forest, Fisheries and Geomatics Sciences at UF/IFAS, facilitated the meeting. Kristie Perez, a PhD student in the UF School of Natural Resources and Environment within UF/IFAS transcribed this report.

A total of 89 people attended the NCAP public scoping meeting via the Zoom online platform. This included the process team composed of employees of the Florida Department of Environmental Protection (FDEP), the University of Florida Institute of Food and Agricultural Sciences (UF/IFAS), and PEW. The meeting agenda can be found in Appendix A. The meeting objectives were to:

- Introduce participants to the Aquatic Preserve program
- Present an overview of the NCAP and the Management Plan development process
- Brainstorm a list of key issues that may be included in the NCAP Management Plan

Welcome and Introductions

The meeting began with Joy introducing herself and providing her background. She announced that the meeting was being recorded and that feedback could be provided in anonymously via a survey if anyone preferred that over speaking in the meeting or typing in the chat box during the meeting. The link to the survey was then provided (https://ufl.qualtrics.com/jfe/form/SV_etuYkEgjl5UxKMC). Joy also noted that enrollment for the meeting had doubled in the past 24 hours from 70 people to over 140 in total.

Joy then welcomed the group to this kick-off NCAP public meeting and emphasized the excitement of the team for the great turnout at the meeting. Joy acknowledged our participants from the public as the most important people in the 'room' and reviewed the groups included in the meeting. These included the process team (FDEP and UF/IFAS, as well as PEW assisting unofficially with communications) and some members of the management advisory committee that is being formed (federal, state and county government, non-governmental organizations, UF/IFAS, fisherman, landowners, and citizens). She also reviewed the basic functions of the Zoom platform (mute, chat, views) with all participants and emphasized that the chat will be used to record public comments.

Joy reviewed the agenda at a high level and turned the floor over to Leslie Reed, the Chief of Staff for the FDEP.

Opening Remarks

Leslie highlighted the importance of our coastal resources as the foundation of the environmental and economic health of Florida. She reflected on the enactment of the Aquatic Preserve Act in 1975 and the importance of the mission of Aquatic Preserves to protect "Florida's living waters to ensure they will always be home for bird rookeries and fish nurseries, freshwater springs and salt marshes, seagrass meadows, and mangrove forests." She recalled the passing of House Bill 1061 in 2020 designating the NCAP as Florida's 42nd aquatic preserve and noted the NCAP is the first new preserve in over 32 years. Leslie also noted the many ways the aquatic preserve protections can benefit the areas as well as how the NCAP management plan fits into that. She emphasized the importance of transparency and public input to these processes and also thanked everyone again for taking the time to attend the meeting.

Informational Overview

Mike Shirley, Deputy Director for FDEP's Office of Resilience and Coastal Protection, again thanked everyone who had taken time out of their week to join the meeting. He shared his background in research, stewardship and restoring habitats for over 30 years in aquatic preserves and research reserves in Florida. He then emphasized that the success of an aquatic preserve or research reserve is measured by the amount of community involvement, specifically that your meeting participation (time & input) is essential to aquatic preserve management.

Mike noted that upon learning of the aquatic preserve designation, FDEP was able to engage with coastal communities, groups in support of the designation, and UF/IFAS. Seagrass and water quality monitoring was started quickly with assistance from PEW and a citizen's support group, The Aquatic Preserve Society. Mike reviewed the role of the Office of Resilience and Coastal Protection, including the management of aquatic preserves as well as other programs and managed areas. Through the Office of Resilience and Coastal Protection, the aquatic preserve will have access to department resources and other experts across the state.

Mike reiterated that NCAP is 'your' aquatic preserve and went on to say it is the largest spring-fed seagrass habitat in the world and of national importance and a 'gem' to be treasured. He emphasized that every comment is appreciated and that the goal is to gather all information to create a plan appropriate for the resource. He closed by outlining Earl Pearson's role in guiding statewide management plan development for aquatic preserves and turned the floor over to him.

Earl provided an overview of aquatic preserve management plans, specifically that they are managed in 10-year cycles mirroring upland management plans. This period allows for a long view and adaptive management throughout the time period. He provided examples of management goals from other preserves. Earl noted the preference on protection over restoration in management plan goals and emphasized the importance of partnerships in achieving these goals. He then reviewed the steps and associated dates for the management plan development process as noted below.

Aquatic Preserve Management Plan Development Process

- Public Scoping Meeting – September 28, 2021
- Management Plan Development:
 - Advisory Committee Meeting 1 – September 30, 2021
 - Advisory Committee Meeting 2 – November 30, 2021
 - Advisory Committee Meeting 3 – January 19, 2022
 - Advisory Committee Meeting 4 – March 31, 2022
- Draft Plan Published
- Formal Public Meetings – May 19 & May 24, 2022
- Final Advisory Committee Meeting – May 26, 2022
- Presented to the Acquisition and Restoration Council
- Presented to the Board of Trustees

Earl advised that background on the NCAP including information on the natural resources, cultural resources, and current management activities has been gathered. However, the 'heart of the management plan' is how the preserve will be managed – that is, which goals, objectives, and strategies will be focused on for the next 10 years. He described tonight's scoping meeting as the beginning of that process, specifically collecting input from those that use the preserve. He also reviewed the advisory committee memberships which has certain statutory requirements (i.e. an elected official from each county) but also includes members of local stakeholder groups such as fishing and ecotourism in the case of the NCAP. Earl noted that advisory committee meetings are public and that additional public meetings will be held (May 19 & May 24) after advisory committee meetings 1-4.

This portion of the meeting was wrapped up by sharing the contact information of the FDEP members of the NCAP Process Team. Of note, Cheryl Clark has been overseeing a project to pull together historical data that will aid the NCAP in leveraging this information. Joy noted the contact details will also be sent in a follow-up email on September 29 regarding the NCAP management plan process and that the email addresses used to register for this meeting will only be used to communicate about this process.

Michael Shirley, Deputy Director, Michael.Shirley@dep.state.fl.us, 904-823-4500

Earl Pearson, Planner IV, Earl.Pearson@dep.state.fl.us, 850-245-2104

Cheryl Clark, Coastal Projects Manager, Cheryl.P.Clark@floridaDEP.gov, 850-245-2109

At the conclusion of these presentations, the floor was opened for a question-and-answer period on covered and related topics with the results that follow.

Questions and Answers

1. Why was Levy County not included?
 - a. Mike responded that Levy County waters are included in the Big Bend Seagrasses Aquatic Preserve.

2. Is the 10-year update process the same as the initial development process?
 - a. (Earl confirmed that this is correct, except in the case of the updates, we aren't coming into it from scratch like with this plan.

3. I know that there is in the coastal areas of Hernando Beach area there's a privately owned submerged lands and read something else, where it had something about adjacent public lands and designated resources...So, would that have to be part of the mitigation and follow the rules and stuff like that?
 - a. Mike advised that the aquatic preserve boundary does not overlap those areas. For a proposed project close to the boundary there will be a state lands boundary determination. The boundary was intended to keep developed areas outside of the boundary (Please see enabling legislation for details.)

4. What type of things would drive restoration?
 - a. Mike provided the example in South Florida, where the volume and timing of fresh water going into that area so trying to restore the natural patterns of freshwater would drive restoration there. Earl provided another example, specifically propeller scarring of seagrasses. In cases this might only go down to the root and might naturally restore itself and grow back just given time. But if it's really deep then that does warrant some restoration, because otherwise it just continues to expand and wash away.

5. Are local residents part of the management advisory committee?
 - a. Joy noted that approximately five people are representing private landowners, fishing interests, ecotour operators, and retirees. These four-hour meetings are also open to the public should anyone wish to attend. They will be recoded as well with the potential for reports if there is interest.

6. What is the offshore boundary for the plan recommendation such as monitoring of seagrass? Also, for clarification can monitoring extend beyond the offshore boundary into Federal waters.
 - a. Mike stated that those are the kind of questions the management advisory committee will be tackling. And if the need be, to protect the seagrasses, you must look at deeper water to get a better indicator then it could fit within the research realm of an aquatic preserve. You'd have to have the resources and the agreements in place to do so. Most of the monitoring efforts in the aquatic preserves have been within the aquatic preserve. If there's monitoring needed outside the Aquatic Preserve the advisory group might explore that possibility. This information can be shared with partners to leverage additional resources.

7. How should sea level rise be considered?
 - a. Mike advised that across the state we're watching changes like mangroves advancing into marshes. Sea level rise is driving more frequent flooding such as king tides. Sea level rise has changed the way natural areas are managed; we're managing for change. In the past, historic maps were used as a guide of what to restore back to but now we should consider sea level rise and changes in habitats. Fortunately, there's a lot of good

information coming our way on how to manage for change. Salt marsh habitats, for instance, are extremely sensitive to sea level rise.

8. Can someone define working waterfront and fisheries as mentioned earlier?
 - a. Mike defined these as waterfronts that helps support the economy, marinas for instance, activities dependent on that waterfront area which includes a basket of activities. (Please see <https://coast.noaa.gov/data/digitalcoast/pdf/working-waterfronts.pdf> for more details). It's important to have that balance of activities between using the resource and keeping the resource sustained.
9. For the Hernando County Port Authority/Waterways Advisory Committee, we have a 10-year plan for the development of artificial reefs and oyster reefs. It seems like now within the boundary of the proposed preserve it's adding another layer of hurdles to the project. We already need to get DEP approval, FWC, approval and Coast Guard approval. Where does this fit in?
 - a. Mike responded that the advisory committee meeting will be a great opportunity to ask these types of questions. The goal for the NCAP is to be compatible with the community's perspective. From a management perspective when it comes to things like artificial reefs, which can have a benefit in building habitat if there's a lack of habitat. It also can benefit fisheries, as long as other habitats are not damaged. Also, Joy made a note for the management advisory committee. (Update: any artificial reef projects that were funded under Gulf Restoration/Deep Horizon were grandfathered through the legislation.)
10. There are concerns that liquid natural gas port facilities may be pursued in Citrus County and creating a port enterprise zone in Hernando County. Can the preserve prevent these protected waters from allowing pass through access to offshore areas from such shoreline traffic?
 - a. Mike noted that this is another good topic to bring up to the management advisory committee. Balancing between environmental, community and the economic needs. The aquatic preserve designation leads to more examination of the potential impacts. For instance, if it's something impacting an aquatic preserve, it has to be shown to be clearly in the public interest if it requires a submerged land lease. This aquatic preserve is also designated as an Outstanding Florida Water, which means that whatever happens, there should not be an impact to ambient water quality condition. (Please see https://floridadep.gov/sites/default/files/OFW%20factsheet_0.pdf for more details). So, it is another layer of scrutiny, but it doesn't stop things it just allows for a more detailed look into the project
11. It's really essential that you recognize going into this that sea level rise is going to be a perpetual challenge. As the pace of these changes increases, it might be much more difficult for those species to adapt to those changes specifically thinking about Marian's marsh wren and I believe also the Scott's seaside sparrow. These and others solely in the salt marshes of basically the Big Bend coastline and are likely to abandon habitat as mangroves attain more and more dominance. As salt marshes are more fire tolerant, maybe experimenting with using prescribed fire in salt marsh if only to dial back the pace of that essentially natural invasion by mangroves to see if that can be delayed long enough for new salt marsh to become established as salt marsh is allowed to migrate inland so that we can basically sustain those species and the face of these rapid changes?
 - a. Mike advised that this is another great topic for the management advisory committee to address.
12. My concern is that this area is the destination point for scalloping from around the state and around the country. Each year, we have hundreds and even thousands of boaters which we appreciate coming to our Nature Coast to scallop but along with that we're having a tremendous

amount of scarring on the seagrass beds. Will we be able to address this with this advisory committee?

- a. Mike responded affirmatively that this is also the kind of concern the advisory committee may address. Understanding the impacts to seagrasses and exploring ways to restore and maybe even guide boaters so that they don't cause that kind of damage could be addressed by the management plan.

Public Input

Next, we were split into smaller of the small groups with individual facilitators for just under 30 minutes. The question to be answered was “What do you want to see happen in the NCAP?” and this could include anything that you feel should be built into the management plan. Notably, though not everything will be put in perfectly as stated, it will start the conversation that we will then have for this next nine months.

The results of this small group activity were copied verbatim into the worksheet below. The original work of the small groups (done using Jamboards) is included in Appendix B.

COMMENT

1	comprehensive monitoring regime to track changes in the natural communities (e.g., mangroves, forests, hydric hammocks) to guide adaptive management approach, especially accretion and erosion rates - surface elevation tables and other standard methodology
2	put evaluation and protection of cultural resources into the plan. if there are uplands, put in management plans for those
3	primary focus should be protection of existing pristine areas and habitat restoration of damaged areas
4	Communication and community involvement throughout the process.
5	like the proactive element, concerns about algal blooms in other areas, look to prevent that here. Future development, Veteran's Expressway, pipelines - need to preserve
6	resources into education for the seagrass areas, in particular with boaters, especially during scallop season - prop scarring, not running in shallow areas. Education could be a big help but committee could focus on getting that out there
7	I would like to add that talking with acquaintances in law enforcement, their primary concern is the need for improved signage delineating the seagrass areas that are protected are desperately needed, otherwise there is literally no way to enforce the areas.
8	habitat mapping for seagrass, education about seagrass scarring, water quality monitoring
9	An exemption for past mistakes/poor prior science. ie. plugged natural waterways that now have to jump through all the regulations that were not in effect at the time.
9B	<u>(Clarification</u> on comment above) I live in Charlotte County. Where this is the case. Long story, but we are dealing with waterways that were plugged by the EPA to reduce sediment transport during further development by a private contractor. Now huge hurdles to get natural waterways re-opened.
10	Education aspect stressing boating and recreation practices that will protect seagrasses and shorelines and why the communities should care about that. Also living shoreline projects can help reduce erosion and damage while also protecting the ecosystem

11	and seagrass mapping from other agencies. Capture where we are expecting to see certain habitats and where we do not expect to see them. Some coastal work has been done about coastal karst features being biodiversity hotspots. Also need to use appropriate period of records for spring flows and freshwater inputs.
12	Estuary is unique in terms of spring flow making up freshwater inputs. across FL, spring flows are declining - need to think in terms of increasing groundwater levels and river levels to something closer to historic levels. Support and participate in developing strategies that will reduce groundwater consumption to sustain estuarine system
13	involving local community is extremely important to incorporate - pull from depth of local knowledge to amplify outcomes especially citizen volunteers for monitoring
14	detailed baseline fauna surveys of hardbottom communities (and ongoing surveys). Need to do seagrass transects for offshore seagrass beds similar to other areas and drawing from Hernando Marine Area plan
15	Frequent water quality testing that is available to the public.
16	Fuel spills in Hernando Beach - no enforcement, frustration and reporting has gone down in response. Law enforcement often cannot make citation because direct evidence cannot be collected
17	EDUCATION & COMMUNITY ENGAGEMENT
18	ESTABLISHING APPROPRIATE BASELINES & MONITORING
19	SEAGRASS & SCARRING REDUCTION (& ENFORCEMENT)
20	Prop scarring and shallow water areas being heavily used cannot be overlooked. Maybe the mapping imagery can be used for scar assessment?
21	seagrass mapping (2007 began) SWFWMD 4 year cycle 2020 maps are about to be released. [need to continue - support driven] Accuracy to mapping - but the species diversity and health are necessary aids to mapping efforts
22	Balance between revenue and resource - Scalloping associated prop scarring (How can we and/or who would be responsible for the enforcement and management of these actions?)
23	Recreational Access - maintaining access re: scalloping and prop scarring / boater education
24	Seagrass threshold measures - (establishing a minimum or action benchmark)
25	Cultural Resource Management in terms of management
26	Baseline data management and collection/establishment
27	Water quality baseline dataset
28	Species Migration (mangroves shifting north and snook changes) - what does that look like for this area of Florida (Dr. Silvia Earl - research in the 50s)
29	COAST Dataset support - SWFWMD does quarterly sampling at 70 of the historic COAST sites
30	Education on the type of anchoring devices - RE: Seagrass prop scarring
31	Making Data more socially understandable (translate the data into opportunities the general public can relate to or use)

32	Involve or work with guides on education regarding resources/AP/etc
33	NEED FOR ENFORCEMENT - Boating Related - FWC LE / Environmental - DEP Regulatory
34	Changes in the community structures based on the tropicalization - Predator/prey and species distribution (ex Snook migrating further north and changing diets)
35	Fish Farming and the implications on native/wild populations
36	Hardbottom habitat: Sponge communities and focus on the ecology
37	Unique area due to pristine nature - would like to encourage future research on marine mammals (dolphins specifically)
38	Seagrass Monitoring fixed sites annual – in partnership with FWRI
39	Seagrass Monitoring Aerial 5-10 year in conjunction with SWFWMD and other applicable agencies
40	Water Quality Monitoring Monthly fixed historical Project Coast Sites in partnership with UF Fisheries Department
41	Continuous Water Quality Monitoring with data sondes at Cotee and Anclote River estuaries. – Aquatic Preserve Staff
42	Scallop Monitoring and Boater Intercept Surveys in conjunction with FWRI and Pasco County staff. Let them know we currently conduct the intercept surveys each year.
43	Participating in Local County Zoning and Comprehensive Planning.
44	Education and Outreach to residents and stakeholders.
45	Identify and implement restoration projects including seagrass, living shorelines, oyster habitat.
46	Coordinate Red Tide sampling efforts in conjunction with FWRI and Pasco County staff. Let them know we currently sample during HAB bloom events.
47	Coordinate with Passive Parks Department. The AP may want to participate in events or have their own at our coastal parks.
48	Coordination for land acquisition/grants to purchase land in AP. Buffering.
49	ADVANCED WATER TREATMENT
49A	Explanation for statement above: (Pasco County) i.e Port Ritchie, stormwater & runoff (and sewage spillage). Will we plan to address the uplands issue? (implementation of more current procedures to prevent seagrass dieoff - encourage local governments to who own & operate to prevent these from occurring) - SWFWMD has only data of this type? Would be good to enhance?
50	Tampa Bay - flooding, rainwater into sewage treatment processes has been overwhelmed due to rainwater because not cared for (needs radical changes)
51	Concerns over continued septic tank use in single family homes (retrofitting?)
52	Importance of interagency coordination
53	has degraded over last 60 years. Main issue - seagrass protection, increased enforcement against prop scarring and look at the statute: 1) enhanced penalties 2) negligence standard (so that people would be more careful - doesn't need to be intentional)
54	Seagrass mapping every 4 years with water quality, Suncoast does every 2 year (perhaps more beneficial)

55	Main concern: CLEAN WATER (a fish kill today at mouth of the Suwannee)
56	looking for inclusion of wise use of the resource - so we will need education. Also, the inclusion of fresh water springs component.
57	interested in cultural resources and partnership opportunities (working with other APs)
58	protection & monitoring of cultural sites is key
59	Less known about hardbottom habitats, sponges may be important as nursery habitat or for water filtration (also impacted by runoff, red tides, etc)
60	Fishing and tour guide - evaluation, protection, restoration and protection. Evaluation - establish a clear scientific baseline of water quality, scarring, nutrient loading, SG assessment, diversity assessments.
61	Protection - pole and troll zones, feasibility way to include that in areas that are needed due to depth. if not, delineating poles lines just south of Homosassa. Boundary of what is being protected.
62	Have a regional plan for habitat improvement so we are coordinated across county boundaries.
63	Consider removing the first week of scallop season, reduce it a single seven day period.
64	Ed/outreach to community. social media, schools, boater signage
65	opportunity to develop an app for the public to help them navigate the preserve and the habitat represented there. make it easy for boaters to do the right thing.
66	Perhaps a quarterly interagency working group (DACS, FWC, DEP, WMD, local law enforcement) to coordinate, address developing issues and implement adaptive action plans
67	Restoration - bird stakes and sediment tubes to help with preparing of prop scars. Debris removal at community basis.
68	Essential Fish Habitat for so many species - conservation of habitats should be the priority
69	Like to see specifics within plan to account for predator/prey interactions and shifting fish stocks.
70	Concern about fish farming and antibiotics and want to know if there is something can be done.
71	Expect at the end of the process develop goals and priorities of habitats, water quality, sediment management, education. have action plans at the end
72	Have a broad vision of interlock agreements including counties, cities, regional entities, DOT - location of bridges and roads need to be reviewed
73	decisions about sovereign lands need to be clear, especially up to Carrabelle. What's allowed needs to be reviewed
74	Consideration of manatee habitat use and possibly look at carrying capacity studies for sea grass in the area. have some increase enforcement for speed zones or harassment. maybe some aerial surveys.
75	Community education that there is an AP and a good thing and it is beneficial to community, not another layer of restrictions.

76	Area proposed is one of the highest ecology diverse and should have a larger degree of protection than other areas. SLR and habitat transition is important. might want to i.d. upland areas that could be converted.
77	Baseline data on water quality and habitat should be handled soon
78	fill in gaps with monitoring of water quality
79	Concern about impacting dredging plans in Pasco County, what is the status of that?
80	boundaries for AP don't go up against land mass?
81	will the data collected from the preserve be able to be used in BMAP development and MFL establishment?
82	Concerns about spoil islands and I'd like to know about positive or negative impacts of creation of spoil island
83	Question - Does the boundary go right up to Hudson Beach area, understand water quality has degraded in that area.

Each small group facilitator gave a short recap when the entire group was brought back together. Participants were asked to stay if possible, but Joy did note that a meeting report would be released in two weeks as well.

Joy asked if there was anyone who did not get to speak in their small group and/or if they heard something they wanted to share with the larger group. Some chat ideas were added that Joy included in her Jamboard.

Joy also received a private message noting the preserve is a prime candidate for new citizen support organization to champion its protection help raise help fundraise and provide volunteers for citizen science projects, due to a large number of retirees, many of whom have boats. She noted this was a great point and that one of the management advisory committee members oversees the statewide aquatic preserve nonprofit. Mike shared that Kevin Claridge is on the management advisory committee and that he is the president of the Aquatic Preserve Society. Mike also emphasized the value in recruiting volunteers to support management of the Nature Coast Aquatic Preserve. Aquatic preserves have limited fulltime staff so there is a need for volunteers. Volunteers can assist in nearly every aspect of Aquatic Preserve management from education and outreach, research, and restoration.

A comment was made that we have a huge resource in the under 20s, over 60s, and all the middle ranges of people that could be engaged in translating the data and what they see in the ecology which could be fed into the neighborhood groups and to the community groups, and that would be a nice thing to see the state university and college system.

Joy also asked if there might be anything missing. She mentioned that comments could be typed in the chat. She asked Jocelyn to again add the survey link to the chat. An additional comment was made that in the Everglades you must take an online test on preventing propeller scarring before you can legally boat there or even kayak.

Next Steps

Joy reviewed her earlier comment that a meeting report will be provided in two weeks at the email address provided in the Zoom registration and that these email addresses will not be used for anything other than to communicate with you about the NCAP (approximately monthly). She also provided her email address (jhazell@ufl.edu). An email will follow on 9/29/2021 as well reiterating these items, including the survey link

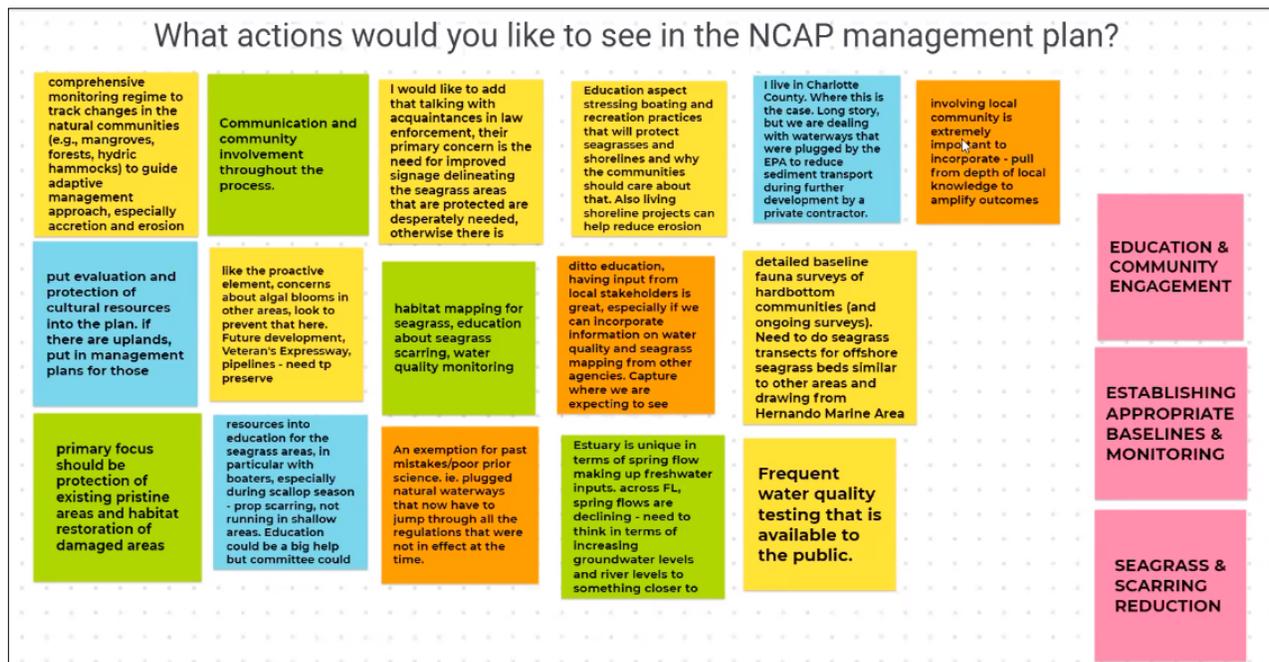
again and a link to the online locations where documents related to this process will be available (<https://floridadep.gov/rcp/aquatic-preserve/locations/nature-coast-aquatic-preserve>). Joy asked if there were any questions on next steps and noted that future meetings will hopefully be in person.

A separate question was asked about findings for local water testing and looking at pollution levels in the water. Mike advised that there are water quality criteria and a total maximum daily load (TMDL) process to guide basin management action plans. This has been a valuable process for other preserves.

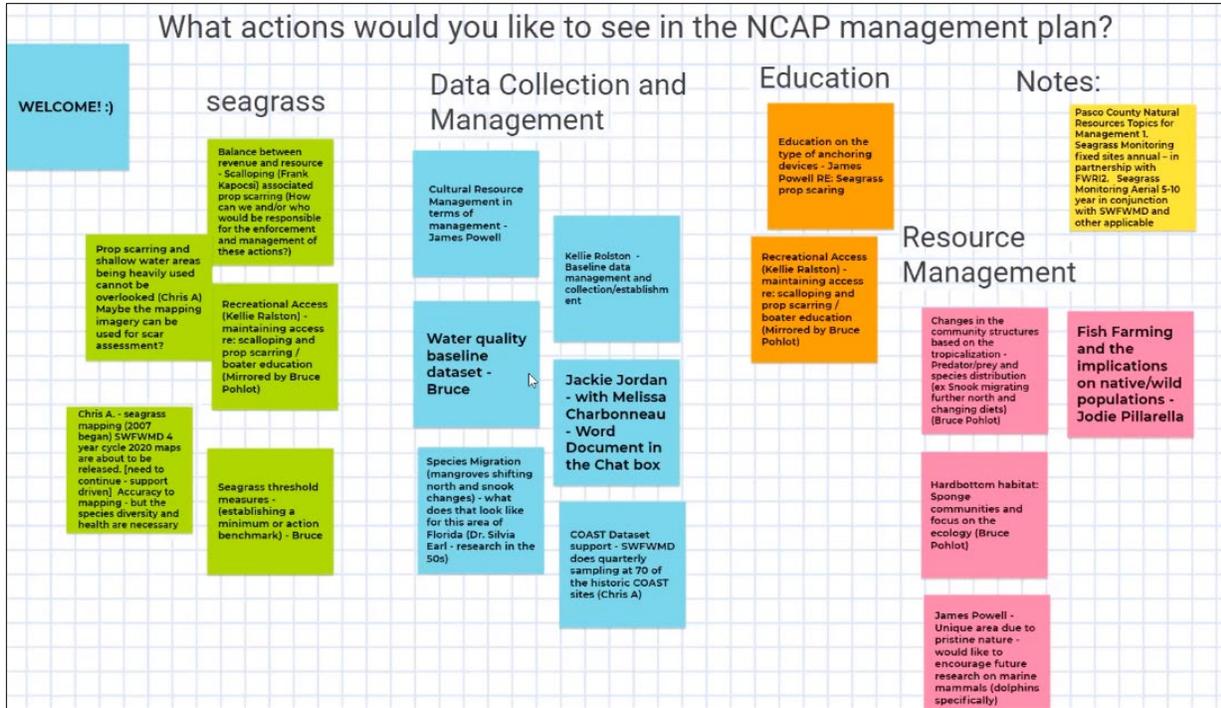
Joy thanked everyone again for attending. She also made a last request for any final comments and noted that process team members would be staying after the meeting if there were any additional needs.

Mike announced that this was a great kick-off meeting and that all the comments that have come in are going to be extremely valuable. The Aquatic Preserve staff will be looking to the community to help in building a volunteer group and will want to connect through different partnerships to help manage this aquatic preserve. Mike again thanked all.

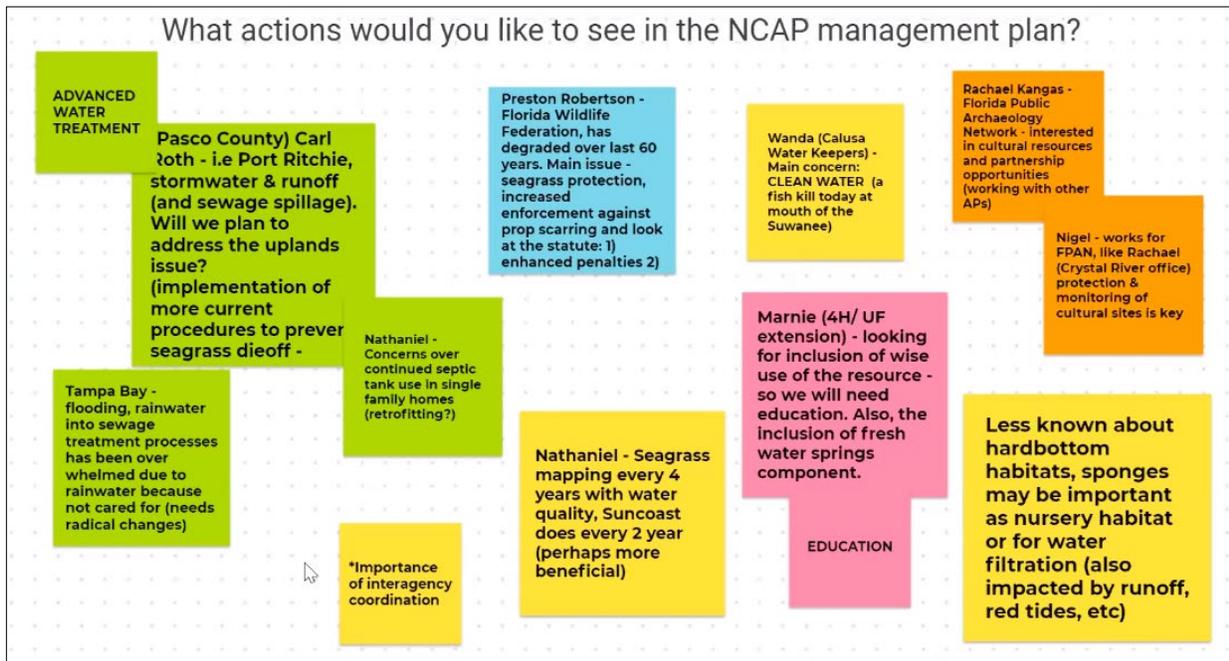
Screenshots of Jamboards



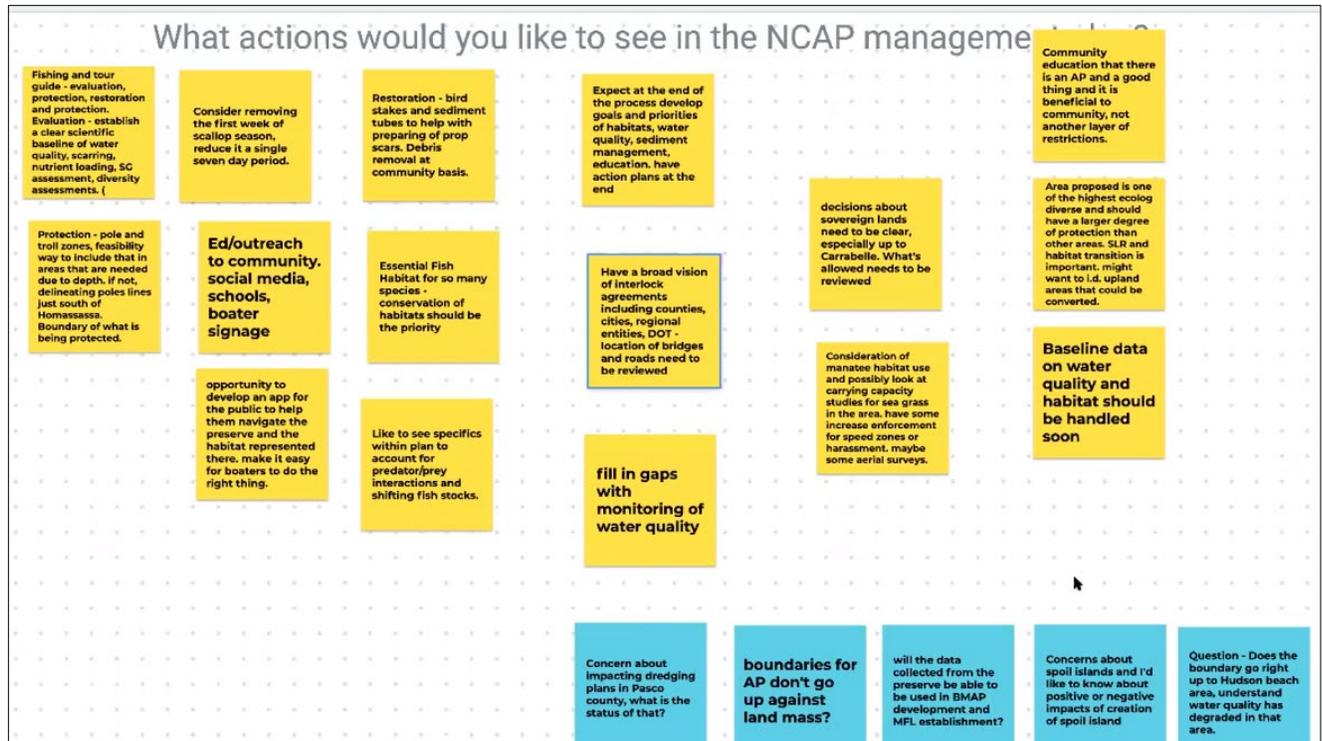
Group 1. Digital sticky notes, each with a comment from a member of the public.



Group 2. Digital sticky notes, each with a comment from a member of the public.



Group 3. Digital sticky notes, each with a comment from a member of the public.



Group 4. Digital sticky notes, each with a comment from a member of the public.

Zoom Chat Transcript

- 01:02:25 Jocelyn Peskin: https://ufl.qualtrics.com/jfe/form/SV_etuYkEgjl5UxKMC
- 01:03:14 Jamie Hammond: Can the survey be filled out by the same person more than once - if additional input arises as the meeting progresses?
- 01:05:26 Joy Hazell (she/her/hers): Jamie, I don't believe so. Folks are welcome to also email me at jhazell@ufl.edu.
- 01:09:20 Dan Hilliard: Why is Levy Co. not included in the preserve?
- 01:10:51 Savanna Barry: Hi Dan - great question! Levy's County's state waters are already included in a different aquatic preserve, the Big Bend Seagrasses Aquatic Preserve. <https://floridadep.gov/rcp/aquatic-preserve/locations/big-bend-seagrasses-aquatic-preserve>
- 01:17:54 Dan Hilliard: Visit www.WARINCONLINE.com and see the report on the Lower Withlacoochee River Environmental Assessment. Discharge from the river system is not "good".
- 01:20:59 Carl Roth: Earl mentioned the focus on Protections vs Restoration. What type of things would drive restoration?
- 01:20:59 Madison Trowbridge: Is the 10-year update process the same as the initial development process?
- 01:21:29 keith kolasa: What is the offshore boundary for the plan recommendation such as monitoring of seagrass?
- 01:24:08 keith kolasa: For clarification can monitoring extend beyond the offshore boundary into Federal Waters?
- 01:26:43 Carl Roth: How should sea level rise be considered?

01:27:03 DeeVon Quirolo: There are concerns that LNG port facilities may be pursued in Citrus County and creating a port enterprise zone in Hernando County. Can the preserve prevent these protected waters from allowing pass through access to offshore areas from such shoreline traffic?

01:33:29 Jocelyn Peskin:from Charles Morton: Here in Hernando Co. we have a 10 year plan that provides for artificial reefs and oyster reefs which are now in the proposed area. This seems like another level of government hurdles to get anything done.

01:43:45 Dan Hilliard: I thank you all for the conversation and hope I will be able to participate in the future in some fashion. Unfortunately, I am out of time this evening.

01:45:13 Jamie Hammond: Thank you for joining Dan!

02:22:01 Nick` Stubbs: Is there a media contact I can speak with tomorrow?

02:24:25 Nick` Stubbs: Perhaps. Person who handles media questions

02:24:53 Charles Morton: Have a regional plan for habitat improvement so we are coordinated across county boundaries.

02:25:28 Joy Hazell (she/her/hers): @ Nick Stubbs. If you email me I will get you to the right person, jhazell@ufl.edu

02:27:24 Charles Morton: Hint: Normally scalloping is done at low current times. Using a mushroom anchor minimizes sea grass destruction. It uses weight to hold the vessel in place rather than digging in.

02:28:59 Charles Morton: If you want citizen monitoring like is being done on red tide and the scallop sitter program it would be nice to have some funding available

02:33:39 Charles Morton: In thee everglades you must take a on line test on preventing prop scaring before you can legally boat there -- even kayaking

02:34:37 Jocelyn Peskin:https://ufl.qualtrics.com/jfe/form/SV_etuYkEgjl5UxKMC

02:38:45 Mark Sramek: Good meeting. Thank you.

02:39:57 Charles Morton: Just an observation but more mangroves generally mean more snook. Snook love mangroves

02:40:21 Kate Spratt: Thank you!

02:42:48 Marnie Ward: Thank you

02:46:14 Charles Morton: The problem is that Law Enforcement must see the violation in order for them to do anything about it.

C.4 / Advisory Committee Meeting #1

C.4.1 / Florida Administrative Register Posting

Section 3.4.4.A of the Handbook requires a minimum of 45 square feet of usable, safe, and sanitary outdoor play area per child, one year of age and older, and the outside play area must be able to accommodate one-half of the licensed capacity of the program. Section 3.4.4.B and C require a licensed urban child care facility to have an additional minimum of 45 square feet of usable indoor play space to substitute for 25% of the licensed capacity for outdoor play space, which must include equipment that provides physical activity. The total number of children using the play area may not exceed the outdoor capacity. Subsection 65C-22.001(6), F.A.C., states in pertinent part that child care programs must follow the standards found in the Handbook.

On July 14, 2021, Petitioner filed a written withdrawal of the petition. As such, this petition was dismissed.

A copy of the Order or additional information may be obtained by contacting: Agency Clerk, Department of Children and Families, 2415 North Monroe St., Ste. 100, Tallahassee, FL 32303 or Agency.Clerk@myflfamilies.com.

Section VI

Notice of Meetings, Workshops and Public Hearings

BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND

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

DATE AND TIME: Tuesday, September 28, 2021, 6:00 p.m. – 8:00 p.m.

PLACE: This is an online meeting. Please register at <https://floridadep.gov/ncap-meeting>

GENERAL SUBJECT MATTER TO BE CONSIDERED: The Florida Department of Environmental Protection's Office of Resilience and Coastal Protection is holding a scoping meeting to present an overview of the Aquatic Preserve Program and seek public input prior to developing a management plan for the Nature Coast Aquatic Preserve. Members of the Nature Coast Aquatic Preserve Management Plan Advisory Committee have also been invited to attend and listen to comments, and may also participate in the discussion.

A copy of the agenda may be obtained by contacting: Joy Hazell at jhazell@ufl.edu.

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: Joy Hazell at jhazell@ufl.edu. 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).

BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND

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

DATE AND TIME: Thursday, September 30, 2021, 1:00 p.m. – 5:00 p.m.

PLACE: This is an online meeting. Please register at <https://floridadep.gov/ncap-adv-comm/>

GENERAL SUBJECT MATTER TO BE CONSIDERED: The Nature Coast Aquatic Preserve Management Plan Advisory Committee will meet to develop and prioritize issues and strategies for the Nature Coast Aquatic Preserve Management Plan.

A copy of the agenda may be obtained by contacting: Joy Hazell at jhazell@ufl.edu.

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: Joy Hazell at jhazell@ufl.edu. 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).

REGIONAL PLANNING COUNCILS

Tampa Bay Regional Planning Council

The Tampa Bay Regional Planning Council's Agency on Bay Management announces a public meeting to which all persons are invited.

DATE AND TIME: September 9, 2021, 9:00 a.m.

PLACE: This meeting will be held via a virtual communication platform. Persons wishing to participate in this meeting should dial: +1 786 635 1003. The meeting ID is: 828 9405 5418. The Passcode is: 1234. The Zoom Meeting Link is: <https://us02web.zoom.us/j/82894055418?pwd=Sk10eDVaak16MUw3c1F2d0VrNXdhZz09>

GENERAL SUBJECT MATTER TO BE CONSIDERED: To conduct the regular business of the Tampa Bay Regional Planning Council's Agency on Bay Management.

A copy of the agenda may be obtained by contacting: Wren Krahl, Wren@tbrpc.org.

C.4.2 / Advisory Committee Meeting #1 Summary

Nature Coast Aquatic Preserve Management Advisory Committee (MAC) Meeting

September 30, 2021

1 pm – 5 pm

Zoom

Meeting Summary

Overview

Thursday, September 30, 2021, the Nature Coast Aquatic Preserve (NCAP) Management Advisory Committee (MAC) Meeting convened on zoom. Convener, Florida Department of Environmental Protection (FDEP), lead facilitator Joy Hazell and the NCAP process team designed and facilitated the meeting (Appendix A, Agenda).

The MAC, which is made up of state government agency staff, University of Florida faculty, local business owners, and non-governmental organization employees, attended the meeting (Appendix B, Meeting Participants/Management Advisory Committee). The meeting objectives were to:

- Build community and trust among group members
- Create shared understanding of AP designation, the Stakeholder (SH) engagement process and the role of the group
- Brainstorm opportunities to include in management plan
- Begin prioritization of opportunities for the management plan

Welcome and Introductions

The meeting began with one hour of activities designed to set a positive, collaborative tone for the rest of the day. Activities included introductions, a meeting opener where participants shared a personal connection to the Nature Coast Aquatic Preserve, an explanation and clarification of the meeting agenda, objectives, and participant generated ground rules for the meeting (Appendix C, Group Norms). Participants were put into small groups to discuss their expectations for the MAC process of creating the NCAP management plan Chapter 4. A summary of expectations is below:

- Help the process
- Incorporating public opinions that were sent in
- What is set is set appropriately for next 10 years
- Manage expectations for practicality
- See more protection for the resources
- Learn the process of drafting an aquatic preserve management plan
- Provide research opportunities to university students
- Learn new ways the MAC can collaborate now and, in the future

Presentations

To create a shared understanding an aquatic preserve designation, management plan development process, existing monitoring efforts in the aquatic preserve and the role of the MAC in drafting chapter 4 of the management plan four presentations were given by members of the NCAP process team (Appendix D, NCAP Process Team).

Nature Coast Aquatic Preserve (NCAP) & the Management Plan Development Process. Mike Shirley and Earl Pearson, Florida Department of Environmental Protection.

Nature Coast Aquatic Preserve Draft Management Plan. Hannah O. Brown, University of Florida.

Ongoing Research and Monitoring of the Nature Coast Aquatic Preserve. Cheryl P. Clark, FDEP and Savanna Barry, University of Florida, IFAS, Extension. For copies of presentations, please contact Joy Hazell (jhazell@ufl.edu).

Once the presentations concluded the floor was open for a question-and-answer period, the results are listed below.

1. Was climate change or climate resilience addressed in the draft management plan?
 - a. Hannah responded affirmatively that it was discussed by multiple people that she spoke with, and that it's included in ecosystem science section that addresses multiple types of climate change impacts.
2. Current sampling of seagrass beds near shore is great, especially reactivating Project COAST but there does seem to be a data gap in the representation of seagrasses further from shore.
 - a. Noted for future inclusion in management plan.
3. Great that these 90 sampling stations were reinstated, what is the expectation for this water sampling to be maintained in the next 10 years.
 - a. Mike advised that recurring funds are being requested to continue the work. There is a legislative budget request being proposed. There is also a request to NOAA to consider the designation of a National Estuarine Research Reserve for the region which helps with getting national funding.
4. How do we communicate the amazing science that Project COAST is doing, particularly when issues of coastal development that may impact and change nutrient level in watersheds arise?
 - a. Savannah indicated that the seagrass research is available, published in open access journals. A communications plan and identifying the right people to communicate to is key. Noted for future collaboration between Project COAST, PEW Charitable Trust and others.
5. Can you give us some ideas of the background concentrations of phosphorus? Are they normally higher in certain regions than others, what is the cause of that?
 - a. Savannah noted the patterns we observe in phosphorus concentrations are mostly attributed to natural patterns in the soils and how much the watersheds interact with the Hawthorn Group deposit of sediments.
6. Florida just passed legislation which enables the EPA to declare all aquatic preserves no discharge zones and I wondered if that applied to NCAP and whether you've applied to the EPA or if you have to apply?
 - a. Mike indicated that this it would apply to all aquatic preserves in Florida, and that the process is underway.
7. Is there any knowledge about how hurricanes or other tropical systems affected the submerged aquatic vegetation (SAV) and other benthic habitats?
 - a. Savannah advised the most notable event in the period of record was the 1998 El Nino, which led to significant rainfall linked to notable decline in light penetration increase in nutrient concentrations. The system was able to recover to normal conditions within about six to eight months. So, there is certainly some level of resilience within the system and while it wasn't a hurricane, it was the biggest hit that the system took in the Project COAST period of record.

Public Meeting Recap and Debrief

The facilitator reminded everyone that the drafting of Chapter 4 of the management plan began in earnest on Tuesday at the NCAP Public Meeting. 89 participants attended the public meeting including a large portion of the MAC. MAC members provided a few thoughts on the public meeting:

“We have incredibly diverse public who are supportive of the nature coast. Even the folks who are maybe a little concerned about how the NCAP might affect something they're especially interested in taking the approach of being respectful of the resources. Given the input we received at the public meeting, we have a lot of very dedicated and experienced users have this resource.”

The facilitator sent an email of the 83 comments given at the public meeting. The public comments will be analyzed and used for development of Chapter 4 of the NCAP management plan.

For a full report of the public meeting please contact Joy Hazell (jhazell@ufl.edu).

Chapter 4 Issue Generation and Grouping

The next activity of the day had MAC members put into small groups to brainstorm a list of locally relevant issues that they would like to see included in the management plan.

The facilitator provided a definition of issues and outline to explain the issues fit into Chapter 4 of the management plan:

Definition – issues that impact the management of the Nature Coast Aquatic Preserve (NCAP) directly; or are of significance to local or regional efforts that would greatly benefit from the aquatic preserve’s participation in them. *“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.”*
Add citation

Chapter 4 Outline:

1. **Ecosystem Science Program**
 1. Background
 2. Current Status
 3. Issues
2. **The Resource Management Program**
 1. Background
 2. Current Status
 3. Issues
3. **The Education and Outreach Program**
 1. Background
 2. Current Status
 3. Issues
4. **The Public Use Management Program**
 1. Background
 2. Current Status
 3. Issues

MAC members were split into 4 small groups and the facilitator gave the following directions, with a reminder of the purpose of brainstorming; all ideas are on the table.

1. Brainstorm a list of issues to include in Chapter 4 of the NCAP management plan
2. Put each issue under a management program
 1. One issue can be in more than one management program

3. Under each issue answer two questions
 1. What do we know about this issue?
 2. Who is working on this issue?

The results of the small group activity are copied verbatim from the worksheet provided. Only one group moved far enough along to answer, "what do we know about this issue?".

Group 1.

PROGRAM	ISSUES
ECOSYSTEM SCIENCE	Data gaps - Hardbottom/sponge
ECOSYSTEM SCIENCE	Data gaps - Offshore seagrass
ECOSYSTEM SCIENCE	Data gap - harvest rates/effort in scallop fishery (carrying capacity of the scallop fishery)
	Data gaps - imperiled species use (sea turtles)
	Long-term monitoring
	Tropicalization/range expanding species (mangrove encroachment)
RESOURCE MANAGEMENT	SAV/Seagrass - monitor and preserve
RESOURCE MANAGEMENT	Assess/define restoration needs
RESOURCE MANAGEMENT	Managing spoil islands (preventing erosion, removing invasives) - value for birds
	Invasive species (e.g., Brazilian pepper removal through partnerships/contracts - Preserving hydric hammock, threatened)
	Marine debris
	Anthropogenic and natural impacts to hardbottom
	Fisheries - management, special rules, special areas
EDUCATION AND OUTREACH MGMT	Propeller scarring
EDUCATION AND OUTREACH MGMT	Volunteerism/Citizen Science - focused on data gaps identified
EDUCATION AND OUTREACH MGMT	Friends of... group
	Marine Science Station, and similar (partnerships)
PUBLIC USE MANAGEMENT	Propeller scarring
PUBLIC USE MANAGEMENT	Manatee protection zones - more appropriate location
PUBLIC USE MANAGEMENT	Public access
	Fisheries - management, special rules, special areas
	Signage

Group 2.

PROGRAM	ISSUES
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ECOSYSTEM SCIENCE	Spring Fed Freshwater Flows
ECOSYSTEM SCIENCE	Aquaculture Zoning finfish, macroalgae, shellfish
ECOSYSTEM SCIENCE	Prop Scarring
	Tropicalization/SLR/SST - CC Indicators - Mangroves Fisheries, Saltmarsh Migration, Corals
	Submarine Groundwater Discharge (high biodiversity FW seeps)
	Sponge Habitat Hard Bottom Research
	Stormwater sheet flow runoff
	Scallop populations, habitat & water quality
	Habitat Fishery shifts
RESOURCE MANAGEMENT	Spring Fed Freshwater Flows
RESOURCE MANAGEMENT	Aquaculture Zoning finfish, macroalgae, shellfish
RESOURCE MANAGEMENT	Prop Scarring
	Water Quality Monitoring
	Seagrass Management & Protection
	Improved Habitat Mapping for restoration and management needs
	Stormwater sheet flow runoff
EDUCATION & OUTREACH MGMT	Spring Fed Freshwater Flows
EDUCATION & OUTREACH MGMT	Law enforcement engagement
EDUCATION & OUTREACH MGMT	Prop Scarring
PUBLIC USE MANAGEMENT	Scallop populations, habitat & water quality
PUBLIC USE MANAGEMENT	Law enforcement engagement
PUBLIC USE MANAGEMENT	Aquaculture Zoning finfish, macroalgae, shellfish
	Prop Scarring

Group 3.

1. BRAINSTORM ISSUES		PROGRAM
ES, EO, RM	Water quality/quantity	Ecosystem Science
RM, EO	Invasive species	Ecosystem Science
RM, EO	Imperiled species	Ecosystem Science
ES, EO, RM, PU	Quality/quantity seagrass habitat	
EO	Discard of recreational and commercial catch	
ES, EO, RM, PU	Harmful algal bloom	
EO, RM, PU	Prop scar restoration	Resource Management

ES, RM, EO, PU	Scallop data collection	Resource Management
ES, RM	Evaluation restoration options/program	Resource Management
RM, PU	Disturbance of fish & wildlife	
RM, PU	Overharvesting/ evaluation of fisheries	
ES, RM, EO, PU	Impact of climate change & sea level rise	
EO	Science vs myth	Education and Outreach Mgmt
EO	Resistance to change	Education and Outreach Mgmt
RM, EO, PU	Effects of user-group actions (prop scar)	Education and Outreach Mgmt
EO, PU, ES	Education of local decision makers	
ES, EO, RM, PU	Changes spring flow	
RM, EO, PU	Marine debris (derelict vessels, ghost traps, derelict aquaculture gear, discarded fishing gear)	
RM, PU, EO	Marking of sensitive habitat, nav dangers	Public Use Management

Group 4.

PROGRAM	2. ISSUES	3. WHAT DO WE KNOW ABOUT THIS ISSUE?
ECOSYSTEM SCIENCE	Monitoring of Water quality	Monthly samples being collected
ECOSYSTEM SCIENCE	Monitoring habitats (seagrass, salt marsh)	Seagrass monitoring yearly, no salt marsh monitoring
ECOSYSTEM SCIENCE	Poor Run-off quality (violations?)	Run-off issues in Crystal
ECOSYSTEM SCIENCE	Lack of info on hardbottom communities	Know sponges present but don't know how many
	Tropicalization	Species typically present further south moving north
	(No place for citizen science data to be recorded?)	
RESOURCE MANAGEMENT	Protection of Resource	
RESOURCE MANAGEMENT	Seagrass restoration	
RESOURCE MANAGEMENT	Loss of salt marsh	
	Control or mitigate run-off	
	Improve water treatment (stormwater, sewage, septic)	

EDUCATION AND OUTREACH MGMT	Education on scarring
EDUCATION AND OUTREACH MGMT	Boater education
EDUCATION AND OUTREACH MGMT	Improve public engagement
	Target partnership development
PUBLIC USE MANAGEMENT	Usage of area (who, what)
PUBLIC USE MANAGEMENT	Identifying potential conflicts

Each group reported their activity results for the entire MAC. The facilitator asked the group for their impressions of the activity results across groups. Responses included:

Commonalities Across Groups

- Prop scarring
- Scallops
- Water quality spring run offs
- Law enforcement
- Marine debris

Unique ideas

- Invasive or nonnative species
- Public engagement and awareness of the preserve
- Imperiled species beyond those legally classified imperiled or higher
- Nowhere was human population growth specifically mentioned (detailed in the current draft of the management plan)
- Need to understand where tourism is headed

Florida Sunshine Law

The Management Advisory Committee falls under the Florida Sunshine Law. To ensure everyone understood and followed the facilitator presented 3 slides. The text from the slides is copied verbatim below.

The Scope of the Sunshine Law

- It provides a right of access to governmental proceedings at both the state and local levels.
- The law is equally applicable to elected and appointed boards.
- It has been applied to any gathering of two or more board members to discuss some matter which will foreseeably come before that board.
- It can apply to advisory boards, even though their recommendations may not be binding upon the agencies that create them.

Three Basic Requirements

1. Meetings of public boards or commissions must be open to the public;
2. Reasonable notice of such meetings must be given; and
3. Minutes of the meetings must be taken, promptly recorded, and open to public inspection.

Additional Information

- Board members may not use electronic or other means of communication to conduct a private discussion about board business.
- While a board member is not prohibited from discussing board business with staff or a non-board member. These individuals cannot be used as a liaison to communicate information between board members.
- The Sunshine Law provides that no resolution, rule, regulation, or formal action shall be considered binding if they are not made in an open meeting.
- If you receive a communication regarding your work, specifically soliciting an idea or process, reach out to your staff for guidance.
- Penalties can be levied for violations, including misdemeanors and fines.

Next Steps and Closing

The facilitator asked the MAC if there was anyone else who should be a member of the advisory committee. Ideas included:

- United States Geological Service (USGS)
- Florida Public Archeology Network (FPAN)
- Florida Natural Area Inventories (FNAI) – FNAI is a member of the Acquisitions and Restoration Council and will be part of the management plan approval process

MAC members also inquired about potential speakers in the future. The facilitator proposed hosting short webinars in between meetings that the committee can watch live or recorded. The webinar format will ensure that there is enough time within the committee meetings for discussion and action. The first proposed webinar is on cultural resources.

Finally the facilitator provided the MAC with next steps including a meeting report and synthesis by 10/14, a future meeting schedule (Appendix E) and a website where all materials will be posted, <https://floridadep.gov/rcp/aquatic-preserve/locations/nature-coast-aquatic-preserve>.

This closed the meeting.

Participant List

FIRST NAME	LAST NAME	ROLE	ORGANIZATION
THOMAS	Ankersen	Committee member	University of Florida
SAVANNA	Barry	Subject matter expert	University of Florida/IFAS/Extension
STEVE	Brinkley	Committee member	Florida Fish and Wildlife Conservation Commission
HANNAH	Brown	Plan author	University of Florida/NOAA
MELISSA	Charbonneau	Committee member	Pasco County
CHERYL	Clark	Subject matter expert	Department of Environmental Protection
MORGAN	Edwards	Subject matter expert	University of Florida
MIKE	Engiles	Committee member	Crystal River Watersports
JUSTIN	Grubich	Committee member	Pew Charitable Trusts
JAMIE	Hammond	Subject matter expert	University of Florida
TIMOTHY	Jones	Subject matter expert	Department of Environmental Protection
FRANK	Kapocsi	Committee member	Homosassa River Alliance
KEITH	Kolasa	Committee member	Hernando County
MICHAEL	Kuhman	Committee member	Florida Department of Agriculture and Consumer Services
ENRIQUE	LATIMER	Committee member	Duke Energy
SCOTT	Matthewman	Committee member	Florida Department of Environmental Protection
MARIA	Merrill	Committee member	Florida Fish and Wildlife Conservation Commission
CHARLES	Morton	Committee member	Hernando Waterways Advisory Committee
LARRY	Nall	Committee member	Aquatic Preserve Society
JOYCE	Palmer	Committee member	U.S. Fish and Wildlife Service
EARL	Pearson	Committee member	Florida Department of Environmental Protection
KRISTIE	Perez	Co-Facilitator	University of Florida
JOCELYN	Peskin	Zoom producer	University of Florida

JAMES	Powell	Committee member	Clearwater Aquarium
BARBARA	Roberts	Committee member	Florida Department of Environmental Protection
BRITTANY	Scharf	Committee member	University of Florida/IFAS/Extension
MICHAEL	Shirley	Subject matter expert	Florida Department of Environmental Protection
MADISON	Trowbridge	Committee member	Southwest Florida Water Management District
MARNIE	Ward	Committee member	University of Florida/IFAS/Extension

NCAP Process Team

Name	Agency	Role	Email
Michael Shirley	Florida Dept. of Environmental Protection	Subject Matter Expert	Michael.Shirley@dep.state.fl.us
Earl Pearson	Florida Dept. of Environmental Protection	MAC Committee Member	Earl.Pearson@dep.state.fl.us
Cheryl Clark	Florida Dept. of Environmental Protection	Subject Matter Expert	Cheryl.P.Clark@floridaDEP.gov
Joy Hazell	UF/IFAS/Extension	Lead Facilitator	jhazell@ufl.edu
Savanna Barry	UF/IFAS/Extension	Subject Matter Expert	savanna.barry@ufl.edu
Laura Reynolds	UF/IFAS/Soil and Water Sciences	Subject Matter Expert	lkreynolds@ufl.edu
Jamie Hammond	UF/IFAS/Extension	Plan Editor	jmelyn1987@ufl.edu
Kristie Perez	UF/IFAS/SNRE	Co-facilitator	kristieperez@ufl.edu

C.5 / Advisory Committee Meeting #2

C.5.1 / Florida Administrative Register Posting

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: Terrence Samuel, 2900 Apalachee Parkway, Room D315, Tallahassee, FL 32399, (850)617-2100. 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 HIGHWAY SAFETY AND MOTOR VEHICLES

The DEPARTMENT OF HIGHWAY SAFETY AND MOTOR VEHICLES announces a public meeting to which all persons are invited.

DATE AND TIME: November 9, 2021, 2:30 p.m. – 4:00 p.m. ET

PLACE: THIS MEETING WILL BE HELD VIA MICROSOFT TEAMS. PLEASE SEE DIAL-IN INFO BELOW.

GENERAL SUBJECT MATTER TO BE CONSIDERED: The Motorist Modernization Advisory Board is meeting to discuss and provide guidance & recommendations on Phase 2 of the Motorist Modernization Program.

AGENDA

- Roll Call
- Welcome
- New Advisory Board Membership Update
- Review and Approval of Last Meeting Minutes
- Phase II IV&V Update
- Stakeholder Outreach Update
- MM Phase II Program Update
- Financial Review
- Project Updates
- Communications Update
- Q&A
- Adjourn

Microsoft Teams meeting

Join on your computer or mobile app

Click here to join the meeting:

https://teams.microsoft.com/l/meetup-join/19%3ameeting_MmFIYmMwYjgtZjRkYS00ZWRLTlkOTUyYTI3MGNlZDE1ODBm%40thread.v2/0?context=%7b%22id%22%3a%2225c7bf74-6ed1-4f3c-af88-d6c3933606ca%22%2c%22oid%22%3a%22f12acde9-abbd-45e0-93b8-12e80c44c029%22%7d

Or call in (audio only) (850)583-5466, 362353834# United States, Tallahassee, Phone Conference ID: 362 353 834#

A copy of the agenda may be obtained by contacting: The agenda is included above.

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: Terrence Samuel, 2900 Apalachee Parkway, Room D315, Tallahassee, FL 32399, (850)617-2100. 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).

BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND

The Florida Department of Environmental Protection, Office of Resilience and Coastal Protection and University of Florida announces a workshop to which all persons are invited.

DATE AND TIME: Tuesday, November 30, 2021, 1:00 p.m. – 5:00 p.m.

PLACE: This is an online meeting. Please join at <https://floridadep.gov/ncap-acm2/>.

GENERAL SUBJECT MATTER TO BE CONSIDERED: The Nature Coast Aquatic Preserve Management Plan Advisory Committee will hold their second meeting to develop and prioritize issues and strategies for the Nature Coast Aquatic Preserve Management Plan.

Meeting Objectives: Determine the list of issues to be included in the management plan. Begin developing Goals and Objectives for Issues 1 & 2.

A copy of the agenda may be obtained by contacting: Joy Hazell at jhazell@ufl.edu.

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: Joy Hazell at jhazell@ufl.edu. 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).

REGIONAL PLANNING COUNCILS

West Florida Regional Planning Council

The Emerald Coast Local Emergency Planning Committee (LEPC) announces a public meeting to which all persons are invited.

DATE AND TIMES: Wednesday, November 3, 2021: Subcommittee meetings, 9:00 a.m. CT; LEPC Quarterly meeting, 10:00 a.m.

PLACE: Virtually

GENERAL SUBJECT MATTER TO BE CONSIDERED: The Emerald Coast Local Emergency Planning Committee (LEPC) will hold its Quarterly meeting virtually on Wednesday, November 3, 2021.

The meetings will be held via webinar.

C.5.2 / Advisory Committee Meeting #2 Summary

Nature Coast Aquatic Preserve Management Advisory Committee (MAC) Meeting

November 30, 2021

1 pm – 5 pm

Zoom

Meeting Summary

Overview

Tuesday, November 30, 2021, the Nature Coast Aquatic Preserve (NCAP) Management Advisory Committee (MAC) convened for the second time on zoom. Convener, Florida Department of Environmental Protection (FDEP), lead facilitator Joy Hazell and the NCAP process team designed and facilitated the meeting (Appendix A, Agenda).

The MAC members include state and federal government agency staff, University of Florida faculty, local business owners, and non-governmental organization employees, who attended the meeting (Appendix B, Meeting Participants/Management Advisory Committee). The meeting objectives were to:

- Build community and trust among group members
- Take ideas from previous events and sort into goals, issues, strategies, and objectives
- Finalize Issues for the NCAP management plan

Welcome, Introductions, and Setting the Stage

The meeting began with thirty minutes of activities designed to set a positive, collaborative tone for the rest of the day. Activities included introductions given it had been two months since we met and new members were in attendance. Participants shared their favorite outdoor activity during the meeting opener which was followed by a review of the project goals and timeline, as well as the meeting objectives, agenda, and group norms as established by participants in the last meeting (Appendix C, Group Norms).

Looking Back / Looking Forward

Participants were then put into groups of three and given five minutes to discuss together what was accomplished in the previous MAC meeting. Joy brought the group back together and asked a few groups to share. The group also reviewed the word clouds from both the Public Meeting and MAC Meeting #1. Of note, the size of the words in these 'clouds' reflects the frequency that it was mentioned by the group. For more detail around this activity or others during the meeting, please email Joy Hazell at jhazell@ufl.edu.

Joy noted concern from the previous meetings that there was not sufficient time to complete small group activities. She emphasized that the NCAP process team had allotted additional time for today's break-out room sessions (Appendix D, NCAP Process Team). Joy then outlined the first group activity task, providing definitions for the categories (goals, issues, strategies, and objectives) that small groups would be expected to sort the items on existing lists into, more specifically from past meetings those lists created in past meetings.

Small Group Activities – Sorting Data

For the next activity of the day MAC members were provided definitions of the terms: issue, goal, strategy, and objective (Appendix E, Definitions of Terms). Jamie also walked the group through an example of the small group activity that would follow, using content from the Public Meeting.

MAC members were split into 4 small groups and the facilitator gave the following directions, with a reminder of the purpose of initiating the process, over finalizing it; all ideas are still on the table.

4. Using the list assigned to your group, generated from the last meeting's small group activity, categorize each item into one or more of the four categories Put each issue under a management program
 - a. One item can be in more than one category
5. For each item, answer the question "What do you want to see accomplished?"

Between the two activity segments, the MAC returned to the main Zoom room to regroup and review interim progress. Each group reported their activity results for the entire MAC. The facilitator asked the group for their impressions of the activity as well as trends across groups after sharing the combines list of issues. Responses included: Water Quality, Natural Resource Protection, Climate Change/Tropicalization, Public Use/User Issues, and Education & Outreach.

The following were proposed as the issues that we move forward in the exploring for the NCAP Management Plan Chapter 4. The group was asked to align their items under these as they continued working.

- Water Quality/Quantity
- Natural Resources Protection
- Seagrass Protection
- Climate Change
- Public Use/User Issues
- Education

The results of the small group activity are copied verbatim below from the worksheet provided.

Group 1.

Item	Issue	Goal	Objective	Strategy	What do you want to see accomplished?
<i>Water Quality/Quantity</i>					
<i>Marine debris</i>		X	X	X	
<i>Assess/define restoration needs</i>		X		X	
<i>Long-term monitoring</i>			X	X	
<i>Marine debris</i>		X	X	X	
<i>Natural Resource Protection</i>					
<i>Assess/define restoration needs</i>		X		X	
<i>Long-term monitoring</i>			X	X	
<i>Data gaps - imperiled species use (sea turtles)</i>		X			
<i>Data gap - harvest rates/effort in scallop fishery (carrying capacity of the scallop fishery)</i>		X			
<i>Managing spoil islands (preventing erosion, removing invasives) - value for birds</i>			X		
Item (Group 1 continued)					
<i>Invasive species (e.g., Brazilian pepper removal through partnerships/contracts - Preserving hydric hammock, threatened)</i>	*			X	

<i>Marine debris</i>	X	X	X		
<i>Anthropogenic and natural impacts to hardbottom (and in general)</i>					
<i>Fisheries - management, special rules, special areas</i>	*			Habitat management considerations - more research?	
<i>Volunteerism/Citizen Science - focused on data gaps identified</i>			X		
<i>Manatee protection zones - more appropriate location</i>	X		X	study trends in manatee injuries, food supply, etc. to predict	
<i>Seagrass Protection</i>				educate the public & commercial entities - why it's important & what disturbs it	
<i>Marine debris</i>	X	X	X		
<i>SAV/Seagrass - monitor and preserve</i>	*	X	X		
<i>Data gaps - Offshore seagrass</i>	X				
<i>Assess/define restoration needs</i>	X		X		
<i>Long-term monitoring</i>		X	X		
<i>Propeller scarring</i>	X				
<i>Climate Change</i>				GARI is doing studies - include them as a partner	
<i>Tropicalization/range expanding species (mangrove encroachment)</i>	*			education for homeowners about species, know what to expect & be prepared to adapt	
<i>Long-term monitoring</i>		X	X		
<i>Public Use/User Issues</i>					
<i>Marine debris</i>	X	X	X		
<i>Public access</i>	X				
<i>Fisheries - management, special rules, special areas</i>	*				
<i>Propeller scarring</i>	X				
<i>Manatee protection zones - more appropriate location</i>	X		X		
<i>Signage</i>			X		
Item (Group 1 continued)	Issue	Goal	Objective	Strategy	What do you want to see accomplished?
<i>Education</i>					
<i>Anthropogenic and natural impacts to hardbottom (and in general)</i>	*				
<i>Marine debris</i>	X	X	X		
<i>Propeller scarring</i>	X				

Volunteerism/Citizen Science - focused on data gaps identified					X
Friends of... group					X
Marine Science Station, and similar (partnerships)					X
Manatee protection zones - more appropriate location			X		X
Signage					X

Group 2.

Item	Issue	Goal	Objective	Strategy	Notes from Breakout	What do you want to see accomplished?	Who has authority?
Tropicalization/SLR/SS T - CC Indicators - Mangroves Fisheries, Saltmarsh Migration, Corals	X		x	x	can help make room inland with public lands for landward movement, can do research on actions (example Rx burns in marshes), living shorelines, restoring oyster reefs		
<i>Habitat Fishery shifts</i>		X	X	X	snook range expansion, lionfish colonization - tropicalization effects. some could be beneficial for at least some groups (e.g., snook benefits anglers who like to fish for them), FWC has a role here on the fishery side		
Water Quality/Quantity	X						
Item (Group 2 continued)	Issue	Goal	Objective	Strategy	Notes from Breakout	What do you want to see accomplished?	Who has authority?
<i>Stormwater sheet flow runoff</i>		X	X	X	related to water quality - development, old/aging/insufficient stormwater management - silted in canals/silting into waterways, need filtration/capture. Roads, rooftops, pavement - all contributing. Grasses and other green solutions filter the edges, riprap rather than concrete seawalls, baffle boxes maintained by local govt		

				(settles out large particles). Need to research strategies to cleanse runoff. Coir logs/coconut fiber materials that tend to absorb oil, pollutants, changed periodically. Netting to capture debris, different strategies evolving. Street sweeping can prevent oils and other fluids and street pollution from entering water.		
<i>maintain or improve WQ</i>	X					
<i>Spring Fed Freshwater Flows</i>	X	X		maintain/restore/renew spring flows, working with partners (SWFWMD) - just notes here for now		
<i>Water Quality Monitoring</i>			X	In Pasco, some beaches have terrible WQ issues related to septic tanks. Beaches that came off of impaired waters list were being tracked but the ones that were getting worse not being tracked. Identifying spots that are continually impaired, identify sources. Fertilizer and pesticide ordinances can tie in, grass clippings and nutrient sources - more education needed. Enforcement of ordinances - what is the status of that? Some ordinances might need to be strengthened.		
Item (Group 2 continued)				Notes from Breakout	What do you want to see accomp li-shed?	Who has authority ?
	Issue	Goal	Objective	Strategy		
<i>Submarine Groundwater Discharge (high biodiversity FW seeps)</i>			X	could be related to both water quality and habitat/biodiversity protection, research and resource management both could have an objective, depends how it is affecting the environment		
<i>Aquaculture Zoning finfish, macroalgae, shellfish</i>				X	FDACS regulates this, finfish would probably not be viable, shellfish might be. Outcome could be to examine water quality impacts associated with any aquaculture activities	FDACS
Seagrass Management & Protection	X					

Prop Scarring	X	X		reduce scarring is the objective, addressing Rock Island Channel scarring, Sandy Hook, Bird Racks (hotspots), FWC help support enforcement, education			
Improved Habitat Mapping for restoration and management needs			X				
Education and Engagement and Enforcement	X						
Item (Group 2 continued)				Notes from Breakout	What do you want to see accomplished?	Who has authority?	
	Issue	Goal	Objective	Strategy			
Law enforcement engagement			X	X	FWC has limited resources but will enforce laws that exist, there is a law against seagrass destruction within a aquatic preserve but very rare to be able to enforce, worst of prop scarring happens around scallop season - could partner for targeted enforcement to write a few tickets, education also. Objective could be to get resources needed to enforce laws - example, they didn't have speed guns to measure speed of boats within speed zones (equipment needed). Another example, did not have ability to tell distance of boats from dive flags until equipped with range finders. Need increased presence at key times of the year, word will get out about it. It is not just FWC - the Counties also have officers that can be trained and mobilized, they have a big influence. BOCC needs to be behind any requests for increased capacity in local LE. For boating inside the Everglades you must get an online certification that shows you took a course on how to prevent seagrass damage - requirement, was a burden but was free and educational and something enforceable. Course		

Item (Group 2 continued)	Issue	Goal	Objective	Strategy	Notes from Breakout	What do you want to see accomplished?	Who has authority?
					would need to be quality. Could be integrated with the scallop stamp. Would probably have to be at the county level.		
<i>Public Use/Impacts</i>	X						
<i>Manage increased use and damage related to population growth</i>				X	might need to be some kind of limitations somewhere down the line		
<i>Boat ramps and access</i>					need more research, needs can vary by location. Large influence of vacation rentals - state issue unless existing ordinance grandfathered in		
<i>Scallop populations, habitat & water quality</i>		X	X		protecting scallop population, could limit licenses or other limits, alternating seasons, etc. shorter seasons		FWC - for seasons, limits
Natural Resource Protection	X						
<i>Submarine Groundwater Discharge (high biodiversity FW seeps)</i>			X		could be related to both water quality and habitat/biodiversity protection, research and resource management both could have an objective, depends how it is affecting the environment		
<i>Sponge/Hardbottom Habitat Research</i>			X		need for baseline data, habitat/natural resource, contributes to clear water, structure for fishing. Catalogue biodiversity - sponges, corals, algae, macroinverts.		
<i>Emphasize upland connections</i>		X					
<i>Improved Habitat Mapping for restoration and management needs</i>				X			

Group 3.

Item	Issue	Goal	Objective	Strategy	What do we want to accomplish with this issue?	COMMENTS
Water quality/quantity	X				Quality: Ensure the AP meets or exceeds the designated use as class 2 or 3 as an OFW; Quantity (add with row 18): Ensure water entering the AP meets or exceeds Minimum Flows and	

				Levels and does not contribute to water quality and habitat degradation		
Invasive species	x			Identify / Control / Irradicate	Invasive species may need to be a GOAL under a different species	
Imperiled species	x			Increase population / ensure habitat that is needed is preserved; Monitoring; Education		
Quality/quantity seagrass habitat	x			Maintain and restore where necessary high quality seagrass habitat; Accurate Mapping;		
<i>Discard of recreational and commercial catch</i>			x x		Could be own issue?	
Harmful algal bloom	x?	x	x	x	Issue: Water Quality	
<i>Prop scar restoration</i>		x		x Restore	Issue: Seagrass	
<i>Scallop data collection</i>				x		
<i>Evaluation restoration options/program</i>				x		
<i>Disturbance of fish & wildlife</i>		x		Minimize	Issue: Resource Management (Fisheries)	
<i>Overharvesting/ evaluation of fisheries</i>					Issue: Resource Management (Fisheries); May fall under partnerships (Fisheries management is FWC focus)	
Item (Group 3 continued)	Issue	Goal	Objective	Strategy	What do we want to accomplish with this issue?	COMMENTS
Impact of climate change & sea level rise	x				Resilience to the impacts of Climate change and sea level (tropicalization)	CC and SLR are not unique to the AP - should fall under a larger issue like WQ or Habitat Quality; Second comment that

						it can be it's own issue
Science vs-myth-Resistance to-change						
Effects of user-group actions (prop scar)	x				Managing the use of the AP resources by ALL user groups (public/private/commercial); minimize user group conflicts; Determine user group impacts via monitoring; educate user groups	
Education of local decision makers		x	x		Collaboration / Early and Often Outreach	Issue: Education and Outreach
Changes spring flow		x	x	x	Monitoring necessary to participate in decision making processes	Issue: Water Quantity
Marine debris (derelict vessels, ghost traps, derelict aquaculture gear, discarded fishing gear)		x			Eliminate / Educate / Identify at risk vessels	Issue: Education and Outreach; Resource Management; Water Quality; Seagrass
Marking of sensitive habitat, nav dangers				x		
Education and Outreach	x				Prop scar restoration; Discard of recreational and commercial catch; Disturbance of fish & wildlife; Marine debris (derelict vessels, ghost traps, derelict aquaculture gear, discarded fishing gear)	
Item (Group 3 continued)	Issue	Goal	Objective	Strategy	What do we want to accomplish with this issue?	COMMENTS
Water Quality/Quantity	X				Discard of recreational and commercial catch; Marine debris (derelict vessels, ghost traps, derelict aquaculture gear, discarded fishing gear)	
Natural Resource Protection (Management)	X				Prop scar restoration; Disturbance of fish & wildlife; Marine debris (derelict vessels, ghost traps, derelict aquaculture gear, discarded fishing gear); Marking of sensitive habitat, nav dangers	
Climate Change	X					
Public Use / User Issues	X				Prop scar restoration; Discard of recreational and commercial catch; Disturbance of fish & wildlife; Marine debris (derelict vessels, ghost traps, derelict aquaculture gear, discarded fishing gear); Marking of sensitive habitat, nav dangers	
Seagrass Protection (quality and quantity)	X				Prop scar restoration; Marine debris (derelict vessels, ghost traps, derelict aquaculture gear, discarded fishing gear)	
	X				Prop scar restoration; Discard of recreational and commercial catch; Evaluation restoration options/program; Overharvesting/	

Research and Monitoring

evaluation of fisheries; Marine debris (derelict vessels, ghost traps, derelict aquaculture gear, discarded fishing gear)

Additional note: Cultural resources need to be included somewhere; Scallop data collection outside DEP AP purview (row 9); Outside DEP Purview - Overharvesting/ evaluation of fisheries (Row 12)

Group 4.

Item	Issue	Goal	Objective	Strategy	What do we want to accomplish with this item?	Comments
<p>Natural Resources Protection (Includes hardbottom, sponge habitats, saltmarsh, vents etc.)</p>					<p>Monitoring, analyzing and restoring. Does this include fish and wildlife? - Partnership rises to the top, FWC oversees Fish and Wildlife. Should it include seagrass? How do we capture changes/impacts? What kind of research and monitoring is already out there? What do we know? What do we need to know?</p>	
Item (Group 4 continued)	Issue	Goal	Objective	Strategy	What do we want to accomplish with this item?	Comments
<p>Public Use/User Issues</p>					<p>Depending on # of staff, an early step has to be an organization of existing and historical information, i.d. gaps. Historical mapping and land use changes. Navigational signage that prevents people running aground. Promote alternative anchoring methods or avoid damage from scarring, specifically rental boats (partner with power pole). Facilitate third party research - scallop season - promote monitoring that captures scaring before and after scallop season to target restoration. Zoning of sensitive habitats - pole and troll. User issues between guides and other activities. Follow other successful models around the state. Explore new rules that can protect really sensitive areas in the nature coast. Partner with FWC to develop the reef fish stamp. Maybe partner with FWC in terms of scallop season to have a free stamp. Gain support for management plan for knowing who your user groups are and target your education and outreach.</p>	<p>Facilitate and support things that there may not be staff bandwidth.</p>
<p>Seagrass protection</p>					<p>Highlight because it is iconic? What if SG all disappears and it is all sponges? Our group would include this in natural systems.</p>	
<p>Education</p>					<p>Target education based on impacts you are seeing. Increasing the scars hurt campaign,</p>	

<p>Water Quality</p>	<p>X</p>		<p>extending beyond Citrus Co. Good to have some measurable impacts. Can take time to get education to really stick. Includes quality, quantity and timing of water. Identify new TMDLs for water in SG areas. Goals understand what is impacting water quality in the region. Target messaging about water quality and what they can do in their backyard to improve water quality.</p>			
<p>Item (Group 4 continued)</p>	<p>Issue</p>	<p>Goal</p>	<p>Objective</p>	<p>Strategy</p>	<p>What do we want to accomplish with this item?</p>	<p>Comments</p>
<p><i>Natural Systems - Habitats</i></p>	<p>X</p>					
<p><i>Monitoring of Water quality</i></p>		<p>X</p>		<p>X</p>	<p>Mimic what they are doing in Big Bend. Align with present initiatives and funding and momentum. Monitoring AP through a University contract. Continue Project Coast - agreement for sharing data. Have CH come up and share what they have done. Opportunity to look at lessons learned that CH did for water quality monitoring.</p>	
<p><i>Monitoring habitats (seagrass, salt marsh, hardbottom communities, vent communities)</i></p>		<p>X</p>		<p>X</p>	<p>Identify unique features of aquatic preserve</p>	
<p><i>Poor Run-off quality (violations?)/Control or mitigate</i></p>			<p>X</p>		<p>Want good run-off quality. Identify violations. Reducing stormwater (etc.) run-off impacts to habitat</p>	
<p><i>Lack of info on hardbottom communities</i></p>		<p>X</p>			<p>Improve understanding of hardbottom communities</p>	
<p>Climate Change</p>	<p>X</p>					
<p>Tropicalization (shifts in ecological regimes due to a changing climate/SLR/changing sea surface temp)</p>	<p>X</p>	<p>X</p>			<p>1. Understanding shift in populations (Goal) 2. Improve understanding of how it will impact the area. 3. Model what we expect in the area to help drive restoration actions (FWC - habitat suitability monitoring.) 4. Adaptive planning for management, enhancement, and resilience actions. 5 Stony corals moving northward</p>	
<p><i>(No place for citizen science data to be recorded?) Citizen Science Data Collection for monitoring</i></p>			<p>X</p>	<p>X</p>		
<p><i>Protection of Resource</i></p>					<p>Enforcement. Implied under AP statute, regulatory laws and permitting process (big picture purpose of AP and management plan)</p>	
<p><i>Seagrass and salt marsh restoration/reduce loss of salt marsh and seagrass/monitoring for baseline and target</i></p>			<p>X</p>	<p>X</p>	<p>Depends on if you are physically restoring or if they are restored. put in place minimum threshold or window (confidence intervals around a threshold) of SG coverage in the NC bay that we don't want to get below.</p>	

<i>Item (Group 4 continued)</i>	Issue	Goal	Objective	Strategy	What do we want to accomplish with this item?	Comments
<i>Improve water treatment (stormwater, sewage, septic)</i>		X	X		Diverse topic across multiple regulatory fronts and actions. Objective. Convert septic to sewer or maintain infrastructure. Build public or county support for advanced wastewater.	
<i>Education on scarring</i>				X	Anchoring issues and damage/scarring from boat propellers	
<i>Boater education</i>		X				
<i>Improve public engagement</i>					Can be on multiple fronts. Can be a component of each. Maybe incorporate public engagement.	
<i>Target partnership development</i>		X		X	Can fit in all of them. Strategy to get something done. Or an objective as a way to meet a goal. Or an identification of missing stakeholders.	
<i>Usage of area (who, what)</i>		X			Figure out usage through a survey or additional means (fishing license/# of ecotourism operators). Work with FWC to identify the Universe of scallopers. Does greater usage associate with greater damage.	
<i>Identifying potential conflicts</i>					Large scale activities (development, large pipeline, roads). Policy - things that go against BMAP or SWIM or AP rule. User group conflicts.	
<i>Land acquisition for water treatment or habitat</i>				X	Can assist with water quality and salt marsh enhancement and restoration.	
<i>Control invasive species</i>				X		
<i>Collaborate and/or apply for funding to accomplish the G/O/S completion</i>				X		
<i>Identify who is doing what in terms of agencies/groups</i>			X			

Report-out and Consensus around Issues

All groups again joined the main room after the second data sorting activity. Each facilitator was asked to share any key discussions that came up. Responses included:

- inclusion of cultural resources
- connections to uplands
- considerations about how to include items, i.e. under Education & Outreach vs. other pertinent 'umbrellas' or the idea of having Seagrass Protection as a separate issue vs. under Natural Resource Protection
- research & monitoring as an issue
- pressure of growth and how to place limits, looking at unique ways to protect sensitive spaces
- including spring fed & freshwater flows, importance of quantity & timing, in addition to quality of water
- consideration of aquaculture

The process team advised that all this information will be taken into consideration in merging the documents from today's meeting. Once this master document is circulated, the MAC can look for gaps,

priorities, and further contemplate what is realistic to take on vs. what might be facilitated or supported through partnerships.

A question was raised about inviting people from other agencies to meet with us during process and the idea of potential for periodic interagency workshops with local and county officials discussed. Group members will provide Joy with contact information to follow-up on potential opportunities.

Mike will be presenting to the Springs Coast Steering and Management Committees in December on the work that has been done to date by the NCAP MAC. This may be an opportunity to coordinate alignment with Surface Water Improvement and Management (SWIM) Plan objectives or look to create a working group for such a purpose.

Public Comment

There were no members of the public in attendance. No additional comments were made at this time.

Closure and Next Steps

The facilitator noted the group would receive a meeting report in roughly two weeks, as they did last time. She added that a combined document will be created from today's small group work and will be circulated to the MAC one week before the next meeting along with the agenda. Due to the new Covid-19 variant and the proximity to the holidays, the next meeting will also be conducted via Zoom. The next meeting was announced as January 19th from 1pm to 5pm on Zoom, however, this has been rescheduled to January 18th, same time & format (Appendix F, Meeting Schedule). The March meeting is currently planned to be in-person.

This closed the meeting.

Participant List

First Name	Last Name	Role	Organization
Thomas	Ankersen	Committee member	University of Florida
Savanna	Barry	Subject matter expert	University of Florida/IFAS/Extension
Anna	Braswell	Subject matter expert	University of Florida
Steve	Brinkley	Committee member	Florida Fish and Wildlife Conservation Commission
Melissa	Charbonneau	Committee member	Pasco County
Kevin	Claridge	Committee member	Aquatic Preserve Society
Cheryl	Clark	Subject matter expert	Department of Environmental Protection
Mark	Edwards	Committee member	Citrus County BOCC
Morgan	Edwards	Subject matter expert	University of Florida
Justin	Grubich	Committee member	Pew Charitable Trusts
Jamie	Hammond	Subject matter expert	University of Florida
Joy	Hazell	Lead Facilitator	University of Florida/IFAS/Extension
Timothy	Jones	Subject matter expert	Department of Environmental Protection
Frank	Kapocsi	Committee member	Homosassa River Alliance
Keith	Kolasa	Committee member	Hernando County

Anna	Laws	Committee member	Florida Fish and Wildlife Conservation Commission
Scott	Matthewman	Committee member	Florida Department of Environmental Protection
Charles	Morton	Committee member	Hernando Waterways Advisory Committee
Joyce	Palmer	Committee member	U.S. Fish and Wildlife Service
Earl	Pearson	Committee member	Florida Department of Environmental Protection
Kristie	Perez	Co-Facilitator	University of Florida
James	Powell	Committee member	Clearwater Aquarium
Laura	Reynolds	Subject matter expert	University of Florida
Barbara	Roberts	Committee member	Florida Department of Environmental Protection
Michael	Shirley	Subject matter expert	Florida Department of Environmental Protection
William	Toney	Committee member	Recreational Fishing Guide
Madison	Trowbridge	Committee member	Southwest Florida Water Management District
Marnie	Ward	Committee member	University of Florida/IFAS/Extension
Coleen	Weaver	Committee member	Pasco County BOCC

NCAP Process Team

Name	Agency	Role	Email
Michael Shirley	Florida Dept. of Environmental Protection	Subject Matter Expert	Michael.Shirley@dep.state.fl.us
Earl Pearson	Florida Dept. of Environmental Protection	MAC Committee Member	Earl.Pearson@dep.state.fl.us
Cheryl Clark	Florida Dept. of Environmental Protection	Subject Matter Expert	Cheryl.P.Clark@floridaDEP.gov
Joy Hazell	UF/IFAS/Extension	Lead Facilitator	jhazell@ufl.edu
Savanna Barry	UF/IFAS/Extension	Subject Matter Expert	savanna.barry@ufl.edu
Laura Reynolds	UF/IFAS/Soil and Water Sciences	Subject Matter Expert	lkreynolds@ufl.edu
Jamie Hammond	UF/IFAS/Extension	Plan Editor	jmelyn1987@ufl.edu
Kristie Perez	UF/IFAS/SNRE	Co-facilitator	kristieperez@ufl.edu

C.6 / Advisory Committee Meeting #3

C.6.1 / Florida Administrative Register Posting

Florida Administrative Register

Volume 47, Number 243, December 17, 2021

DEPARTMENT OF CHILDREN AND FAMILIES
Substance Abuse Program
RULE NO.: RULE TITLE:
65D-30.0141 Needs Assessment for Medication-Assisted
Treatment for Opioid Use Disorders
NOTICE IS HEREBY GIVEN that on December 1, 2021, the
Department of Children and Families, received a petition for
waiver of subsection 65D-30.0141(2), Florida Administrative
Code, from CRC Health Treatment Clinics, LLC d/b/a St. Lucie
Comprehensive Treatment Center. Subsection 65D-30.0141(2)
of the Code requires awarded applicants to receive at least a
probationary license within two (2) years of receipt of an award
letter connected to their Methadone Medication-Assisted
Treatment Application to Proceed to Licensure Application. If
an applicant fails to obtain a probationary license within the
specified time, the Department shall rescind the award.
A copy of the Petition for Variance or Waiver may be obtained
by contacting: Agency Clerk, Department of Children and
Families, 2415 North Monroe Street, Suite 400, Tallahassee, FL
32303 or Agency.Clerk@myflfamilies.com.

DEPARTMENT OF CHILDREN AND FAMILIES
Agency for Persons with Disabilities
RULE NO.: RULE TITLE:
65G-5.004 Selection of Housing.
The Agency for Persons with Disabilities hereby gives notice:
that on October 20, 2021, the Agency for Persons with
Disabilities, received a petition for Medicaid variance and/or
waiver of Rule 65G-5.004, F.A.C., from Ms. Tessa Lyn
Solomon, Petitioner. The rule states in part that "Neither the
supported living provider nor the immediate family of the
supported living provider shall serve as landlord or have any
interest in the ownership of the housing unit." The Petitioner
seeks a waiver or variance from this portion of Rule 65G-
5.004(b).
A copy of the Order or additional information may be obtained
by contacting: Brett Taylor, Senior Attorney Agency for
Persons with Disabilities, 4030 Esplanade Way, Suite 335,
Tallahassee, Florida 32399-0950, (850)410-1309,
brett.taylor@apdcare.org.

Section VI Notice of Meetings, Workshops and Public Hearings

DEPARTMENT OF AGRICULTURE AND CONSUMER
SERVICES
Division of Administration
The Florida Farmworkers Advisory Council announces a
telephone conference call to which all persons are invited.
DATE AND TIME: January 6, 2022, 1:00 p.m.

PLACE: Zoom at
<https://zoom.us/j/91065234889?pwd=VCtpMEExXVfhPbUVs dWezL3pLWDRDdz09>, Dial-in number: (301)715-8592,
Meeting ID: 910 6523 4889, Passcode: 152757.
GENERAL SUBJECT MATTER TO BE CONSIDERED: The
Florida Farmworkers Advisory Council will meet to discuss
general business.
A copy of the agenda may be obtained by contacting: Ricardo
Alvarez, Cell (850)766-8583, Ricardo.Alvarez@FDACS.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: Ricardo Alvarez, Cell (850)766-8583,
Ricardo.Alvarez@FDACS.gov. If you are hearing or speech
impaired, please contact the agency using the Florida Relay
Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).
For more information, you may contact: Ricardo Alvarez, Cell
(850)766-8583, Ricardo.Alvarez@FDACS.gov.

DEPARTMENT OF AGRICULTURE AND CONSUMER
SERVICES
Division of Administration
The Florida Agriculture Center & Horse Park Authority Board
of Directors announces a telephone conference call to which all
persons are invited.
DATE AND TIME: December 29, 2021, 3:00 p.m.
PLACE: Zoom/Conference Call; Dial in number: (929)436-
2866, Meeting ID: 840 3786 2826, Passcode: 440726
GENERAL SUBJECT MATTER TO BE CONSIDERED:
Florida Agriculture Center & Horse Park Authority Board of
Directors will meet to discuss general business.
A copy of the agenda may be obtained by contacting: Jason
Reynolds at jreynolds@flhorsepark.com.
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: Jason Reynolds at jreynolds@flhorsepark.com. If
you are hearing or speech impaired, please contact the agency
using the Florida Relay Service, 1(800)955-8771 (TDD) or
1(800)955-8770 (Voice).
For more information, you may contact: Jason Reynolds at
jreynolds@flhorsepark.com.

BOARD OF TRUSTEES OF THE INTERNAL
IMPROVEMENT TRUST FUND
The Florida Department of Environmental Protection, Office of
Resilience and Coastal Protection and University of Florida
announces a public meeting to which all persons are invited.
DATE AND TIME: Tuesday, January 18, 2022, 1:00 p.m. –
5:00 p.m.

5745

PLACE: This is an online meeting. Please join at <https://floridadep.gov/ncap-acm3/>.

GENERAL SUBJECT MATTER TO BE CONSIDERED: The Nature Coast Aquatic Preserve Management Plan Advisory Committee will hold their third meeting to develop and prioritize issues and strategies for the Nature Coast Aquatic Preserve Management Plan.

Meeting objectives:

- Continue prioritization of goals, objectives and strategies for NCAP management plan.
- Finalize issues for the NCAP management plan.

A copy of the agenda may be obtained by contacting: Joy Hazell at jhzell@ufl.edu.

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: Joy Hazell at jhzell@ufl.edu. 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).

REGIONAL PLANNING COUNCILS

Northeast Florida Regional Planning Council

The Northeast Florida Regional Council announces a public meeting to which all persons are invited.

DATE AND TIME: January 6, 2022, 10:00 a.m. Board of Directors Meeting, immediately followed by the Regional Leadership Awards ceremony and elected officials luncheon

PLACE: 100 Festival Park Avenue and virtual via Zoom. Joining information can be found at www.nefrc.org.

GENERAL SUBJECT MATTER TO BE CONSIDERED: Regular Meeting.

A copy of the agenda may be obtained by contacting: (904)279-0880.

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: (904)279-0880. 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 BUSINESS AND PROFESSIONAL REGULATION

Board of Pilot Commissioners

The Board of Pilot Commissioners Pilotage Rate Review Committee announces a telephone conference call to which all persons are invited.

DATE AND TIME: January 5, 2022, 10:00 a.m.

PLACE: 1(888)585-9008, participant passcode: 491089625

GENERAL SUBJECT MATTER TO BE CONSIDERED: Consideration of a proposed agency action in the matter of an application for a change in rates of pilotage filed by the Palm Beach Pilots Association for the port of Palm Beach.

A copy of the agenda may be obtained by contacting: Board of Pilot Commissioners, 2601 Blair Stone Rd., Tallahassee, FL 32399, (850)717-1982.

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 Pilot Commissioners, 2601 Blair Stone Rd., Tallahassee, FL 32399, (850)717-1982. 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 Pilot Commissioners, 2601 Blair Stone Rd., Tallahassee, FL 32399, (850)717-1982.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

RULE NO.: RULE TITLE:

62-304.610 Hillsborough River Basin TMDLs

The Department of Environmental Protection announces a workshop to which all persons are invited.

DATE AND TIME: January 21, 2022, 10:00 a.m.

PLACE: Webinar Registration: <https://attendee.gotowebinar.com/register/5702189766903898896>

GENERAL SUBJECT MATTER TO BE CONSIDERED: To receive public comments on draft nutrient total maximum daily loads (TMDLs) for impaired waters in the Hillsborough River Basin, to be adopted in Rule 62-304.610, F.A.C. The draft TMDLs to be presented at the public workshop are for Lake Valrico (WBID 1547A) in the Hillsborough River Basin. These nutrient TMDLs, if adopted, will constitute site-specific numeric interpretations of the narrative nutrient criterion set forth in paragraph 62-302.530(48)(b), F.A.C., and replace the otherwise applicable numeric nutrient criteria in subsection 62-302.531(2), F.A.C., for this water. The draft TMDL document for this impaired water is available on the Department's TMDL website: <https://floridadep.gov/dear/water-quality-evaluation-tmdl/content/draft-tmdls>, and will be provided upon request to interested parties by mail or via email distribution. The Department will accept written comments on the draft TMDLs, as well as the establishment of these nutrient TMDLs as site-

C.6.2 / Advisory Committee Meeting #3 Summary

Note: Advisory Committee Meeting #3 was cancelled.

C.7 / Advisory Committee Meeting #4

C.7.1 / Florida Administrative Register Posting

of License By Means of Accreditation, Substantive Change Applications, Name Change Applications, Attorney and Executive Director Reports, Request for Variance, Applications for Exemption for Religious Colleges, Informal Hearings, Improper School Closure Reports, review and vote on application for recognition for Licensure by Means of Accreditation and the General Business of the Commission. Public Comment: The Commission is committed to promoting transparency and public input during its public meetings. Speakers are requested to complete a public comment form, which will be available at the meeting, and to indicate whether they represent a group or faction. The Commission will hear public comment only regarding issues on the agenda. Individuals and representatives of groups will generally be allotted three minutes, but the time may be extended or shortened at the discretion of the Chair. The Chair may impose a cumulative time limit for all public comment on any agenda item.

A copy of the agenda may be obtained by contacting: Commission Office at Commission for Independent Education, 325 West Gaines Street, Suite 1414, Tallahassee, Florida 32399-0400.

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: Commission Office at Commission for Independent Education, 325 West Gaines Street, Suite 1414, Tallahassee, Florida 32399-0400. 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: Commission Office at Commission for Independent Education, 325 West Gaines Street, Suite 1414, Tallahassee, Florida 32399-0400.

DEPARTMENT OF REVENUE

Property Tax Oversight Program

The DEPARTMENT OF REVENUE announces a public meeting to which all persons are invited.

DATE AND TIME: March 30, 2022, 2:00 p.m. ET

PLACE: 2450 Shumard Oak Boulevard, Building 2, Room 1220, Tallahassee, Florida 32399

The meeting will be conducted using communications media technology, specifically a telephone conference call. Persons interested in attending by phone may do so by calling 1(888)585-9008 and entering the attendee access code 617-774-

676. The public point of access to the meeting is 2450 Shumard Oak Blvd., Building 2, Room 1220, Tallahassee, Florida 32399. GENERAL SUBJECT MATTER TO BE CONSIDERED: The Department will present applications for the Certified Florida Appraiser, Certified Florida Evaluator and Certified Cadastralist of Florida designations. Please refer to the Certified Florida Appraiser Admissions and Certifications Committee meeting agenda and materials on the Department's website at <https://floridarevenue.com/opengovt/Pages/meetings.aspx> before attending the meeting.

A copy of the agenda may be obtained by contacting: Kelly McLane, Property Tax Oversight program, Department of Revenue, PO Box 3294, Tallahassee, FL 32315-3294, (850)941-6024, kelly.mclane@floridarevenue.com. Parties may also submit written materials they intend to offer during the meeting to Kelly McLane.

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: Kelly McLane at (850)941-6024 or kelly.mclane@floridarevenue.com. 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: Kelly McLane, Property Tax Oversight program, Department of Revenue, PO Box 3294, Tallahassee, FL 32315-3294, (850)941-6024, kelly.mclane@floridarevenue.com.

BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND

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

DATE AND TIME: Thursday, March 31, 2022, 1:00 p.m. – 5:00 p.m.

PLACE: This is an online meeting. Please join at <https://floridadep.gov/ncap-acm4/>.

GENERAL SUBJECT MATTER TO BE CONSIDERED: The Nature Coast Aquatic Preserve Management Plan Advisory Committee will hold their fourth meeting to develop and prioritize issues and strategies for the Nature Coast Aquatic Preserve Management Plan.

Meeting objectives:

- Continue development and clarification of goals, objectives and strategies for NCAAP management plan.

• Finalize issues for the NCAP management plan.
 A copy of the agenda may be obtained by contacting: Joy Hazell at jhazell@ufl.edu.
 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: Joy Hazell at jhazell@ufl.edu. 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 ELDER AFFAIRS
 Office of Public and Professional Guardians
 The Foundation for Indigent Guardianship announces a public meeting to which all persons are invited.
 DATE AND TIME: April 12, 2022, 10:00 a.m. – 12:00 Noon
 PLACE: Microsoft Teams Meeting.
 Join on your computer or mobile app by copying and pasting the link below in your web browser:
https://teams.microsoft.com/dl/launcher/launcher.html?url=%2F%23%2F%2Fmeetup-join%2F19%3Ameeting_MzY1OWE3YjgtZDIiNy00MjFkLWJiZmEtZWNiYWJjZTdiODQ1%40thread.v2%2F0%3Fcontent%3D%257b%2522Tid%2522%253a%2522f75a7744-d4bf-4623-8660-bcfa3569e2a0%2522%252c%2522Oid%2522%253a%252226c7b903-10d6-406a-86b5-b0263ee9aa9a%2522%257d%26CT%3D1646855202159%26OR%3DOutlook-Body%26CID%3D58EE1461-A579-4296-A703-98F5FB396BC0%26anon%3Dtrue&type=meetup-join&deeplinkId=7ebceaa9-2204-4581-919e-7643d75d5630&directDl=true&msLaunch=true&enableMobilePage=true&suppressPrompt=true
 GENERAL SUBJECT MATTER TO BE CONSIDERED:
 Board of Directors updates relative to the Foundation for Indigent Guardianship.
 A copy of the agenda may be obtained by contacting: Charles Alkire, via email at charles.alkire@verizon.net.
 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: OPPG at (850)414-2381. 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 BUSINESS AND PROFESSIONAL REGULATION
 Board of Accountancy
 The Board of Accountancy announces a public meeting to which all persons are invited.
 DATE AND TIME: Tuesday, March 29, 2022, 10:30 a.m.
 PLACE: 1(888)585-9008, Pass code number: 683213166#
 GENERAL SUBJECT MATTER TO BE CONSIDERED: The Budget Task Force will meet to discuss the Board's quarter financials.
 A copy of the agenda may be obtained by contacting: Angela Francis, (352)333-2505.
 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: Angela Francis, (352)333-2505. 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: Angela Francis, (352)333-2505.

DEPARTMENT OF HEALTH
 Board of Pharmacy
 The Board of Pharmacy Probable Cause Panel announces a public meeting to which all persons are invited.
 DATE AND TIME: April 7, 2022, 9:00 a.m. ET
 PLACE: 1(888)585-9008, Participant Code: 599196982(#)
 GENERAL SUBJECT MATTER TO BE CONSIDERED: The panel will conduct a meeting related to public disciplinary cases.
 A copy of the agenda may be obtained by contacting: www.floridaspharmacy.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 7 days before the workshop/meeting by contacting: (850)245-4474. 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).

C.7.2 / Advisory Committee Meeting #4 Summary

Nature Coast Aquatic Preserve Management Advisory Committee (MAC) Meeting

March 31, 2021

1 pm – 5 pm

Zoom

Meeting Summary

Overview

Thursday, March 31, 2022, the Nature Coast Aquatic Preserve (NCAP) Management Advisory Committee (MAC) convened for the fourth meeting. Due to Covid, the third meeting was cancelled, and input was gathered through a survey. Revisions were included in the updated draft of the management plan. Convener, Florida Department of Environmental Protection (FDEP), lead facilitator Joy Hazell and the NCAP process team designed and facilitated the meeting (Appendix A, Agenda).

The MAC members include state and federal government agency staff, University of Florida faculty, local business owners, and non-governmental organization employees, who attended the meeting (Appendix B, Meeting Participants/Management Advisory Committee). The meeting objectives were to:

- Build community and trust among group members
- Continue development and clarification of goals, objectives, and strategies for NCAP management plan

Welcome, Introductions, and Setting the Stage

The meeting began with participants sharing announcements for the good of the group. These included but were not limited to:

- The legislative budget for the NCAP 2022-2023 period was recently approved
- Adam Blalock, FDEP Deputy Secretary for Ecosystems Restoration, recently visited the NCAP and looks forward to assisting in the implementation of the management plan
- The SFWMD 2020 seagrass maps are up for the springs coast

Brief introductions were given for the benefit of new members and because the gap in time since our last meeting. We reviewed the overall project goals and timeline. Joy noted that the two public meetings, May 19 (Online) and May 24 (In-Person), will cover the same content. Holding these on different days and in different formats is intended to increase access to the public. Also, the final MAC meeting will be held in-person, tentatively at the Plantation Inn in Crystal River. We further reviewed the objectives and agenda for the current meeting and were reminded of the norms established by the group in a previous meeting (Appendix C, Group Norms).

Looking Back / Looking Forward

The NCAP Process Team (Appendix D, NCAP Process Team) expressed gratitude for the survey and other feedback received contributing to draft 2 of the management plan which the team will be working from today. Of note, draft 3 including today's feedback (and any received up to 3 days after this meeting) will be due to FDEP on April 12.

Participants were then put into small groups and given several minutes to discuss what has been accomplished so far in the process and what remains to be accomplished. Joy brought the group back together and asked each group to share a few comments, some of which are noted below.

- We have established a roadmap.
- The major issues have been outlined with goals and objectives.
- We should drive toward our aspirations in the plan.
- We have moved from sticky notes to a draft of the plan!

Other comments on the work left to be done were shared aloud and in the chat. These included fleshing out and/or fine tune some of the goals, strategies, and objective, including how we measure success, making sure not to harm the resource by making sensitive data public, and others.

For more detail around this activity or others during the meeting, please email Joy Hazell at jhazell@ufl.edu.

Joy reviewed some of the “big picture” items on the draft management plan based on feedback, these included:

- Moving from 7 issues to 4 issues (Note: The 3 “moved” issues: Seagrass, Education, and Research/Monitoring were redistributed among the 4 issues that remained. The content was not lost, only merged.)
- Red text, signifying items NOT within the purview of the aquatic preserve and in cases falling to other agencies, is no longer there but did not disappear. (Explained further by Jamie below.)
- There are still opportunities to “add” to the plan having completed the pieces in process and then being able to step back to determine if there are any “missing” items.

Jamie then reviewed draft 2 of the management plan with the group to ensure all were on the same page with the existing document before moving into the small group exercises. In doing this, she also explained how survey responses were included and changes/consolidations made. Notable, the items in red were only omitted from the “Issues” section of the plan (where MAC feedback is included) but remain a part of the overall management plan. Jamie noted that blue text will be where the MAC will want to focus additional attention first and that underlines & strikethroughs represent edits made. Examples, etc. may appear as comments and if not included this may be because the cutoff was missed for incorporating feedback into draft 2. (Of note, the 23-page document was taken down to 9 pages.)

In preparation for the day’s remaining group activities Mike reminded everyone to put any comments they wanted to share in the notes. He mentioned that FDEP will need to balance their available resources but also wants to inspire the team. He asked the group to keep both in mind – pragmatism and aspirations! Joy then broke everyone into two groups for about an hour with Group 1 led by Joy covering Water Resources and Human Dimensions. Group 2 with Savanna will then cover Climate Change and Submerged Aquatic Resources. A question was raised on the level of detail or specificity that that should be included in objectives. Earl recommended to include any options that might be considered. Another question was raised as to setting targets and thresholds as well as how to get to those. Earl noted that any roadmap or guidelines would be ideal. Mike added that the balance between general but specific may be key. Joy reminded all that the focus today is not on wordsmithing and that interest in that can be pursued outside of the larger group.

Small Group Activity – Approve, Improve, and/or Remove

Issues 1 and 2 were worked on by one group while 3 and 4 were worked on by the other, each reviewed strategies and objectives to “approve, improve, or remove” (Appendix E, Definitions of Terms). Each group also reviewed survey comments and looked to identify anything that was missing from the current draft.

The teams returned, took a break and reconvened for a second round in the same groups continuing discussion on the originally assigned issues. At roughly, 4 pm the two groups returned, and each group leader shared some of the items that were discussed by their respective group.

Report-out

Some of the items shared by Group 2, led by Savanna, (covering issues 1 & 2 - Climate Change and Protection/Management of Submerged Aquatic Resources) included:

- The group was able to complete an initial pass through both issue 1 and 2, including some rearranging
- They were able to consolidate some duplicated items and provide some specific examples for general strategies, i.e. types of data that could be collected
- They removed some but primarily improved and approved what was there
- Suggestions were added as to committees that could be included to ensure partnerships were successful, especially with upland connections
- They felt productive and had a lot of good dialogue

A question was raised on longer term timeframes/planning horizons for climate change. Savanna added that these suggestions were incorporated as well as other pertaining to habitat suitability modeling.

Some of the items shared by Group 1, led by Joy, (covering issues 3 & 4 - Water Resources and Human Dimensions) included:

- Also only having time to complete the two assigned issues, and having incorporated some of the verbiage recommended by Tom (particularly concepts of thresholds and triggers for action relating to the Water Resources issue)
- They had an extended discussion on “aspirational” vs. “pragmatic” as it relates to the management plan
- Ensuring that any reference to partnership would be with an entity that was in agreement or “on board” with the actions being referenced was discussed as well
- One objective was removed, others improved to provide opportunities for action and grants
- Poll and troll zones were discussed including where they might be appropriate, with the caveat of scientific assessment (do they work?) and stakeholder assessment (are they safe?)
- The establishment of a CSO (citizen support organization) or “friends group” being included in the plan in general vs. the issues section was discussed

A question was raised on hardbottom protections, going back to Group 2, if there were any spatially explicit management strategies planned. Savanna noted Keith’s contribution to this discussion and mentioned various options were included.

Note: The feedback provided today will continue to be incorporated as well as any feedback sent after the meeting. There will be another iteration or draft of the management plan circulated for feedback, more details below.

Public Comment

Preston, of the Florida Wildlife Federation, thanked everyone for being involved in seagrass protection. He shared three points on behalf of the federation, specifically that they 1) support the inclusion of Climate Change as a primary management plan issue looking at both the long and short term impacts to the system, 2) would like for the collection of actionable data on submerged resources, seagrasses mainly to be prioritized to ensure we have a baseline and know if it is growing or diminishing, and 3) would like penalties for violating the laws related to prop scarring and other aquatic preserve laws to be changed/increased to be more adequate (specifically Chapter 379).

Bruce, of the International Game Fish Association (IGFA), expressed their full support for the inclusion of Climate Change related management plans and noted they have seen dramatic effects from what is more often termed “Tropicalization” in the area. IGFA is part of a coalition with fellowships and have found species moving north, i.e. snook, and these patterns can have dramatic impacts on the local environment in terms of predator-prey relationships and the food web as a whole. They would also like to see a system in place with science-based thresholds which once crossed, would trigger management actions. This would require sound monitoring programs and IGFA feels that public stewardship opportunities could be

helpful to management toward this goal and for the health of the resource long term. Regarding poll and troll zones, IGFA has advocated for these in the past in the Everglades, however, this needs to be based on sound scientific studies that show there is a benefit and will help that environment recover (should not be used randomly).

Rob representing Wild Oceans, a group of conservation minded recreational fisherman, recognized the committee for their work in developing the management plan. He noted that Wild Oceans is excited about the preserve and encouraged by what they are seeing and hearing. He then echoed the sentiments shared by other members of the public in supporting Climate Change as a primary management plan issue along with the inclusion of appropriate adaptive management strategies. Rob noted that shifting stocks, sea level rise, predator-prey relationships, and ensuring coastal resilience are of particular interest to Wild Oceans. He also asked that the collection of existing submerged habitat data be prioritized, with an emphasis on clearly defined thresholds that would trigger adaptive management strategies as necessary to support the long-term health of the resource. Rob closed by adding that Wild Oceans agrees this is an opportunity to develop a strong and useful citizen support organization. He noted that currently many such groups are effectively being used around the state and that there is even the potential to have one in each of the counties – a mechanism for community outreach, a way to harness volunteer capacity, and also to develop a sense of ownership in the resource!

suggested that there is the opportunity for creation of a CSO in each county.

Closure and Next Steps

Joy noted that the group will receive a meeting report in roughly two weeks and that this distribution will include a copy of draft 3 of the issues chapter of the management plan which is due to FDEP by April 12. Any additional comments made within 3 business days from today's meeting (April 5 at 5 pm) will be included in that draft. Additional comments can still be made on the next draft and will be incorporated for draft 4.

Again, the future meetings on May 19 (Online) and May 24 (In-Person) are public meetings (each approximately 6pm - 8 pm). If the MAC can join both (at least partially) so that you are able to hear comments from the public it will be helpful as we move forward in incorporating those into draft 4, the final draft. Please also advertise the public meetings through your networks. The in-person public meeting and the last MAC (May 26, 10 am - 3 pm) meeting are both tentatively planned for the Plantation Inn in Crystal River. Once this is confirmed and additional notification will go out. A field day or site visit may be organized for May 25 for those who prefer to stay over. Earl added that the last MAC meeting is not the last public meeting for the management plan. There is a chain of events/meetings before final approvals with the Board of Trustees. Joy will circulate that in her email tomorrow with the other details on providing additional feedback and the above referenced meetings.

This closed the meeting.

Participant List

First Name	Last Name	Role	Organization
Thomas	Ankersen	Committee member	University of Florida
Savanna	Barry	Subject matter expert	University of Florida/IFAS/Extension
Melissa	Charbonneau	Committee member	Pasco County
Cheryl	Clark	Subject matter expert	Department of Environmental Protection
Morgan	Edwards	Subject matter expert	University of Florida
Justin	Grubich	Committee member	Pew Charitable Trusts
Jamie	Hammond	Subject matter expert	University of Florida
Joy	Hazell	Lead Facilitator	University of Florida/IFAS/Extension
Chris	Holland	Committee member	Duke Energy
Timothy	Jones	Subject matter expert	Department of Environmental Protection
Frank	Kapocsi	Committee member	Homosassa River Alliance
Joyce	Kleen	Committee member	U.S. Fish and Wildlife Service
Keith	Kolasa	Committee member	Hernando County
Rob	Kramer	Member of the public	Wild Oceans
Anna	Laws	Committee member	Florida Fish and Wildlife Conservation Commission
Charles	Morton	Committee member	Hernando Waterways Advisory Committee
Earl	Pearson	Committee member	Florida Department of Environmental Protection
Kristie	Perez	Co-Facilitator	University of Florida
Bruce	Pohlot	Member of the public	International Game Fish Association
Laura	Reynolds	Subject matter expert	University of Florida
Barbara	Roberts	Committee member	Florida Department of Environmental Protection
Preston	Robertson	Member of the public	Florida Wildlife Federation
Michael	Shirley	Subject matter expert	Florida Department of Environmental Protection
William	Toney	Committee member	Recreational Fishing Guide
Madison	Trowbridge	Committee member	Southwest Florida Water Management District
Marnie	Ward	Committee member	University of Florida/IFAS/Extension
Coleen	Weaver	Committee member	Pasco County BOCC

NCAP Process Team

Name	Agency	Role	Email
Michael Shirley	Florida Dept. of Environmental Protection	Subject Matter Expert	Michael.Shirley@dep.state.fl.us
Earl Pearson	Florida Dept. of Environmental Protection	MAC Committee Member	Earl.Pearson@dep.state.fl.us
Cheryl Clark	Florida Dept. of Environmental Protection	Subject Matter Expert	Cheryl.P.Clark@floridaDEP.gov
Joy Hazell	UF/IFAS/Extension	Lead Facilitator	jhazell@ufl.edu
Savanna Barry	UF/IFAS/Extension	Subject Matter Expert	savanna.barry@ufl.edu
Laura Reynolds	UF/IFAS/Soil and Water Sciences	Subject Matter Expert	lkreynolds@ufl.edu
Jamie Hammond	UF/IFAS/Extension	Plan Editor	jmelyn1987@ufl.edu
Kristie Perez	UF/IFAS/SNRE	Co-facilitator	kristieperez@ufl.edu

C.8 / Public Meeting #2 and 3

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

C.8.1 / Florida Administrative Register Posting

DATE AND TIME: May 12, 2022, 11:00 a.m. EST
PLACE: Telephone Conference Call Information:
Call-In Number: 1-888-585-9008
Participant Code Number: 139-523-300
GENERAL SUBJECT MATTER TO BE CONSIDERED:
Financial Appropriations, Recipient Reports, Budget and
Funding Requests, Council Recommendations, and General
Research Discussions.
A copy of the agenda may be obtained by contacting: Kandi
Futch at 863-578-1946 or Kandice.Futch@FDACS.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 5 days before the workshop/meeting by
contacting: Kandi Futch at 863-578-1946 or
Kandice.Futch@FDACS.gov. If you are hearing or speech
impaired, please contact the agency using the Florida Relay
Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).
If any person decides to appeal any decision made by the Board
with respect to any matter considered at this meeting or hearing,
he/she will need to ensure that a verbatim record of the
proceeding is made, which record includes the testimony and
evidence from which the appeal is to be issued.
For more information, you may contact: Kandi Futch at 863-
578-1946 or Kandice.Futch@FDACS.gov.

BOARD OF TRUSTEES OF THE INTERNAL
IMPROVEMENT TRUST FUND
The Florida Department of Environmental Protection's Office
of Resilience and Coastal Protection and the University of
Florida announces a public meeting to which all persons are
invited.
DATE AND TIME: Thursday, May 19, 2022, 6:00 p.m. – 8:00
p.m.
PLACE: This is an online meeting. Please register at
<https://floridadep.gov/ncap-meeting2>
GENERAL SUBJECT MATTER TO BE CONSIDERED: The
Florida Department of Environmental Protection's Office of
Resilience and Coastal Protection is holding a public meeting
to present the draft Nature Coast Aquatic Preserve Management
Plan to the public for their review and feedback. Information on
the Nature Coast Aquatic Preserve can be found at
<https://floridadep.gov/rcp/aquatic-preserve/locations/nature-coast-aquatic-preserve>. The management plan is available at
<http://publicfiles.dep.state.fl.us/CAMA/plans/Nature-Coast-AP-Management-Plan-DRAFT.pdf>.
Members of the Nature Coast Aquatic Preserve Management
Plan Advisory Committee have also been invited to attend and
listen to comments, and may also participate in the discussion.
There is an additional opportunity to comment in an in-person
public meeting on May 24, and there will be an advisory

committee meeting on May 26 to review comments from both
meetings and the management plan.
A copy of the agenda may be obtained by contacting: Joy Hazell
at jhazell@ufl.edu.
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: Joy Hazell at jhazell@ufl.edu. 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).

BOARD OF TRUSTEES OF THE INTERNAL
IMPROVEMENT TRUST FUND
The Florida Department of Environmental Protection's Office
of Resilience and Coastal Protection and the University of
Florida announces a public meeting to which all persons are
invited.
DATE AND TIME: Tuesday, May 24, 2022, 6:00 p.m. – 8:00
p.m.
PLACE: Plantation Inn, Magnolia Room B, 9301 West Fort
Island Trail, Crystal River, FL 34429
GENERAL SUBJECT MATTER TO BE CONSIDERED: The
Florida Department of Environmental Protection's Office of
Resilience and Coastal Protection is holding a public meeting
to present the draft Nature Coast Aquatic Preserve Management
Plan to the public for their review and feedback. Information on
the Nature Coast Aquatic Preserve can be found at
<https://floridadep.gov/rcp/aquatic-preserve/locations/nature-coast-aquatic-preserve>. The management plan is available at
<http://publicfiles.dep.state.fl.us/CAMA/plans/Nature-Coast-AP-Management-Plan-DRAFT.pdf>.
Members of the Nature Coast Aquatic Preserve Management
Plan Advisory Committee have also been invited to attend and
listen to comments, and may also participate in the discussion.
There is an additional opportunity to comment in a virtual
public meeting on May 19, and there will be an advisory
committee meeting on May 26 to review comments from both
meetings and the management plan.
A copy of the agenda may be obtained by contacting: Joy Hazell
at jhazell@ufl.edu.
Pursuant to the provisions of the Americans with Disabilities
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agency at least 48 hours before the workshop/meeting by
contacting: Joy Hazell at jhazell@ufl.edu. 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).

C.8.2 / Meeting Summary

Nature Coast Aquatic Preserve Management Plan Development Public Meetings May 19th and 24th, 2022

Meeting Report

Overview

The Nature Coast Aquatic Preserve (NCAP) management plan development process convened two public meetings to gather input on the Management Plan. The first was May 19th, 2022, on zoom and 60 people attended that meeting. The second public meeting was May 24th, 2022, in person and 26 people attended. Convener, Florida Department of Environmental Protection (FDEP), lead facilitator Joy Hazell and the NCAP process team designed and facilitated the meeting (Appendix A, Agenda).

The meeting objectives were to:

- Build community and trust among group members.
- Gather input to the Nature Coast Aquatic Preserve Draft Management Plan

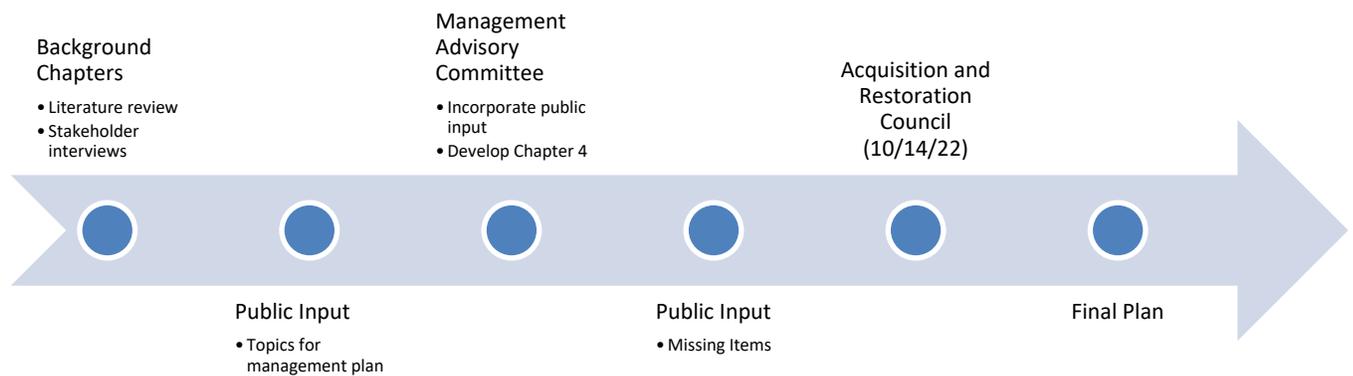
Welcome and Introductions

The meeting began with introductions of the NCAP process planning team, management advisory council and members of the public who were asked their interest in the NCAP. The facilitator clarified the management plan process development goals:

- To engage NCAP stakeholders in the development of the 10-year management plan
- To form an advisory committee who will identify issues, goals, objectives, and strategies for NCAP management plan
- To build community support for the NCAP

Presentations

To create a shared understanding an aquatic preserve designation, management plan development process, and the role of the public in providing input into chapter 4 of the management plan two presentations were given by members of the NCAP process team (for copies of the presentations please contact Joy Hazell, jhazell@ufl.edu). In addition to the contents of the draft plan, the public was given an overall timeline of the project (figure 1.)



(Figure 1. A timeline of the NCAP management plan development and approval process)

Public Input on the Plan

After the presentations participants were split into four small groups, each of which had it's on facilitator/notetaker. Participants were given or shown a copy each issue in Chapter 4 and were asked if anything was missing from each issue. The participants' input is recorded below and sorted by chapter, priority comments, already incorporated into the plan, outside of the NCAP purview and general comments.

Issue One: Water Resources

Priority Comments

(content provided by the Public that MAC should address first, based on time constraints)

1. Adaptive – shift sites to get info/catch changes
2. Grants for citizen monitoring – sea grant?
3. Plankton monitoring
4. Carbon in sediment - holding more sugars
5. What happens/monitoring, what triggers action
6. Lacking info on soil and substrate below the preserve.
7. Establish background data on soil and substrate
8. Goals of the plan should be to establish baselines of water quality, quantity, submerged resources, and soils
9. There definitely needs to be an educational outreach component to this. Since this is one of the last 'true Florida" ecological areas, it's important to get students out there to see that.

10. (Bonefish Tarpon Trust) Support for understanding the baseline. Critical to understand changes and address them.
11. (BTT) Knowing what's there and what's needed is critical. Knowing what needs there are for support groups/partners to advocate for (specific as possible) is most helpful for stakeholders
12. Students and families, professors/teachers collecting data and doing studies and providing information - volunteer data collection that is organized
13. include identifying new/emerging technologies to gather data more easily & cost effectively (to streamline future process) - i.e., that broader areas, potentially without staff, etc.
14. include action steps when degradation is detected
15. Great deal of discussion on needs for identification in WQ tasks, can we add more specific language around protection tasks related to WQ?
16. What about language for improvement of WQ (over preservation)?
17. is there an established database to bring together the different WQ efforts/data for easily access? (If not consider building off UF WQ database?)

Incorporated in Plan

(content present in Chapter 4 as Integrated Strategies or Performance Measures)

look at partnering with existing WQ monitoring programs?

Citizen science

Civic involvement 5 – 21 years

Upland connections – road construction, have these issues been rectified

Oversight of construction permit

Signage re types of boats/motors that can go in certain areas

ID/Include adjacent business

TMDLs

Citizen science – RBNERR model

Partner with county commission

Saltwater intrusion/septic/stormwater monitoring

Outside AP Purview

(content previously discussed by MAC and OMITTED as part of the Issues section, or outside AP purview)

Would like to see SWFWMD be more proactive with sharing their monitoring results

Analyze the improvements from the septic to sewer project in Citrus
Retaining pond feeding fish kills in Homosassa
Scallop monitoring
Oyster monitoring
Water quality sampling for smaller creeks
Decrease fertilizer
Exotics Ozello mangroves choked with Brazilian pepper – citizen involvement help for public
Trends and changes – SWFWMD MFLs keep increasing water being taken out of springs
Watershed plan for tri-county – tie watersheds to share info, watershed planning body, partner w/agencies, partner broader watershed
scallopers go every day and get limit

General Comments

Very concerned about salinity increasing and springs reversing flow
love the students being actively involved...funding for both!
I think the uplands connection is important. If there's a way to coordinate springs protection and NCAP. That would be helpful.
Possible dead zone forming in NCAP?
Possible emerging contaminants affecting people
The water source within a canal system such as Hernando Beach, Sea Pines, and Hudson are primarily from the Gulf so it would seem logical that any pollution (or nutrient) discharge into the waters would be within the overall concern to the NCAP. However the jurisdiction would probably be with DEP
The Weeki Wachee is already an Outstanding Florida Waterway so I believe here is policy in place that protects the water quality. It is beyond the purview of the NCAP but cooperation with DEP and SWFWMD should be a given.
explicitly state that we will work with other APs
clarify boundaries as well as other agencies
Suggest Hernando County as base for NCAP
Prioritization is critical (as early as possible) - Overall & with each issue, otherwise more goals and objectives will not be achieved
there are multiple preserves and other protected areas and it is not clear if all areas in between are being protected, for example (3Ws)
Wawa filled spring
Inland water quality affect sea grass
Wake an issue
SWFWMD – not proactive w/ sharing data with stakeholders
How do we determine if current sampling is sufficient
Is monitoring enough to determine if goals are being met?
Only get peoples attention when close beaches
Red dye in mulch – what is it

Issue Two: Protection and Management of Submerged Resources

Priority Comments

(content provided by the Public that MAC should address first, based on time constraints)

1. Protect = education and enforcement...as well as protect, not anchoring on sensitive habitat, not collecting prohibited species
2. Would love to see language about cultural resources. Applicable to monitoring and getting baseline data and educating law enforcement - add cultural resources with all of these things
3. What do we mean by protect hard bottom communities?
4. Identify, map and mark and/or remove/relocate large rocks for recreational boaters for navigational safety.
5. (BTT) Key to understanding is the baseline of where we are on the habitat components. At a minimum we need to maintain seagrass and hardbottom (Preston seconded)
6. I think you'll need a significant education component in addition to enforcement on the prop scarring issue. This goes back to the communications plan for the roll out (and ongoing info).
7. Look into increasing the penalties for propeller scarring, the present penalties are not stopping the damage
8. Pole and troll zones - there is a push to try to establish these in areas of high damage around St. Martin's Keys
9. prop scarring - are there going to be rules and regs about jet drives, propeller guards to prevent scarring
10. FWC Conversation: 1) More FWC, 2) Coordinating with FWC to make sure we have names and contacts for officials in enforcement (Preston seconded), 3) I also agree with increasing FWC officer presence. 4) FWC are good partners but they have very limited resources, only 2 officers patrolling at any one time is not enough
11. Tour operators as first line educators
12. Vacation rentals – place for education on aquatic preserve
13. Strategy – hot spot plan for restoration – identify areas to restore and have a plan to take advantage of grants or tap into compensatory mitigation projects
14. Education in schools including upland areas
15. Develop plan for school education

16. Merit badge program for boy scouts
17. Connect with STEM coordinator in schools to get Aquatic Preserve information into schools
18. Include invasive species management
19. Grant research on uses of Brazilian pepper to incentivize removal
20. Include invasive species management
21. Have actions for when invasive species are identified
22. Laminated instructions in all rental boats/public ramps – what lives in seagrass, don't tear it up, sponge community
23. Share example education programs across counties
24. Tour guides/operator/fishing guides use or are required to use power pole as example
25. Education of next get/new citizens/boaters/rental boaters and Education in public schools about what is under water
26. Florida Heritage Monitoring Scouts - partnership with APs statewide. Is an opportunity for partnership to document and identify, pre-established program. Avenue for cultural resource goals
27. sunshine law doesn't apply to prehistoric cultural resources
28. Cultural resource mapping disclosure - Could ask for legislative exemption for those.
29. utilize established partnerships such as with BBSAP and the Florida Public Archaeology Network...regarding monitoring of cultural resources. Rather than the idea of protection we should seek more to monitor changes over time
30. Are there currently any plans in place to investigate the historical resources that are submerged?
31. How do we measure if goals or objectives are achieved? (Any strategies that do not have a timeline or achievable measure should be updated)
32. Concern: Law enforcement of shrimping related to location (because at night & close to coast - no enforcement) / Additional concern that their equipment is damaging bottom (not performing to specifications)
33. Especially important to cross-sectors (agencies, government, municipality, etc.) to achieve desired results
34. Consider that seagrasses are being lost in other parts of the state making this area more important. Should expansion be a goal. Recognizing relationship with nutrient pollution
35. How much of the preserve has been mapped?

Incorporated in Plan

(as Integrated Strategy or Performance Measure)

Law enforcement supervision during scallop season for environmental and human safety

Better marking of areas

Goal 5/Obj 1 – great objective but how will it be done

Understand and if necessary address boat anchoring and people getting out of boat into resource

Evaluate if there is enough law enforcement

Mangroves should be included in Issue 2

Include underwater archeological sites

Ways to reach county commissioner – engagement plan

Outside AP Purview

content previously discussed by MAC and OMITTED as part of the Issues section,
or outside AP purview)

Is fisheries included in the submerged resources? What types of marine life are included? What about bivalves and other species? (tied to mapping question also)

Marine mammals aren't part of the goal

General Comments

Need to map, understand, protect, educate, enforce etc.

if there are additional needs for mapping or other programs making specific needs known to partners will help them advocate for them (Preston seconded)

Any time \$ to be made off natural resources, mother nature loses, need to strike a balance

Pollution, springs collapsing, or even trying to restore parts of the preserve could effect historical and cultural resources there. I just hope someone records the historical and cultural resources there before anything is changed.

I understand that this plan is to protect and preserve the natural recourses, but has anyone considered that a change in the chemical composition of the water or soil could damage the historical resources there?

Education is most important

Without increased funding for Law enforcement things won't get accomplished

Documentary on NCAP – channel 3

Require boaters to have license

College level requirements in environmental classes

31 years ago – lot less people

Salinity - would like to know the changes in the salinity in the past 30 years and effects on springs, manatee drinking water

Would like to see FWC have a partnership with commercial fishers to find out more about what is really happening out there - collecting knowledge/data from commercial fishers about concerning patterns (example: dolphin behavior after oil spill)

are there reductions in larger fish being landed in the area?

very frustrated at the degradation of natural resources in this generation, springs are collapsing.

spotlights / bright lights affecting birds - light pollution an extremely concerning aspect

Issue Three: Climate Change

Priority Comments

(content provided by the Public that MAC should address first, based on time constraints)

1. CC w/SLR can affect cultural resources as well so make it specific.
2. Use cultural sites as part of the baseline data - pick areas they want to track that are on or near a cultural site.
3. As SLR increases - the hydric soils are encroaching into uplands that is making habitat for invasive and mangroves - any interaction with DEP to address the new habitat for mangroves where people hadn't had to deal with it before
4. Think about food webs/impacts on other species associated with tropicalization (snook)
5. Integrate disaster mitigation/recovery plans from counties - Develop one for NCAP – necessary for FEMA money, may include property buyout, include vessel removal after hurricane
6. Fish kills are an issue, need to clean up quickly – work with other agencies
7. Accurately define high tide mark – regularly reassess
8. Monitor shoreline changes including island size
9. Improve tide models
10. Stringent policies on seawalls, promote living shorelines
11. Sawgrass restoration projects for shoreline stabilization
12. Use EDNA for monitoring
13. Effective publicize findings
14. Track changes including tree loss due to salt water intrusion plus invasive species
15. Work with local landowners to establish salt marsh corridors - habitat modeling and floodplains.
16. modeling to identify areas where living shoreline projects would be most effective
17. Monitor for any invasive species moving north with tropicalization
18. Also coordinate with NOAA on monitoring/modeling/predictions.
19. Impacts from storms/hurricanes is not mentioned here
20. High tide and nuisance flooding, winter storms/fronts also could be a focus
21. Baseline is key here.
22. performance metrics should include vulnerability assessment if feasible

23. How are we partnering with others that share our same watershed? (And taking into account what is happening around us)

24. What will be done about it? i.e. can we include somehow actions to be taken in mitigation of climate change by AP and/or citizens/supporters

Incorporated in Plan

(as Integrated Strategy or Performance Measure)

Include schedule, how often it will be done

Look for guidance broadly – DEP resources, look outside of FL including NOAA

Include tracking stony coral tissue loss disease

Collaborate with FWC to include animal migrations (ex manatees, pythons)

Collaborate with more universities, not just UF

Collaborate with folks working in upland adjacent area and springs flow

Address boat activity impacts on living shorelines/erosion

Marsh needs room to migrate, may need to work with other agencies

Outside AP Purview

(content previously discussed by MAC and OMITTED as part of the Issues section, or outside AP purview)

Major concern about invasive species that are sold in Florida - plants and aquatic species. Plant nurseries frequently have invasive plants for sale, that should be addressed

Monitor spring flow

Increase Brazilian pepper management

Eelgrass restoration projects

Deal better with flooding including stormwater management

Include canals, use oysters to deal with nutrients

Use nutrient/fertilizer bans

Increase hog management

General Comments

assisted evolution for species to be more resilient to changes in our environment

Determine accuracy of data and use it to solve problems – simple plan

Climate change is a charged term – protect, restore, retain infrastructure/natural resources

Tides are stronger – monitor as part of SLR

Monitor sunny day flooding

Mangrove type matters – monitor changes

Goals should include action, not just documenting, ex super corals can survive hot water, oysters tolerant of salinity, ex. Collaborate with university

Educate property owners, promote living shorelines

Signage/infrastructure should be able to withstand storms

Issue Four: Human Dimensions

Priority Comments

(content provided by the Public that MAC should address first, based on time constraints)

1. Goal three is really education, marking, enforcement, that is how you get things done
2. Goal 3 mentions restoration but obj and strategies are all focused on reduction, not restoration
3. Goal 3 – identifying areas and assessing severity – we already know river mouths are hot spots and scallop season is a major driver. Length of season too long? – boater/scalloper education, they prefer low tide – grass beds with motor down and leave prop scars
4. Cross reference info with USCG area contingency plan
5. Mention cultural resources - can be well put in with the planning for future impacts and law enforcement training
6. Monofilament recycling/collection tubes at access points – also access points have trash cans
7. Poster w/proper scar and the bill for boat damage and show people what lives in seagrass
8. Boater safety adding more environmental information about prop scarring and other impacts
9. Make a video similar to “manatee manners” for seagrass/boating rental and boat sales distributors
10. Promote more community involvement – especially youth
11. Specific list of partners and their expertise where they can best help – needs leadership/community involvement
12. GIS layer that FL master site file has for specific land management area that has all known sites - Rachael Kangas
13. Sit in on USCG area contingency plan group and they talk about damage to env. and shore features as a result of vessel accidents etc. can you get mitigation for resource damage?

14. Is there a baseline for trash collected at individual places? How much trash and what is the trend?
15. Working more with youth on environmental awareness and stewardship
16. 90-day scallop season, huge number of boats, leading to seagrass scarring. Need to get a balance between scallop season and preventing seagrass scarring. Perhaps shortening season
17. Create a mooring ball field in the scallop grounds
18. Work closely with NOAA/FWC Marine Debris Programs.
19. Chuck Morton has ideas signage / education material for boating / prop scarring
20. Are monofilament recycling bins still in use? (Answer: Yes. Sentiment: Could/should there be similar receptacles for other debris? i.e. all actions make a difference)
21. Does this prevent counties from submerging items to be used as fish attractors?
22. What about installing baffle boxes that catch nutrients & trash before it gets into the water? Is there anything in the plan covering prevention? (even from a partnership perspective)

Incorporated in Plan

(as Integrated Strategy or Performance Measure)

Road construction overnight

Other industries – leeching/mining

Spring flows and MFL considerations – additional weight should be given to waters flowing into an AP – spring water bottling concerns

Outside AP Purview

(content previously discussed by MAC and OMITTED as part of the Issues section, or outside AP purview)

Upland - rain gardens, rain barrels, proper management of stormwater definitely should address

What is upland does not stay upland - work to solve pollution/trash issues before it gets downstream

Many septic tanks may be below mean high tide elevation wide – NCAP purview

Ridge road (Pasco) impact on upland areas is huge – 4 lane road to I75 or I4

Pasco county – Moffit center medical complex development, need to ensure correct water management

Lawns and run off/fertilizer missing

Septic tanks and stormwater run off

Mangrove cutting/trimming illegally esp. new residents

General Comments

And education, education, education...

Invasive species spreading by gear/equipment

Rental boats/education – follow routes they should not go

Promote poll/troll areas in heavily impacted areas like St. Martins keys

Citations from FWC are no more than traffic violation – very low cost to boater, may not be a deterrent, some just consider it “cost of day on the water”

Like idea of working with decision makers – specificity to say is this meeting attendance at BOCC or is it getting commissioners on the water which would be best

Maybe restoration plan would help focus projects

In the keys (FK Comm fishing) partner with FWC/State to go collect derelict gear

Groups of divers good partners, things like lionfish roundups

Septic tanks in Hudson lead to beach closures, fecal coliform, county was going to remove but so far hasn't

Viruses from septic tanks in Chaz – USF study early 2000s – polio/enteronius found) started to look more at sewer after that

Legacy of old/not raised septic systems – replacements/upgrades planned?

Preserve should be focused on connection to sewers becoming available in crystal river, Homosassa

BOCC – wastewater treatment, compel sewer connection

BMAP involvement – some of this falls under Priority Focus Areas, could help with ordinances

Marine debris is mostly coming from upland sources so should just focus on debris in general

Villages – water pumping/development Pasco/Hernando

Evaluate if there is enough LE

Many derelict vessels sit for a very long time and no action is done

I think these are good goals

Is there a possibility of unknown uses of seagrass like direct harvest for human consumption causing decline?

Piney Point and other disaster incidents - what can actually be done about these? very frustrating - are we wasting our time?

enforcement of impacts to seagrass is essential / key for success

Boating impacts with wildlife...manatees, sea turtles. Work with FWC

Closure

After all the comments were received from participants the whole group reconvened and the facilitator of each small group provided a summary overview of their group's discussion. Participants were then reminded of the timeline for receiving public comments and final approval of the NCAP management plan.

C.8.3 / Additional Public Comments

Nature Coast Aquatic Preserve Management Plan Additional Comment Input By June 9th, 2022

Note: These comments were received by the Florida Department of Environmental Protection outside the scheduled formal meetings by the D E P set deadline of June 9th, 2022.

- 1) Comments from SWFWMD were provided by external USB drive at the close of the Management Plan Advisory Committee Meeting #5 due to large file size. These comments were text and content suggestions for the background information portions of the plan. Most of the focus was on the Withlacoochee River flows and watershed. Appropriate content edits were accepted and made to the final draft of the NCAP Management Plan by UF in the final Draft submission.
- 2) Keith Kolasa - Hernando County Dept of Public Works – Aquatic Services: Paper copy of the suggested edit to one sentence of the plan was provided to UF at the close of the Management Plan Advisory Committee Meeting #5. Edit was incorporated to the final draft of the NCAP Management Plan by UF in the final Draft submission.

From: Hammond, Jamie L
Sent: Wednesday, June 15, 2022 9:25 AM
To: Hammond, Jamie L
Subject: FW: Nature Coast Aquatic Preserve Management Plan Comments

From: Wellendorf, Nijole "Nia"
<Nijole.Wellendorf@FloridaDEP.gov> Sent: Thursday, June
9, 2022 1:47 PM

To: Pearson, Earl <Earl.Pearson@FloridaDEP.gov>

Subject: FW: Nature Coast Aquatic Preserve Management Plan Comments

Hi Earl,

A few DEAR staff reviewed the draft Nature Coast AP Management Plan. We specifically reviewed text related to impairment status, TMDLs, or BMAPs, but had a few other comments as well. I've included the identify of who made the comment to provide context and a follow-up contact if you wish to follow up.

From Talia Smith, Standards Development Section:

As part of a public scoping meeting (notes on page 187), an older version of our OFW factsheet was shared with the public. For future references to the OFW factsheet, please direct people to our webpage that will always have the most up-to-date version <https://floridadep.gov/dear/water-quality-standards/content/outstanding-florida-waters>.

From Moira Homann, BMAP group:

I looked at the language pertaining to BMAPs (where they also mention the TMDLs) and everything looks good – it's language taken straight out of the BMAP documents for those three springsheds. So no comments on our end as far as those sections.

From Jessica Mostyn and Evelyn Becerra, Watershed Assessment Section:

We didn't have any specific corrections on the listing or impairment status of waters in the Nature Coast AP Management Plan because the report doesn't appear to address listing status. The report contains TMDL and BMAP information on the areas of the region that have a BMAP. It discusses the TMDL reductions and BMAP loading calculations (using the Nitrogen Source Inventory Loading Tool) for the Crystal River/Kings Bay, Homosassa River, Chassahowitzka River, and Weeki Wachee River basins but does not discuss the nutrient loadings or TMDL reductions for waters flowing into the AP region outside of a BMAP region, such as the Tampa

Bay/Anclote River or Withlacoochee River basin.

There are additional TMDLs in the region that they could delve into and many waters not meeting standards that they could address, but they are placing an emphasis on BMAP regions. I think this must be because one of their main mission statements is restoration but they also have a goal of providing water quality assessments. They may want to reference or link the WNAS layer impairments as a way to tie in our ongoing assessment activities in DEAR. Kevin noted, "I think we phrase it that there are additional impairments that may lead to new TMDLs and/or options for ARPs. I think it would be good to note the TMDL prioritization too as a bullet point as an ongoing DEP process."

We did also notice the document mentions "aboriginal" twice when it should perhaps use "indigenous peoples" because aboriginal is generally perceived as insensitive. In the document the glossary definition for aboriginal is "the original biota of a geographical region," which may be a typo of some sort. At one point they list out the first magnitude streams in the region and left Tarpon Springs out but I thought it was also a first magnitude spring according to our Florida Springs layer.

Thanks for the opportunity to review!



Nia Wellendorf

Program Administrator

DEAR Water Quality Standards Program

Florida Department of Environmental
Protection Office: 850-245-8190

Cell: 850-694-1592

Nijole.Wellendorf@FloridaDEP.gov

From: Hammond, Jamie L
Sent: Wednesday, June 15, 2022 9:24 AM
To: Hammond, Jamie L
Subject: FW: comments on Nature Coast Aquatic Preserve Management Plan Draft

From: Christian Wagley
<christian@healthygulf.org> Sent:
Thursday, June 9, 2022 6:48 PM
To: Pearson, Earl <Earl.Pearson@FloridaDEP.gov>
Subject: comments on Nature Coast Aquatic Preserve Management Plan Draft

EXTERNAL MESSAGE

This email originated outside of DEP. Please use caution when opening attachments, clicking links, or responding to this email.

Hello Mr. Pearson:

Healthy Gulf is a diverse coalition of individual citizens and local, regional, and national organizations committed to uniting and empowering people to protect and restore the natural resources of the Gulf of Mexico. One of our priority focus areas is on maintaining and improving the health and resiliency of coastal systems such as wetlands, seagrass beds and waterways.

On behalf of our members and supporters in Florida, we wish to comment on the Nature Coast Aquatic Preserve Management Plan Draft. We are incredibly excited about the opportunity to ensure the protection of this incredibly special place, which is significant not only for Florida but also across the Gulf of Mexico region as the Preserve supports the largest seagrass bed in the Gulf region.

We find the plan to be based in science and to include sound strategies and goals for science, management and education. We offer the following comments on specific referenced sections:

Issue One: Water Resources

Goal One: Assess and define water quality and quantity monitoring needs. Goal Four: Emphasize upland connections.

We ask that you prioritize this goal, as the protection of the Preserve's resources will depend on careful management of what happens on land, across the watersheds that drain to the Preserve. The greatest threats to the health of the Preserve are most likely to come from activities on land, rather than in the water. Concentrating land development in a few select areas that can accommodate additional growth, while

preserving the remaining areas in their natural state, will be critical.

Issue Three: Climate Change

We recommend that the Plan include specific reference to the need to communicate the impacts of climate change on the Preserve to surrounding communities. And to include recommendations for Florida and the nation to reduce greenhouse gas emissions in order to limit the worst impacts of climate change on the Preserve in the decades ahead.

Crystal River Mariculture Center

We recommend that efforts to stock aquatic species be deemphasized. These programs have had difficulty showing positive impacts, especially in the case of finfish. Furthermore, finfish stocking continues to suffer from inherent differences between hatchery and wild fish, including a lower fecundity in hatchery fish.

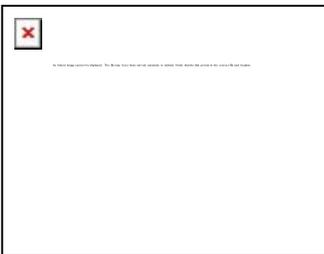
Public Use Issue Issue Four: Human Dimensions

Goal Two: Promote diverse, sustainable use of the aquatic preserve's submerged natural resources

Improvements that increase access to the Preserve should favor non-motorized form of recreation, such as small launch areas for human-powered craft such as kayaks and paddleboards. While education, markers and signage can help some with reducing impacts to seagrass beds by motorized vessels, they are only partially effective.

Additionally, because these vessels operate on fossil fuels, they are constant sources of direct surface water pollution whenever they are underway. Limiting access of large motorized vessels to the preserve by limiting the development of boat ramps and marinas is critical to maintaining the health of the seagrass beds and the entire Preserve. Once large numbers of motorized vessels frequent an area, the combined effects of discharge of petroleum/oil, noise, prop scarring, shoreline damage from wakes, turbidity from vessel movement and wakes can overwhelm and damage natural resources and public enjoyment of waterways.

Thank you very much for considering our comments.



Christian Wagley

(he/him/his)

Coastal Organizer,

Florida-Alabama

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Nature Coast Aquatic Preserve – Public Comments

Organization Background

Inwater Research Group's (IRG) mission is to foster coastal and marine conservation through integrated research and education. Our team has over a century of collective experience working with marine turtles in Florida's coastal waters. IRG focuses its research initiatives on long-term demographic studies that examine trends in the biology, ecology, and health of long-lived marine turtles. Due to our experience and our existing federal and state marine turtle research permits, we often collaborate with government agencies, universities, and other organizations to collect samples and data for their respective marine turtle research projects.

The information collected as part of our research programs are then integrated into myriad educational initiatives ranging from a life-history poster series¹ to k-12 STEM programs² to teacher professional development opportunities in the field. The goal is to introduce local citizens to the incredible animals in their own "backyard" and share the importance of protecting marine turtles. By giving students, teachers, and the general public a glimpse into the unique inhabitants of these waters, we are able to create a sense of stakeholderhood. These educational initiatives help create a community of environmentally responsible stewards in perpetuity.

Over the past decade, IRG has conducted marine research and education initiatives within the waters and communities that encompass the new Nature Coast Aquatic Preserve. Our organization recognizes the importance of the coastal waters that make up the Nature Coast Aquatic Preserve. The waters are a truly remarkable home to an important aggregation of marine turtles. We recommend that the new aquatic preserve utilize marine turtles as an indicator species for the health of the preserve and as a conduit to teach the local community and stakeholders about the preserve through the lens of conservation.

History within the Nature Coast Aquatic Preserve

IRG first conducted vessel-based visual surveys in the preserve area in 2012 and identified exceptionally high numbers of marine turtles in the waters between the Crystal and Homosassa Rivers. This led to the expansion of the project and commencement of marine turtle surveys and captures. Since then, we have completed over 300 miles of transects in the area and have made over 800 turtle sightings.

Consequently, we have captured 450 turtles of four species (241 green turtles, 184 Kemp's ridleys, 24 loggerheads, 1 hawksbill) ranging from juvenile to adult size classes. This work resulted in a 2021 publication where density, distribution, demographics, disease prevalence and genetic contribution was described for each of the species found in the area³. We also discovered unexpectedly high rates of green turtles with debilitating fibropapilloma tumors. While the waters of the preserve appear relatively pristine with dense seagrass and sponge beds, green turtles have a disease prevalence at a rate expected in degraded or polluted areas⁴. Additionally, loggerhead turtles tested positive for the disease but did not exhibit the debilitating tumors seen on green turtles.

We have also collaborated with researchers from other organizations to study the health of turtles within the region including the New England Aquarium^{5,6}, the Loggerhead Marinelifelife Center^{7,8}, and Southeastern Louisiana University⁹. Since the inception of our research in the Big Bend area, other marine turtle research programs have recognized the importance of the area and have subsequently started conducting separate projects in these waters.

While the research within the aquatic preserve has been fruitful, communicating this important information to the community and stakeholders is the most important step. IRG has created educational initiatives and partnered with local school districts to deliver this information to students (k-12) for free. These initiatives are housed in transportable trunks containing STEM lesson plans that align with state education standards and teach students how to protect these imperiled species. Students get a hands-

on opportunity to conduct the same research that IRG researchers do, but with model turtles. They collect the same biometric data and make inferences based on observations to assess the health of their turtle. Included in these trunks are the same tools utilized by researchers so that students can engage through an atmosphere of authenticity. This allows students to anchor into the messages, creating longer knowledge retention, and shaping their future behaviors. Each one of our trunks reaches approximately 1,000 students per year. Currently IRG has 15 trunks being utilized in communities adjacent to the aquatic preserve¹⁰.

Working directly with Citrus and Pasco County School Districts, we have rooted these programs in vital areas of the preserve. Each district owns multiple trunks and utilizes them every year to reach thousands of students. Both districts found their own funding sources to bring these programs to their classrooms and the IRG education and research teams have partnered to host professional development sessions for their teachers.

We hope that our organization's history of working within these waters and with the local communities will benefit the development of the aquatic preserve's management plan. We have outlined our general recommendations for the management plan and offer our assistance in any way that we can during this process.

Management Plan Recommendations

1. Establish a long-term monitoring program for marine turtles

Marine turtles have been documented utilizing multiple habitats within the aquatic preserve. Mangrove estuaries, seagrass beds, oyster and limestone reefs, and hardbottom sponge beds are all important to different species and size classes of turtles found in the preserve. We recommend establishing long-term monitoring protocols at sites within the preserve to determine species and size class composition within specific habitats. A long-term monitoring program will also help identify trends in marine turtle health and recovery of these protected species.

2. Identify new areas for marine turtles

The majority of research effort has focused on seagrass driven communities, which are dominated by the generally herbivorous and threatened green turtle. Further research should explore additional habitat types that may be important to other marine turtle species. Anecdotal reports from commercial and recreational fishers suggest that threatened loggerheads may be more abundant on deeper reefs. Sponge beds found within the aquatic preserve may also be important to the spongivorous and critically endangered hawksbill turtle. Hard-shelled organisms found within the sponge beds may also be a food source for loggerheads and the critically endangered Kemp's ridley turtles. The relief created by these sponge beds likely provides refuge for green, loggerhead, Kemp's ridley, and hawksbill turtles.

Exploratory survey and capture efforts should document the prevalence of marine turtles in understudied habitats that are associated with marine turtles at other locations in Florida.

3. Utilize marine turtles as an indicator species

Marine turtles utilize various habitats within the aquatic preserve and are an integral part of multiple ecological cycles. The abundance and health of marine turtles within the aquatic preserve can act as an indicator to the overall health of the preserve that is easily understandable by stakeholders. Paired with other relatable indicators, such as charismatic megafauna (elasmobranchs, manatees), recreational and commercial fish species (scallops, sea trout, redfish), and habitats (hectares of seagrass, sponge bed), stakeholders will be able to understand tangible changes within the aquatic preserve that represent its overall health.

4. Promote collaborative research programs

Aquatic preserve staff should promote and foster collaborative research within the preserve. Concerted effort should focus on connecting groups working within the preserve to create mutually beneficial projects. This may include sharing data to produce more holistic outcomes or combining similar datasets

to examine larger temporal and spatial trends. Such collaborative work would extend limited budgets and benefit management of the aquatic preserve.

5. *Create education initiatives highlighting the importance of the aquatic preserve*

Educational initiatives should focus on creating in-depth, state education standards-based curriculum that highlight the various species of flora and fauna within the aquatic preserve and the real-world issues affecting the preserve (climate change, marine debris, fishing practices, irresponsible boating, etc.). Engaging educational programs that directly reach students are very effective modes of outreach. Hands-on teaching methods that utilize real world problems have longer retention and a higher likelihood of behavior change than passive teaching (i.e. brochures, signs, didactic presentations).

Charismatic megafauna offer a valuable conduit between the management of the aquatic preserve and its stakeholders. Additionally, students who have an immersive experience share those lessons with their loved ones, increasing the overall educational reach.

6. *Create partnership(s) with tour operators working within the aquatic preserve*

Local sportfishing and eco-tour operators depend on the sustainability of resources within the aquatic preserve. Creating a partnership between the operators, preserve managers, and other stakeholders provides an opportunity to share knowledge between user groups. It creates a communication channel and gives operators a sense of ownership in the management of the aquatic preserve. The partnership should provide an avenue for operators to report concerns to preserve managers. It should also provide voluntary educational opportunities to learn more about flora and fauna within the preserve and conservation challenges within the region. Operators can act as informal educators to share this knowledge with customers visiting the preserve.

References

- 1 inwater.org/education/educational-posters
- 2 inwater.org/education/curricula-requests
- 3 Chabot, R. *et al.* A Sea Turtle Population Assessment for Florida's Big Bend, Northeastern Gulf of Mexico. *Gulf and Caribbean Research* **32**, 19-33, doi:10.18785/gcr.3201.05 (2021).
- 4 Perrault, J. R. *et al.* Insights on Immune Function in Free-Ranging Green Sea Turtles (*Chelonia mydas*) with and without Fibropapillomatosis. *Animals (Basel)* **11**, doi:10.3390/ani11030861 (2021).
- 5 McNally, K. L., Mott, C. R., Guertin, J. R. & Bowen, J. L. Microbial communities of wild-captured Kemp's ridley (*Lepidochelys kempii*) and green sea turtles (*Chelonia mydas*). *Endangered Species Research* **45**, 21-36, doi:10.3354/esr01116 (2021).
- 6 McNally, K. L., Mott, C. R., Guertin, J. R., Gorham, J. C. & Innis, C. J. Venous blood gas and biochemical analysis of wild captured green turtles (*Chelonia mydas*) and Kemp's ridley turtles (*Lepidochelys kempii*) from the Gulf of Mexico. *PLoS One* **15**, e0237596, doi:10.1371/journal.pone.0237596 (2020).
- 7 Perrault, J. R., Bresette, M. J., Mott, C. R. & Stacy, N. I. Comparison of whole blood and plasma glucose concentrations in green turtles (*Chelonia mydas*) determined using a glucometer and a dry chemistry analyzer. *Journal of wildlife diseases* **54**, 196-199 (2018).
- 8 Perrault, J. R. *et al.* Potential effects of brevetoxins and toxic elements on various health variables in Kemp's ridley (*Lepidochelys kempii*) and green (*Chelonia mydas*) sea turtles after a red tide bloom event. *Sci Total Environ* **605-606**, 967-979, doi:10.1016/j.scitotenv.2017.06.149 (2017).
- 9 Clarkson, P. M. *Corticosterone and testosterone in two populations of immature Kemp's Ridley sea turtles, Lepidochelys kempii, in the Gulf of Mexico.* (Southeastern Louisiana University, 2016).
- 10 inwater.org/education/traveling-turtles-a-traveling-trunk-program



National Wildlife Federation

Gulf Program
PO Box 15365
St. Petersburg, FL 33733



Florida Wildlife Federation

National Wildlife Federation Affiliate
PO Box 6870
Tallahassee, FL 32314

May 31, 2022

Submitted via email to FloridaCoasts@FloridaDEP.gov

Florida Department of Environmental Protection
Office of Resilience and Coastal Protection
2600 Blair Stone Road, MS #235
Tallahassee, FL 32399

Re: Comments on Nature Coast Aquatic Preserve Management Plan

To Whom It May Concern:

The National Wildlife Federation (NWF) and Florida Wildlife Federation (FWF) share an interest in habitat conservation through education, advocacy, and science-based stewardship. On behalf of our nearly 7 million members and supporters nationwide and 300,000 supporters in Florida, NWF and FWF are pleased to jointly submit comments for the management plan of Florida's newest aquatic preserve, the Nature Coast Aquatic Preserve (NCAP). Together, we applaud the overall focus that the management plan will provide for people, water, and wildlife including endangered and threatened species such as manatees, green sea turtles and the Gulf sturgeon.

We do, however, find opportunities to strengthen the language of the current draft plan to enhance longer-term planning, incorporate adaptation strategies, and more fully engage with the community. With these opportunities in mind, we present the following recommendations for the final management plan:

- i. **Issue One: Water Resources**
- ii. **Issue Two: Protection and Management of Submerged Resources**
- iii. **Issue Three: Climate Change**
- iv. **Issue Four: Human Dimensions**

i. Issue One: Water Resources

As noted in the management plan, "water resource conditions are known to directly affect the health and productivity of Florida's submerged coastal resources." Both the water quality and quantity of the resource should be prioritized in terms of monitoring, improvement and prevention. To this end we recommend incorporating language in the plan that elevates preventative actions to water quality and quantity conditions. For example, we suggest Goal Four, Objective One, be revised to include the following:

Objective One: Identify influencing factors outside the immediate Aquatic Preserve boundary contributing to resource degradation and provide support and collaboration to **prevent degradation and** improve conditions when possible.

ii. Issue Two: Protection and Management of Submerged Resources

Understanding historic and present conditions of the submerged resources within the NCAP is a key baseline to be able to protect and manage the resource. While the associated supporting goals under Issue Two address this, subsequent items should emphasize the use of monitoring data to identify future risks to resources via trend modeling. This information should be used to identify preventative actions to safeguard current quality habitat. Additionally, we recommend that the NCAP coordinate with their neighboring aquatic preserves to support resource management and collaboration.

iii. Issue Three: Climate Change

Planning for climate change impacts goes beyond being resilient and understanding baselines to guide protections. The highest level of climate change planning works to establish direction and adaptation based on sound science. As such, we recommend that the Climate Change component within the management plan include adaptive management to predict changes in habitat, adapt coastal ecosystems where able (ex. establishing mangrove habitat where salt marshes should not be restored), and utilize informed decision making to respond to trajectories of change. We suggest the management plan incorporate use of the [Resist Accept Direct \(RAD\)](#) framework and establish a [vulnerability/adaptation assessment](#) that utilizes localized data to serve as a guide for management decisions. Specifically, we suggest language in Goal One be revised as follows:

Goal One: Ensure that the NCAP remains resilient *and adaptive* to expected impacts from climate change, including tropicalization and climate-induced habitat shifts.

***Integrated Strategy:** Establish a place-based vulnerability and adaptation assessment using site specific data and models when able to serve as a road map for Resist-Accept-Direct Framework decision making.*

Lastly, we recommend that the Climate Change Goals and supporting objectives, strategies, and performance measures prioritize engagement with community stakeholders in addition to steering committee members, scientists, and other selected groups. Similar to how Issue Four: Human Dimensions, focuses on engaging the community collectively we recommend that Climate Change work within the management plan to engage a variety of stakeholders within the community. Specifically, we suggest the following supportive items within the Climate Change section:

***Objective Three:** Improve community education regarding implications of climate change in the aquatic preserve and of adaptive/resilience efforts.*

***Integrated Strategy:** Engage with conservation elements of County comprehensive plans to reduce and adapt to the impacts of climate change and attend meetings of local/state government boards and agencies to provide updates and discuss relevant issues within NCAP as appropriate to factors of climate change as they are identified.*

Integrated Strategy: Track climate change interaction opportunities and promote behavior changing stewardship through education and other interventions.

iv. Issue Four: Human Dimensions

As noted within the current draft, marine debris cause significant harm to the environment. While Goal One specifically includes the aim to “reduce the presence of marine debris” and the supportive Objective Three intends to “reduce marine debris at the source”, neither of the sections address the prevention component of marine debris in terms of stopping the production of litter/marine debris to begin with. As such, we recommend working to minimize creation of marine debris by adding the following as an integrated strategy under Goal One, Objective Three:

Integrated Strategy: Engage with conservation elements of County plans to reduce the creation of litter/marine debris outright and attend meetings of local/state government boards and agencies to provide updates and discuss relevant issues within NCAP as appropriate to influencing factors of litter/marine debris production as they are identified.

Human degradation of the precious resources of NCAP can be reduced by stringent enforcement of existing rules, especially as to propeller scarring in seagrass beds. Push-pole only areas should be considered as well as increased penalties for law violators. To this end, we suggest revising the following final integrated strategy under Goal Three, Objective Two:

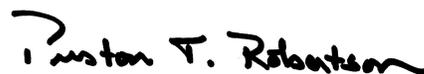
Integrated Strategy: ~~Identify scarring hotspots and determine the best practice to reduce scarring, may include education, pole and troll zones,~~ ***by both creating and enforcing poling only zones and prioritizing*** increased enforcement.

Thank you for your work on the Nature Coast Aquatic Preserve Management Plan. We look forward to the finalization and implementation of the management plan and the further protection and enhancement this will bring to the Nature Coast Aquatic Preserve. NWF and FWF are pleased to engage in the NCAP process and welcome FDEP staff to contact our organizations for additional information about our recommendations. Thank you for receiving and reviewing public comment during this process and for your commitment to protect Florida’s coasts and waters.

Sincerely,



Amanda Moore Director,
Gulf Program
National Wildlife Federation
moorea@nwf.org



Preston T. Robertson
President and CEO
Florida Wildlife Federation
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Issue One: Water Resources

Goal Four: Emphasize upland connections

Objective One: Identify influencing factors outside the ~~immediate~~-Aquatic Preserve boundary contributing to resource degradation and provide support and collaboration to improve conditions ~~when possible~~

Integrated Strategy: Interagency collaboration (notify agency partners of data findings, propose changes to address present or potential future impacts to NCAP, assist in efforts where applicable and possible)

Integrated Strategy: Establish and ~~or~~-host quarterly regional workshops to encourage collaboration and data sharing to improve contributing water quality (e.g., engage with groups like Springs Coast Committee, likely need separate NCAP steering committee)

Integrated Strategy: Participate in decision making process for upriver/inland freshwater influencing actions (TMDL/BMAP/minimum flows and levels/etc.)

Integrated Strategy: Support federal, state, local and non-governmental land acquisition programs to target headwaters and riparian corridors for rivers and streams that discharge into the NCAP.

Integrated Strategy: Develop adaptive management strategies to address and improve water quality components that exceed benchmark/threshold criteria once parameters are set

Commented [AT1]: Not sure what this means. Aren't parameters already set. E.g. the numeric or narrative criteria

Objective Two: Partner with neighboring/influencing land parcels

Integrated Strategy: Identify and include appropriate adjacent landowners/managers in decision making processes and education/outreach

Objective Three: Partner with government agencies and committees

Integrated Strategy: Engage with local government natural resource and planning agencies conservation elements of County comprehensive plans to enhance coastal information input (example: fertilizer ordinances, wetland protection)

Integrated Strategy: Participate in decision making process for upriver/inland influencing actions (development, construction, habitat acquisition, watershed activities, etc.)

Issue Two: Protection and Management of Submerged Resources

Goal One: Assess historical and present condition of submerged resources to guide management decisions within the Nature Coast Aquatic Preserve.

Objective One: Identify and formulate ~~monitoring management~~-objectives relating to historical programs and data gaps associated with submerged resources within NCAP

Commented [AT2]: This is confusing. Are we identifying and formulation management objectives relative to programs and data gaps, or for the resource itself. It seems like the former given the strategies.

Integrated Strategy: Coordinate with agencies / groups currently monitoring submerged resources within the AP

Integrated Strategy: Participate in and/or host interagency collaborative meetings focusing on submerged resources to ensure data gaps and duplicate efforts are addressed and data is shared in a timely manner (e.g., SIMM, SWFWMD, Hernando County)

Integrated Strategy: Assess feasibility of restarting historical data collection at locations that are relevant to maintaining a sound baseline dataset for NCAP

Integrated Strategy: Determine if current sampling efforts are sufficient, and if not, develop and propose a revised plan of action

Objective Two: Identify current and potential future threats and impacts to the natural communities within NCAP

Integrated Strategy: Develop a steering committee of academic experts and resource managers to promote ~~continue sound~~ robust collaboration of efforts and to identify threats and impacts before or as they occur

Integrated Strategy: Coordinate with agencies / groups currently monitoring submerged resources within the AP to ensure threat or impact indicators are being captured in monitoring effort datasets

Objective Three: Determine the current status of intertidal natural resource communities within NCAP

Commented [AT3]: Seems like this objective would logically precede the one above it. REORDER

Integrated Strategy: Assess the need for, and determine the feasibility of, establishing mapping and/or monitoring programs for oyster reef, salt marsh and mangrove island habitats within NCAP

Integrated Strategy: Utilize interagency collaboration to assist with mapping and monitoring of intertidal communities

Integrated Strategy: Participate in and/or host interagency collaborative meetings focusing on intertidal communities (OIMMP, CHIMMP)

Goal Two: To understand, protect, ~~and~~ maintain and existing seagrass resources, and to restore and enhance degraded seagrass resources where these occur.

Commented [AT4]: Not sure if "restore and enhance" belong here since none of the objectives and associated strategies relate to them. Same goes for goal three.

Objective One: To ensure that NCAP maintains a robust seagrass community at documented historic levels that reflects the role of seagrass as a foundation species upon which many other species rely

Integrated Strategy: Complete a comprehensive assessment of the current and historic spatial extent (using GOMA best practices for Tier 1 – spatial extent monitoring) of seagrass habitat and spatially characterize the relative quality of that habitat, including areas of heavy prop scarring

Integrated Strategy: Establish and implement annual submerged aquatic vegetation monitoring comparable to programs utilized by neighboring Aquatic Preserves (using GOMA best practices for Tier 2 – site-based community composition monitoring)

Integrated Strategy: Incorporate research-based indicators of seagrass condition (e.g., above: belowground biomass, tissue stoichiometry, stable isotopes, etc.) into monitoring programs to provide insights and early-warning signs of seagrass stress

Integrated Strategy: Identify, implement, and support research to deepen understanding of seagrass community function along environmental gradients (north-south, inshore-offshore)

Goal Three: Understand, protect and maintain hardbottom (coral/sponge bed) resources, and to restore and enhance degraded hardbottom where this occurs.

Objective One: Protect and manage hardbottom communities to ensure long term survivorship and ecological functions continue within the NCAP

Integrated Strategy: Identify, implement, and support research into ecosystem function and significance of hardbottom communities

Integrated Strategy: Complete a comprehensive assessment of the spatial extent of hardbottom habitat within NCAP (using GOMA best practices for Tier 1 – spatial extent monitoring)

Integrated Strategy: Establish and implement hardbottom community monitoring comparable to programs utilized by neighboring Aquatic Preserves (using GOMA best practices for Tier 2 – site-based community composition monitoring) (i.e., assess coral and sessile invertebrate abundance and composition on hardbottom habitat and analyze monitoring data for trends)

Integrated Strategy: Characterize hardbottom habitats, including areas of special significance and areas of incompatible use

Integrated Strategy: Explore use of spatial management areas including sea turtle, coral, and sponge refugia, areas that are most appropriate for non-consumptive ecotourism, non-anchoring areas, as well as areas where moorings and/or designated anchoring may be provided for sport fishing and non-consumptive tourism

Goal Four: To ensure that the distribution and abundance of macroalgae occurs such that it contributes to the overall health of the NCAP

Objective One: Establish a baseline understanding of macroalgae components of the NCAP ecosystem

Integrated Strategy: Develop a catalog of macroalgal species that occur within NCAP and identify taxa of special concern (e.g., species with nuisance/bloom potential, ecological indicator species)

Integrated Strategy: Explore the use of volunteer-based science programs to monitor the abundance of drifting macroalgae

Strategy: Examine abundances of drifting and attached macroalgae in relation to water quality parameters and compare observations to other systems

Commented [AT5]: Maybe include a strategy to educate volunteers on invasive algae and create an “early warning system,” for potential invasion.

Goal Five: Provide scientific data and information [on submerged resources](#) to Nature Coast communities, businesses, and officials to improve stewardship of the NCAP in decision-making for coastal development and conservation

Objective One: Improve community understanding of submerged resources and factors that impact the Aquatic Preserve

Integrated Strategy: Create and disseminate accurate information via community outreach, media and signage

Integrated Strategy: Upload all data into DEP’s Statewide Ecosystem Assessment of Coastal and Aquatic Resources (SEACAR) database

Integrated Strategy: Collaborate with partners to develop information briefs [on submerged resources](#) with executive summaries that are readily accessible and written for public distribution

Integrated Strategy: Develop appropriate media communications associated with [submerged resource](#) topics of concern to broaden information dispersal

Integrated Strategy: Form a citizen support organization that will support communication and information dissemination

Integrated Strategy: Hold/support workshops on subjects such as shoreline protection, green infrastructure, coastal-friendly living, coastal resilience, and ecosystem services.

Integrated Strategy: Provide educational on-water site visits to the NCAP for community leaders to aid them in making informed decisions about coastal development and conservation

Commented [AT6]: These seem to go to issues beyond submerged resources

Objective Two: Law enforcement engagement

Integrated Strategy: Participate in natural resource education of local and state law enforcement officers.

Commented [AT7]: Same here. Either make them specific to submerged resources or move to an issue that crosses other issues

Integrated Strategy: Develop communication and partnerships with law enforcement officers to assist in identifying and addressing emerging and ongoing resource threats

Goal Six: Preserve, ~~or manage~~ and to improve the conditions of Nature Coast Aquatic Preserve's submerged resources

Objective One: Set a minimum threshold/monitoring criteria/benchmark for seagrass coverage that the system should meet (similar to WQ standards)

Integrated Strategy: Identify/map sensitive seagrass and other submerged habitats like hardbottom sponge communities, and submerged marine vents, for management purposes

Integrated Strategy: Establish baselines of habitats that are linked to water quality such as seagrass, sponges, oyster reefs (distributions, community structure, densities, biomass estimates)

Commented [AT8]: This objective is limited to sea grass, so the strategies to implement it should be similarly limited

Integrated Strategy: Implement adaptive management tools and restoration projects when/if minimum thresholds/benchmarks are under threat

Objective Two: Submerged or intertidal Cultural resource identification and protection

Integrated Strategy: Partner with ~~leading archaeological, federal, and state cultural resources agencies, as well as NGOs and universities entities~~ to ensure cultural resources are accurately documented and protected

Integrated Strategy: Support cultural resource partners in establishing and implementing submerged cultural resource monitoring comparable to programs utilized by neighboring Aquatic Preserves

Commented [AT9]: Do we know that neighboring preserves have programs that should be emulated?

Integrated Strategy: Work with cultural resource partners to identify and address threats to cultural resources from human impacts such as looting, boat wake erosion and other AP user group impacts, and climate change.

Integrated Strategy: Work with partners to incorporate culture resources into law enforcement training.

Issue Three: Climate Change

Goal One: To ensure that the NCAP remains resilient to expected impacts from climate change, including tropicalization and climate-induced habitat shifts

Objective One: Predict and track climate factors such as sea level rise, increases in sea surface temperature, and alterations in drought/flood cycles

Objective Two: Establish processes to predict and track climate-driven changes in natural communities to guide adaptive management approaches

Objective Three: Address the impacts of climate change on cultural resources

Integrated Strategy: Identify known submerged and intertidal cultural resource sites that may be affected by climate change impacts such as sea level rise and storm damage

Integrated Strategy: Consult with cultural resource partners to determine priorities for documenting and, if warranted, protecting cultural resources sites at risk due to climate change.

Integrated Strategy: Include cultural resources within climate change monitoring and predictive modeling.

Issue Four: Human Dimensions

Goal Two: Promote diverse, sustainable uses of the Aquatic Preserve's submerged natural resources

Objective One: Anticipate impacts related to increased use and identify potential **off site** conflicts/impacts (environmental) like construction, pipelines, development and roadways, etc. and collaborate to mitigate or prevent habitat damage related to increased use/development

Commented [AT10]: This objective seems focused on off site development that may bleed impacts into the AP.

Integrated Strategy: Provide input to **state and** local decision makers on future establishment of access points

Integrated Strategy: Provide education to and support sustainable actions of user groups

Integrated Strategy: Work with subject matter experts to identify specific actions that would prevent/reduce (mitigate) environmental impacts and deliver information to decision makers

Integrated Strategy: Work with decision makers and involved parties to prevent or reduce impacts **from adjacent activities** to preserve resources and water quality **within the AP.**

Commented [AT11]: It seems like the AP should be more proactive here and advance identify future access sites, as well as where they shouldn't be.

Commented [AT12]: This seems geared to on-site impacts

C.9 / Advisory Committee Meeting #5

The following Appendices contain information about the final advisory committee which was held in order to present public comment and obtain input from the advisory committee about the Nature Coast Aquatic Preserve Draft Management Plan.

C.9.1 / Florida Administrative Register Posting

BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND

The Florida Department of Environmental Protection's Office of Resilience and Coastal Protection and the University of Florida announces a public meeting to which all persons are invited.

DATE AND TIME: Thursday, May 26, 2022, 10:00 a.m. – 3:00 p.m.

PLACE: Plantation Inn, Magnolia Room B, 9301 West Fort Island Trail, Crystal River, FL 34429

GENERAL SUBJECT MATTER TO BE CONSIDERED: The Nature Coast Aquatic Preserve Management Plan Advisory Committee is meeting to discuss possible revisions to the the draft Nature Coast Aquatic Preserve Management Plan and review comments received at the public meetings on Thursday, May 19, 2022, and Tuesday, May 24, 2022. Information on the Nature Coast Aquatic Preserve can be found at <https://floridadep.gov/rcp/aquatic-preserve/locations/nature-coast-aquatic-preserve>. The management plan is available at <http://publicfiles.dep.state.fl.us/CAMA/plans/Nature-Coast-AP-Management-Plan-DRAFT.pdf>.

A copy of the agenda may be obtained by contacting: Joy Hazell at jhazell@ufl.edu.

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: Joy Hazell at jhazell@ufl.edu. 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).

REGIONAL PLANNING COUNCILS

Central Florida Regional Planning Council

The Central Florida Regional Planning Council announces a public meeting to which all persons are invited.

DATE AND TIME: May 11, 2022, 10:00 a.m.

PLACE: Central Florida Regional Planning Council, 555 East Church Street, Bartow, FL 33830

GENERAL SUBJECT MATTER TO BE CONSIDERED: Regular meeting of the Central Florida Regional Planning Council (CFRPC) Finance Committee to review annual budget items.

A copy of the agenda may be obtained by contacting: April Dasilva at (863) 534-7130, ext. 129 or at adasilva@cfrpc.org.

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 3 days before the workshop/meeting by contacting: April Dasilva, Program Coordinator, at 1(863)534-7130, ext. 129 or at adasilva@cfrpc.org. 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: April Dasilva, Program Coordinator, at 1(863)534-7130, ext. 129 or at adasilva@cfrpc.org.

WATER MANAGEMENT DISTRICTS

Suwannee River Water Management District

The Suwannee River Water Management District announces a public meeting to which all persons are invited.

DATE AND TIME: Tuesday, May 10, 2022, 9:00 a.m.

PLACE: District Headquarters, 9225 CR 49, Live Oak, FL 32060

GENERAL SUBJECT MATTER TO BE CONSIDERED: Governing Board Meeting, Workshops, Public Hearings, and/or Committee Meetings. Consideration of Suwannee River Water Management District business. All or part of this meeting may be conducted by means of communications media technology.

GoTo Webinar information regarding viewing of and participation in the meeting will be available on the District's website at www.mysuwanneeriver.com.

A copy of the agenda may be obtained by contacting: (386)362-1001 or 1(800)226-1066 (Florida only) or on the District's website at www.mysuwanneeriver.com, when published.

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: (386)362-1001 or 1(800)226-1066 (Florida only). 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.

WATER MANAGEMENT DISTRICTS

St. Johns River Water Management District

The St. Johns River Water Management District announces a public meeting to which all persons are invited.

DATE AND TIME: Tuesday, May 10, 2022. The Governing Board meeting will begin at 10:00 a.m.

C.9.2 / Advertisement Flyer




Nature Coast Aquatic Preserve Management Plan

Public Meetings

6 to 8 p.m. EDT Thursday, May 19, 2022	6 to 8 p.m. EDT Tuesday, May 24, 2022	10 to 3 p.m. EDT Thursday, May 26, 2022
Virtual Meeting: FloridaDEP.gov/ NCAP-Meeting2	Plantation Inn, 9301 West Fort Island Trail, Crystal River, FL 34429	Plantation Inn, 9301 West Fort Island Trail, Crystal River, FL 34429

The management plan for Nature Coast Aquatic Preserve is in the process of being updated by the Florida Department of Environmental Protection's Office of Resilience and Coastal Protection. Members of the public are invited to attend a meeting from 6 to 8 p.m. EDT, Thursday, May 19, 2022, or a meeting from 6 to 7 p.m. EDT, Tuesday, May 24, 2022, to learn about the proposed plans for the preserve and provide comments and an advisory committee meeting on Thursday, May 26, 2022 from 10 a.m. to 3 p.m. to review the plan, suggest edits, and review the comments from the public.

To view the draft, please visit <http://publicfiles.dep.state.fl.us/CAMA/plans/Nature-Coast-AP-Management-Plan-DRAFT.pdf>. Copies also may be obtained by emailing FloridaCoasts@FloridaDEP.gov. Additionally, the public is invited to submit comments to the Office of Resilience and Coastal Protection at FloridaCoasts@FloridaDEP.gov by June 9, 2022.

To learn about Nature Coast Aquatic Preserve, visit <https://FloridaDEP.gov/rcp/aquatic-preserve/locations/nature-coast-aquatic-preserve>.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this meeting is asked to advise the agency at least 48 hours in advance by emailing Joy Hazell at jhzell@ufl.edu. If you have a hearing or speech impairment, please contact the agency using the Florida Relay Service, 800-955-8771 (TDD) or 800-955-8770 (voice).



Scan to learn about Nature Coast Aquatic Preserve



The Florida Department of Environmental Protection's Office of Resilience and Coastal Protection (RCP) manages more than 4.9 million acres of submerged lands and coastal uplands. RCP manages 42 aquatic preserves and three national estuarine research reserves and oversees programs to protect and conserve beaches, coastlines, waterways and Florida's Coral Reef.

C.9.3 / Newspaper Advertisement

Citrus County Advertisement

**Nature Coast Aquatic Preserve (NCAP)
Mgt Plan Public Meetings**

The Florida Department of Environmental Protection's Office of Resilience and Coastal Protection and the University of Florida invite all persons to the public meetings being held Thursday, May 19, 2022 (Online) and Tuesday, May 24, 2022 (In-person) in preparation for the Mgt Advisory Committee Meeting on Thursday, May 26, 2022 (In-person). More information on these and the management plan can be found at <https://FloridaDEP.gov/NatureCoastAP>.

Hernando County Advertisement

Nature Coast Aquatic Preserve Mgt Plan Public Meeting

Thursday, May 19, 2022 (Online). More information can be found by visiting: <https://floridadep.gov/rcp/aquatic-preserve/content/33254-nature-coast-aquatic-preserve-mgt-plan-public-meeting> and registration for this meeting is available at: <https://FloridaDEP.gov/NCAP-Meeting2>.

Tuesday, May 24, 2022 (In-person). More information can be found by visiting: <https://floridadep.gov/rcp/aquatic-preserve/content/33253-nature-coast-aquatic-preserve-mgt-plan-public-meeting>.

The draft of the management plan can be accessed at: <https://publicfiles.dep.state.fl.us/CAMA/plans/Nature-Coast-AP-Management-Plan-DRAFT.pdf>

Pasco County Advertisements

Nature Coast Aquatic Preserve (NCAP) Mgt Plan Public Meetings
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5/11/2022 0000225049

NATURE COAST AQUATIC PRESERVE (NCAP) MGT PLAN PUBLIC MEETING
The Florida Department of Environmental Protection's Office of Resilience and Coastal Protection and the University of Florida invite all persons to the public meetings being held **Thursday, May 19, 2022 (Online)** and **Tuesday, May 24, 2022 (In-person)** in preparation for the Mgt Advisory Committee Meeting on **Thursday, May 26, 2022 (In-person)**. More information on these and the management plan can be found at <https://FloridaDEP.gov/NatureCoastAP>.

C.9.4 / Meeting Summary

**Nature Coast Aquatic Preserve Management Plan Development
Final MAC Meeting
May 26th, 2022**

Meeting Report

Overview

Thursday, May 26, 2022, the Nature Coast Aquatic Preserve (NCAP) Management Advisory Committee (MAC) Meeting convened on in person at the Plantation Inn in Crystal River. Convener, Florida Department of Environmental Protection (FDEP), lead facilitator Joy Hazell and the NCAP process team designed and facilitated the meeting (Appendix A, Agenda).

The MAC, which is made up of state government agency staff, University of Florida faculty, local business owners, and non-governmental organization employees, attended the meeting (Appendix B, Meeting Participants/Management Advisory Committee). The meeting objectives were to:

The meeting objectives were to:

- Build community and trust among group members.
- Gather input to the Nature Coast Aquatic Preserve Draft Management Plan

Welcome and Introductions

The meeting began with introductions of the NCAP process planning team and the management advisory council. The facilitator clarified the management plan process development goals:

- Build community and trust between group members
- Incorporate input from two public meetings into management plan

Revisions to the Plan and Incorporating Public Input

After the welcome MAC members were given suggested revisions to verbiage in various goals based on their or the public's comments. All goal revisions can be found in the management plan.

The MAC members were then split into 4 small groups and each group was given a specific Issue to revisit and determine how the public input they received should be incorporated into the plan. Each group visited two of the Issues. Results of this activity can be found in Appendix C.

Closure

Mac members were thanked by the DEP and UF team for their time, dedication and passion for the NCAP and the management plan development process and reminded of the timeline for final approval of the plan.

- Final comments via email by June 9th
- Final draft of management plan submitted – July 6th
- Acquisition and Restoration Council (ARC) Meeting – October 14th, Tallahassee
- Plan goes to Board of Trustees for final approval

Appendix A. Agenda

10:00 am	Welcome, Introductions and Setting the Stage
10:30 am	Suggested Revisions
11:00 am	Priority Comments Rounds 1 and 2
Noon	Lunch
1 pm	Priority Comments Round 3 and 4
2:00 pm	Recap and Next Steps
2:45	Celebrate and Adjourn

Appendix B – Participant List

First Name	Last Name	Organization
Thomas	Ankersen	University of Florida
Savanna	Barry	University of Florida/IFAS/Extension
Anna	Braswell	University of Florida
Steve	Brinkley	Florida Fish and Wildlife Conservation Commission
Melissa	Charbonneau	Pasco County

Morgan	Edwards	University of Florida
Justin	Grubich	Pew Charitable Trusts
Jamie	Hammond	University of Florida
Frank	Kapocsi	Homosassa River Alliance
Joyce	Kleen	U.S. Fish and Wildlife Service
Keith	Kolasa	Hernando County
Anna	Laws	Florida Fish and Wildlife Conservation Commission
Charles	Morton	Hernando Waterways Advisory Committee
Joyce	Palmer	U.S. Fish and Wildlife Service
Earl	Pearson	Florida Department of Environmental Protection
Kristie	Perez	University of Florida
Barbara	Roberts	Florida Department of Environmental Protection
Brittany	Scharf	University of Florida/IFAS/Extension
Michael	Shirley	Florida Department of Environmental Protection
William	Toney	Charter Captain
Madison	Trowbridge	Southwest Florida Water Management District
Marnie	Ward	University of Florida/IFAS/Extension

**Nature Coast Aquatic Preserve
Management Plan
MAC responses to Public Comments
Consolidated
May 25th, 2022**

Issue One: Water Resources

Priority Comments

(content provided by the Public that MAC agreed needs to be incorporated into MP)

1. Adaptive – shift sites to get info/catch changes - **Goal 3 Objective 1- Maybe issue temporary response to environmental threats and do additional sites/analytes (Add this to a strategy).**
2. Carbon in sediment - holding more sugars – **Sediment belongs in Issue Two – Submerged Resources**
3. There definitely needs to be an educational outreach component to this. Since this is one of the last 'true Florida' ecological areas, it's important to get students out there to see that. – **Needs to be a broader focus in HD (add Objective)**
4. Students and families, professors/teachers collecting data and doing studies and providing information - volunteer data collection that is organized – **add wording to Goal 1, Objective 1 to include 'collaborate' / Goal 4, Objective 2 – language about land owners not parcels**
5. is there an established database to bring together the different WQ efforts/data for easily access? (if not consider building off UF WQ database?) – **Add more information about SEACAR**

MAC General Comments:

1. Analyze historical data and establish trends, In goal 1
2. Data gaps should also include parameters (DNA, nutrient species, caffeine, isotopes). Is frequency sufficient?
3. Modeling, correlation analysis (ex. With submerged resources)
4. Determine “fate” of nutrients (Soil, periphyton, macroalgae, seagrass)
5. Porewater also important

Incorporated in Plan

(content present in Chapter 4 as ISs or PMS, or content addressed in MP Plan Body)

include identifying new/emerging technologies to gather data more easily & cost effectively (to streamline future process) - i.e. that broader areas, potentially without staff, etc.

include action steps when degradation is detected

What happens/monitoring, what triggers action

Lacking info on soil and substrate below the preserve.- **May be too broad where covered**

Establish background data on soil and substrate

Goals of the plan should be to establish baselines of water quality, quantity, submerged resources and soils

Plankton monitoring

Great deal of discussion on needs for identification in WQ tasks, can we add more specific language around protection tasks related to WQ?

What about language for improvement of WQ (over preservation)?

look at partnering with existing WQ monitoring programs?

(Bonefish Tarpon Trust) Support for understanding the baseline. Critical to understand changes and address them.

Citizen science

Civic involvement 5 – 21 years

Upland connections – road construction, have these issues been rectified

Oversight of construction permit

Signage re types of boats/motors that can go in certain areas

ID/Include adjacent business

TMDLs

Citizen science – RBNERR model

Partner with county commission

Saltwater intrusion/septic/stormwater monitoring

Outside AP Purview

(content previously discussed by MAC and OMITTED as part of the Issues section, or outside AP purview)

Would like to see SWFWMD be more proactive with sharing their monitoring results

Analyze the improvements from the septic to sewer project in Citrus

Retaining pond feeding fish kills in Homosassa

Scallop monitoring

Oyster monitoring

Water quality sampling for smaller creeks

Decrease fertilizer

Exotics Ozello mangroves choked with Brazilian pepper – citizen involvement help for public

Trends and changes – SWFWMD MFLs keep increasing water being taken out of springs

Watershed plan for tri-county – tie watersheds to share info, watershed planning body, partner w/agencies, partner broader watershed

scallopers go every day and get limit

General Comments

Very concerned about salinity increasing and springs reversing flow

(BTT) Knowing what's there and what's needed is critical. Knowing what needs there are for support groups/partners to advocate for (specific as possible) is most helpful for stakeholders

Grants for citizen monitoring – sea grant?

love the students being actively involved...funding for both!

I think the uplands connection is important. If there's a way to coordinate springs protection and NCAP. That would be helpful.

Possible dead zone forming in NCAP?

Possible emerging contaminants affecting people

The water source within a canal system such as Hernando Beach, Sea Pines, and Hudson are primarily from the Gulf so it would seem logical that any pollution (or nutrient) discharge into the waters would be within the overall concern to the NCAP. However, the jurisdiction would probably be with DEP

The Weeki Wachee is already an Outstanding Florida Waterway so I believe here is policy in place that protects the water quality. It is beyond the purview of the NCAP but cooperation with DEP and SWFWMD should be a given.

explicitly state that we will work with other APs

clarify boundaries as well as other agencies

Suggest Hernando County as base for NCAP

Prioritization is critical (as early as possible) - Overall & with each issue, otherwise more goals and objectives will not be achieved

there are multiple preserves and other protected areas and it is not clear if all areas in between are being protected, for example (3Ws)

Wawa filled spring

Inland water quality affect sea grass

Wake an issue

SWFWMD – not proactive w/ sharing data with stakeholders

How do we determine if current sampling is sufficient

Is monitoring enough to determine if goals are being met?

Only get peoples attention when close beaches

Red dye in mulch – what is it

Issue Two: Protection and Management of Submerged Resources

Priority Comments

(content provided by the Public that MAC agreed needs to be incorporated into MP)

1. Protect = education and enforcement...as well as protect, not anchoring on sensitive habitat, not collecting prohibited species – **Check plan for anchoring and mooring terminology. Incorporate both where present**
2. Pole and troll zones - there is a push to try to establish these in areas of high damage around St. Martin's Keys – **Covered in Human Dimensions Covered (Include mapping in HD); HD – Further identify and map hot spots to justify management decisions**
3. Tour operators as first line educators – **include strategy – Blue Star Guide program for captains?**
4. Vacation rentals – **place for education on aquatic preserve G5 I1 IS1 – include / diversify the materials and distribution; 11 and 12 go hand in hand. May be able to make into a PM**
5. Strategy – hot spot plan for restoration and enhancement – identify areas to restore and have a plan to take advantage of grants or tap into compensatory mitigation projects
6. Education in schools including upland areas
7. Develop plan for school education
8. Merit badge program for boy scouts
9. Connect with STEM coordinator in schools to get Aquatic Preserve information into schools
10. Laminated instructions in all rental boats/public ramps – what lives in seagrass, don't tear it up, sponge community
11. Share example education programs across counties – **Same as below and Hook line and thinker Support existing programs**

12. Education of next generation/new citizens/boaters/rental boaters and Education in public schools about what is under water – **See comment above**

Incorporated in Plan

(content present in Chapter 4 as ISs or PMs, or content addressed in MP Plan Body)

Law enforcement supervision during scallop season for environmental and human safety

Especially important to cross-sectors (agencies, government, municipality, etc.) to achieve desired results

How do we measure if goals or objectives are achieved? (Any strategies that do not have a timeline or achievable measure should be updated)

Cultural resource mapping disclosure - Could ask for legislative exemption for those.

Florida Heritage Monitoring Scouts - partnership with APs statewide. Is an opportunity for partnership to document and identify, pre-established program. Avenue for cultural resource goals

Include invasive species management

Have actions for when invasive species are identified

(BTT) Key to understanding is the baseline of where we are on the habitat components. At a minimum we need to maintain seagrass and hardbottom (Preston seconded)

I think you'll need a significant education component in addition to enforcement on the prop scarring issue. This goes back to the communications plan for the roll out (and ongoing info).

Would love to see language about cultural resources. Applicable to monitoring and getting baseline data and educating law enforcement - add cultural resources with all of these things

Better marking of areas

Goal 5/Obj 1 – great objective but how will it be done

Understand and if necessary address boat anchoring and people getting out of boat into resource

Evaluate if there is enough law enforcement

Mangroves should be included in Issue 2

Include underwater archeological sites

Ways to reach county commissioner – engagement plan

Outside AP Purview

(content previously discussed by MAC and OMITTED as part of the Issues section, or outside AP purview)

Is fisheries included in the submerged resources? What types of marine life are included? What about bivalves and other species? (tied to mapping question also)

Marine mammals aren't part of the goal

Concern: Law enforcement of shrimping related to location (because at night & close to coast - no enforcement) / Additional concern that their equipment is damaging bottom (not performing to specifications)

Include invasive species management

Grant research on uses of Brazilian pepper to incentivize removal

General Comments

utilize established partnerships such as with BBSAP and the Florida Public Archaeology Network...regarding monitoring of cultural resources. Rather than the idea of protection we should seek more to monitor changes over time

Are there currently any plans in place to investigate the historical resources that are submerged?

How much of the preserve has been mapped?

Need to map, understand, protect, educate, enforce etc.

Consider that seagrasses are being lost in other parts of the state making this area more important. Should expansion be a goal. Recognizing relationship with nutrient pollution

sunshine law doesn't apply to prehistoric cultural resources

Tour guides/operator/fishing guides use or are required to use power pole as example

prop scarring - are there going to be rules and regs about jet drives, propeller guards to prevent scarring

FWC Conversation: 1) More FWC, 2) Coordinating with FWC to make sure we have names and contacts for officials in enforcement (Preston seconded), 3) I also agree with increasing FWC officer presence. 4) FWC are good partners but they have very limited resources, only 2 officers patrolling at any one time is not enough

What do we mean by protect hard bottom communities?

Identify, map and mark and/or remove/relocate large rocks for recreational boaters for navigational safety.

Look into increasing the penalties for propeller scarring, the present penalties are not stopping the damage

if there are additional needs for mapping or other programs making specific needs known to partners will help them advocate for them (Preston seconded)

Any time \$ to be made off natural resources, mother nature loses, need to strike a balance

Pollution, springs collapsing, or even trying to restore parts of the preserve could effect historical and cultural resources there. I just hope someone records the historical and cultural resources there before anything is changed.

I understand that this plan is to protect and preserve the natural recourses, but has anyone considered that a change in the chemical composition of the water or soil could damage the historical resources there?

Education is most important

Without increased funding for Law enforcement things won't get accomplished

Documentary on NCAP – channel 3

Require boaters to have license

College level requirements in environmental classes

31 years ago – lot less people

Salinity - would like to know the changes in the salinity in the past 30 years and effects on springs, manatee drinking water

Would like to see FWC have a partnership with commercial fishers to find out more about what is really happening out there - collecting knowledge/data from commercial fishers about concerning patterns (example: dolphin behavior after oil spill)

are there reductions in larger fish being landed in the area?

very frustrated at the degradation of natural resources in this generation, springs are collapsing.

spotlights / bright lights affecting birds - light pollution an extremely concerning aspect

Issue Three: Climate Change

Priority Comments

(content provided by the Public that MAC agreed needs to be incorporated into MP)

1. CC w/SLR can affect cultural resources as well so make it specific. – **add Cultural Resources to this section; yes, add – obj 2 might be a good place**
2. Use cultural sites as part of the baseline data - pick areas they want to track that are on or near a cultural site. – **Objective 2: after natural communities, add cultural resources**
3. Integrate disaster mitigation/recovery plans from counties - Develop one for NCAP – necessary for FEMA money, may include property buyout, include vessel removal after hurricane – **needs to be incorporated, not sure where; Already mostly covered, derelict vessel mentioned**
4. Fish kills are an issue, need to clean up quickly – work with other agencies – **include this with disaster mitigation/recovery plan; general comment**
5. Accurately define high tide mark – regularly reassess - **Use shoreline change, not mean high tide. Include tides and not just sea level rise. Changes in amplitude (regular, king); Outside purview**
6. Monitor shoreline changes including island size – **Same as 5; Already Captured**
7. Improve tide models – **Same as 5; outside scope**
8. Use Environmental DNA for monitoring – **General Comment; Use emerging technologies/genetic tools, include/add**

9. Track changes including tree loss due to salt water intrusion plus invasive species – covered; **Objective 2 add strategy 1: Hammock to salt marsh / habitat succession**
10. Work with local landowners to establish salt marsh corridors - habitat modeling and floodplains. – general comments; **add to plan; gather supporting information on SLR/habitat changes for education purposes**
11. modeling to identify areas where living shoreline projects would be most effective – **general comment; Include where appropriate shoreline enhancement/interventions**
12. Also coordinate with NOAA on monitoring/modeling/predictions. – covered: **add NOAA to objective 2 / strategy 2**

Incorporated in Plan

(content present in Chapter 4 as ISs or PMs, or content addressed in MP Plan Body)

Include schedule, how often it will be done

Impacts from storms/hurricanes is not mentioned here

Look for guidance broadly – DEP resources, look outside of FL including NOAA

performance metrics should include vulnerability assessment if feasible

Monitor for any invasive species moving north with tropicalization

How are we partnering with others that share our same watershed? (And taking into account what is happening around us)

What will be done about it? i.e. can we include somehow actions to be taken in mitigation of climate change by AP and/or citizens/supporters

Include tracking stony coral tissue loss disease

Collaborate with FWC to include animal migrations (ex manatees, pythons)

Collaborate with more universities, not just UF

Collaborate with folks working in upland adjacent area and springs flow

Address boat activity impacts on living shorelines/erosion

Marsh needs room to migrate, may need to work with other agencies

Outside AP Purview

(content previously discussed by MAC and OMITTED as part of the Issues section, or outside AP purview)

Major concern about invasive species that are sold in Florida - plants and aquatic species. Plant nurseries frequently have invasive plants for sale, that should be addressed

Think about food webs/impacts on other species associated with tropicalization (snook)

Monitor spring flow
Increase Brazilian pepper management
Eelgrass restoration projects
Deal better with flooding including stormwater management
Stringent policies on seawalls, promote living shorelines

Include canals, use oysters to deal with nutrients
Use nutrient/fertilizer bans
Increase hog management

General Comments

assisted evolution for species to be more resilient to changes in our environment
As SLR increases - the hydric soils are encroaching into uplands that is making habitat for invasive and mangroves - any interaction with DEP to address the new habitat for mangroves where people hadn't had to deal with it before
High tide and nuisance flooding, winter storms/fronts also could be a focus

Baseline is key here

Effectively publicize findings

Sawgrass restoration projects for shoreline stabilization

Determine accuracy of data and use it to solve problems – simple plan
Climate change is a charged term – protect, restore, retain infrastructure/natural resources
Tides are stronger – monitor as part of SLR
Monitor sunny day flooding
Mangrove type matters – monitor changes
Goals should include action, not just documenting, ex super corals can survive hot water, oysters tolerant of salinity, ex. Collaborate with university
Educate property owners, promote living shorelines
Signage/infrastructure should be able to withstand storms

Issue Four: Human Dimensions

Priority Comments

(content provided by the Public that MAC agreed needs to be incorporated into MP)

1. Goal 3 mentions restoration but obj and strategies are all focused on reduction, not restoration – **mention restoration in obj/strategies especially who could carry it out like friends groups/citizen sci,**
2. Goal 3 – identifying areas and assessing severity – we already know river mouths are hot spots and scallop season is a major driver. Length of season too long? – boater/scalloper education, they prefer low tide – grass beds with motor down and leave prop scars -**add as education**
3. Mention cultural resources - can be well put in with the planning for future impacts and law enforcement training - **add “cultural” to G2, O2 in front of “natural”**
4. Promote more community involvement – especially youth - **check suggested language in issue 2 to see if it fits better here**
5. Specific list of partners and their expertise where they can best help – needs leadership/community involvement - **included in another chapter / appendix**
6. GIS layer that FL master site file has for specific land management area that has all known sites - Rachael Kangas - **provide this info to FWC LE, reach back out to Rachel**
7. Work closely with NOAA/FWC Marine Debris Programs. - **partnership / add mention**
8. What about installing baffle boxes that catch nutrients & trash before it gets into the water? Is there anything in the plan covering prevention? (even from a partnership perspective) - **add as partnership**

MAC General Comments:

There are items in the outside AP purview section that will still be important to pull out (even if AP does not have “power” related to them), so review!

Oil spill readiness could be something missing!! (Rapid response, disaster preparedness, event-based monitoring)

possible gap = social science research

possibly add an objective here

emphasize friends’ group + “steering” committee

Incorporated in Plan

(content present in Chapter 4 as ISs or PMs, or content addressed in MP Plan Body)

Goal three is really education, marking, enforcement, that is how you get things done

Is there a baseline for trash collected at individual places? How much trash and what is the trend?

Boater safety adding more environmental information about prop scarring and other impacts

Road construction oversight

Other industries – leeching/mining

Spring flows and MFL considerations – additional weight should be given to waters flowing into an AP – spring water bottling concerns

Outside AP Purview

(content previously discussed by MAC and OMITTED as part of the Issues section, or outside AP purview)

90-day scallop season, huge number of boats, leading to seagrass scarring. Need to get a balance between scallop season and preventing seagrass scarring. Perhaps shortening season

Upland - rain gardens, rain barrels, proper management of stormwater definitely should address

What is upland does not stay upland - work to solve pollution/trash issues before it gets downstream

Many septic tanks may be below mean high tide elevation wide – NCAP purview

Ridge road (Pasco) impact on upland areas is huge – 4 lane road to I75 or I4

Pasco county – Moffit center medical complex development, need to ensure correct water management

Lawns and run off/fertilizer missing

Septic tanks and stormwater run off

Mangrove cutting/trimming illegally esp new residents

General Comments

Cross reference info with USCG area contingency plan

Chuck Mortan has ideas signage / education material for boating / prop scarring

Are monofilament recycling bins still in use? (Answer: Yes. Sentiment: Could/should there be similar receptacles for other debris? i.e. all actions make a difference)

Does this prevent counties from submerging items to be used as fish attractors?

Sit in on USCG area contingency plan group and they talk about damage to env. and shore features as a result of vessel accidents etc. can you get mitigation for resource damage?

Working more with youth on environmental awareness and stewardship

Create a mooring ball field in the scallop grounds

Monofilament recycling/collection tubes at access points – also access points have trash cans

Poster w/proper scar and the bill for boat damage and show people what lives in seagrass

Make a video similar to “manatee manners” for seagrass/boating rental and boat sales distributors

And education, education, education...

Invasive species spreading by gear/equipment

Rental boats/education – follow routes they should not go

Promote poll/troll areas in heavily impacted areas like St. Martins keys

Citations from FWC are no more than traffic violation – very low cost to boater, may not be a deterrent, some just consider it “cost of day on the water”

Like idea of working with decision makers – specificity to say is this meeting attendance at BOCC or is it getting commissioners on the water which would be best

Maybe restoration plan would help focus projects

In the keys (FK Comm fishing) partner with FWC/State to go collect derelict gear

Groups of divers good partners, things like lionfish roundups

Septic tanks in Hudson lead to beach closures, fecal coliform, county was going to remove but so far hasn't

Viruses from septic tanks in Chaz – USF study early 2000s – polio/enterovirus found) started to look more at sewer after that

Legacy of old/not raised septic systems – replacements/upgrades planned?

Preserve should be focused on connection to sewers becoming available in crystal river, Homosassa

BOCC – wastewater treatment, compel sewer connection

BMAP involvement – some of this falls under Priority Focus Areas, could help with ordinances

Marine debris is mostly coming from upland sources so should just focus on debris in general

Villages – water pumping/development Pasco/Hernando

Evaluate if there is enough LE

Many derelict vessels sit for a very long time and no action is done

I think these are good goals

Is there a possibility of unknown uses of seagrass like direct harvest for human consumption causing decline?

Piney Point and other disaster incidents - what can actually be done about these? very frustrating - are we wasting our time?

enforcement of impacts to seagrass is essential / key for success

Appendix D / Goals, Objectives, and Strategies

D.1 / Current Goals, Objectives, and Strategies Budget 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. This draft budget outline contains a rough cost estimate of needs for the Nature Coast Aquatic Preserve Management Plan. The purpose of this table is to aid in final discussions associated with adopting this plan and revision is expected prior to the plan being signed by the Board of Trustees. The following represents expected budgetary needs for items such as field operations, education and outreach materials, and travel support managing the resources of the aquatic preserve. This budget was developed using data from the Office of Resilience and Coastal Protection (ORCP) 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 and vehicle/vessel levels and does not include the costs associated with staffing such as salary or benefits nor costs related to vehicle or boat purchases. Budget categories identified correlate with the ORCP 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 and italics indicate funding not available at this time.

Goals, Objectives & Integrated Strategies	Management Program	Implementation Date (Planned)	Length of Initiative	Estimated Average Yearly Cost	Funding Source	2022 - 2023	2023- 2024	2024- 2025	2025- 2026	2026- 2027	2027- 2028	2028- 2029	2029- 2030	2030- 2031	2031- 2032
Issue 1: Water Resources															
Goal 1: Assess and define water quality and quantity monitoring needs.															
Objective 1: Identify existing water quality monitoring programs, catalog the parameters being recorded and identify essential data gaps within the NCAP and its contributing tributaries.															
Strategy 1: Communicate with partners, like Southwest Florida Water Management District, to determine current and historical locations of continuous water quality monitoring station locations within the NCAP.	Ecosystem Science	2022-2023	As needed	No additional cost											
Strategy 2: Communicate with partners, like DEP’s Division of Environmental Assessment and Restoration (DEAR), to determine current and historical locations of water quality nutrient monitoring site locations within the NCAP.	Ecosystem Science	2022-2023	As needed	No additional cost											
Strategy 3: Identify and compare nutrient monitoring efforts with partner efforts, like DEP’s DEAR nutrient monitoring program, to determine overlap/gaps.	Ecosystem Science	2022-2023	1	No additional cost											
Strategy 4: Identify and collaborate with citizen science programs collecting relevant data within the NCAP.	Ecosystem Science	2024-2025	Ongoing	No additional cost											
Objective 2: Identify and formulate options relating to historical programs and data gaps associated with water resources within the aquatic preserve boundaries and its contributing tributaries.															
Strategy 1: Assess feasibility of restarting historical data collection at locations that are relevant to maintaining a sound baseline dataset for the NCAP.	Ecosystem Science	2020	1	No additional cost	S										
Strategy 2: Determine if current sampling efforts are sufficient, and if not – develop and propose a revised plan of action.	Ecosystem Science	2022-2023	2	\$10,000		\$10,000	\$10,000								

Goals, Objectives & Integrated Strategies	Management Program	Implementation Date (Planned)	Length of Initiative	Estimated Average Yearly Cost	Funding Source	2022 - 2023	2023- 2024	2024- 2025	2025- 2026	2026- 2027	2027- 2028	2028- 2029	2029- 2030	2030- 2031	2031- 2032
Goal 2: Expand strategic long-term continuous water quality monitoring efforts within NCAP to assist in the identification and future management of issues relating to the aquatic preserve's submerged resources.															
Objective 1: Establish a reliable baseline dataset to assess and monitor water quality within the Nature Coast Aquatic Preserve.															
Strategy 1: Identify appropriate continuous water quality monitoring station locations.	Ecosystem Science	2023-2024	Ongoing	\$500			\$500	\$500							
Strategy 2: Apply for appropriate funding sources to obtain necessary equipment, as well as maintenance supplies, to install and maintain an appropriate number of continuous water quality monitoring stations.	Ecosystem Science	2023-2024	Ongoing	\$65,000			\$185,000	\$35,000	\$35,000	\$35,000	\$35,000	\$185,000	\$35,000	\$35,000	\$35,000
Strategy 3: Coordinate with appropriate agencies to determine if the installation of supplemental equipment (e.g., flow meters) at continuous monitoring stations is needed to assess water quantity or other supplemental parameters where applicable.	Partnering (Ecosystem Science)	2024-2025	As needed	\$500				\$500	\$500			\$500	\$500		
Goal 3: Ensure that NCAP waters meet or exceed water quality standards associated with their designated use as Class II and III waters, and that those that currently exceed the designated use are not degraded below their ambient condition pursuant to NCAP's Outstanding Florida Water status.															
Objective 1: To identify trends, changes, and needs within the NCAP's waters.															
Strategy 1: Assist with and utilize data from the FWC-FWRI Harmful Algal Bloom program to monitor for changes.	Partnering (Ecosystem Science)	2021	Ongoing	Included in other strategy	S										
Strategy 2: Conduct nutrient monitoring and analyze data for system health assessments. Utilize partner data in annual analysis (e.g., DEP DEAR nutrient sampling, SWFWMD sampling).	Ecosystem Science	2021	Ongoing	\$70,000	S/F	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000
Strategy 3: Develop adaptive management strategies to address and improve water quality components that exceed benchmark/threshold criteria.	Resource Management	2023-2024	As needed	No additional cost											
Strategy 4: Conduct appropriate short term/temporary monitoring or disaster response monitoring to inform efforts to mitigate environmental threats in collaboration with partners.	Ecosystem Science	2024	As needed	\$5,000				\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
Goal 4: Emphasize upland connections to NCAP's submerged resources.															
Objective 1: Identify influencing factors outside the aquatic preserve boundary contributing to resource degradation and provide support and collaboration to prevent degradation and improve conditions when possible.															
Strategy 1: Notify agency partners of findings, propose changes to address present or potential future impacts to the NCAP, assist in efforts where applicable and possible through interagency collaboration.	Partnering (Resource Management)	2023-2024	Ongoing	\$1,000			\$1,000			\$1,000			\$1,000		

Goals, Objectives & Integrated Strategies	Management Program	Implementation Date (Planned)	Length of Initiative	Estimated Average Yearly Cost	Funding Source	2022 - 2023	2023- 2024	2024- 2025	2025- 2026	2026- 2027	2027- 2028	2028- 2029	2029- 2030	2030- 2031	2031- 2032
Strategy 2: Establish and/or host quarterly regional workshops to encourage collaboration and data sharing to improve contributing water quality (e.g., engage with groups like Springs Coast Committee, create NCAP steering committee).	Partnering (Resource Management)	2022-2023	Ongoing	\$4,000	S/O	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000
Strategy 3: Participate in decision making processes for actions in upriver/inland waterbodies influencing NCAP (e.g., TMDL, BMAP, minimum flows and levels).	Resource Management	2023-2024	As needed	\$500			\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500
Strategy 4: Support federal, state, local and non-governmental land acquisition programs to protect headwaters and riparian corridors for rivers and streams that discharge into the NCAP.	Resource Management	2023-2024	As needed	Included in other strategy											
Strategy 5: Develop adaptive management strategies to address and improve water quality components.	Resource Management	2024-2025	Ongoing	Included in other strategy											
Objective 2: Partner with nearby landowners to protect and improve conditions of the NCAP.															
Strategy 1: Identify and include appropriate nearby landowners/managers in decision making processes and education/outreach.	Resource Management	2023-2024	As needed	\$250			\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250
Objective 3: Partner with government agencies and committees including but not limited to federal, state, and local government agencies and stakeholders.															
Strategy 1: Engage with local government natural resource and planning departments to enhance coastal information input (e.g., fertilizer ordinances, wetland protection).	Resource Management	2023-2024	As needed	\$250			\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250
Strategy 2: Participate in decision making processes for actions in upriver/inland waterbodies influencing NCAP (development, construction, habitat acquisition, watershed activities, etc.).	Resource Management	2023-2024	As needed	\$250			\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250
Issue 2: Protection and Management of Submerged Resources															
Goal 1: Assess historical and present condition of submerged resources to guide management decisions within the Nature Coast Aquatic Preserve.															
Objective 1: Identify and formulate monitoring programs to assess status and trends associated with submerged resources within NCAP.															
Strategy 1: Coordinate with agencies and other groups monitoring submerged resources within the NCAP.	Ecosystem Science	2022-2023	As needed	No additional cost											
Strategy 2: Participate in and/or host interagency collaborative meetings focusing on submerged resources to ensure data gaps and duplicate efforts are addressed and data is shared in a timely manner (e.g., SIMM).	Ecosystem Science	2024-2025	Ongoing	\$25,000			\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
Strategy 3: Assess feasibility of restarting historical data collection at locations that are relevant to maintaining a sound baseline dataset for NCAP.	Ecosystem Science	2022-2023	1	No additional cost											
Strategy 4: Determine if current sampling efforts are sufficient, and if not, develop and propose a revised plan of action.	Ecosystem Science	2022-2023	2	Included in other strategy											
Objective 2: Determine the status of intertidal natural resource communities within NCAP.															

Goals, Objectives & Integrated Strategies	Management Program	Implementation Date (Planned)	Length of Initiative	Estimated Average Yearly Cost	Funding Source	2022 - 2023	2023- 2024	2024- 2025	2025- 2026	2026- 2027	2027- 2028	2028- 2029	2029- 2030	2030- 2031	2031- 2032
Strategy 1: Assess the need for and determine the feasibility of establishing mapping and/or monitoring programs for oyster reef, salt marsh, and mangrove island habitats within NCAP.	Ecosystem Science	2023-2024	2	\$25,000		\$25,000	\$25,000					\$25,000			
Strategy 2: Leverage interagency collaboration to assist with mapping and monitoring of intertidal communities.	Partnering (Ecosystem Science)	2024-2025	As needed	\$500			\$500		\$500			\$500		\$500	
Strategy 3: Participate in and/or host interagency collaborative meetings focusing on intertidal communities (e.g., OIMMP, CHIMMP).	Partnering (Ecosystem Science)	2024-2025	As needed	Included in other strategy											
Objective 3: Identify current and potential future threats and impacts to the natural communities within NCAP.															
Strategy 1: Develop a steering committee of academic experts and resource managers to promote robust collaboration of efforts and to identify threats and impacts before or as they occur.	Resource Management	2022-2023	Ongoing	Included in other strategy											
Strategy 2: Coordinate with agencies and other groups currently monitoring submerged resources within the NCAP to ensure threat or impact indicators are captured in monitoring datasets.	Partnering (Ecosystem Science)	2024-2025	As needed	Included in other strategy											
Goal 2: To understand, protect, and maintain existing seagrass resources, and restore and enhance degraded seagrass resources where these occur.															
Objective 1: Manage seagrass communities through research and monitoring, education and outreach, and collaborative mapping efforts with other state agencies to effectively protect and maintain this habitat as a valuable habitat throughout NCAP.															
Strategy 1: Complete a comprehensive assessment of the current and historic spatial extent of seagrass habitat and spatially characterize the relative quality of that habitat, including areas of heavy prop scarring.	Partnering (Ecosystem Science)	2024-2025	1 year (repeated every 4 years)	Included in other strategy											
Strategy 2: Establish and implement annual submerged aquatic vegetation monitoring in collaboration with neighboring aquatic preserve programs.	Ecosystem Science	2021	Ongoing	\$4,000	S	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000
Strategy 3: Incorporate research-based indicators of seagrass condition (e.g., above/belowground biomass, tissue stoichiometry, stable isotopes, indicator species status (e.g., marine turtles, bay scallops, manatees) etc.) and sediment quality (e.g., organic carbon and nutrient stocks, sulfides, and grain size and texture) into monitoring programs to provide insights and early-warning signs of seagrass stress.	Ecosystem Science	2023-2024	Ongoing	\$10,500-12,500			\$12,500	\$10,500	\$10,500	\$10,500	\$10,500	\$10,500	\$10,500	\$10,500	\$10,500
Strategy 4: Identify, implement, and support research to deepen understanding of seagrass community function along environmental gradients (e.g., north-south, inshore-offshore).	Ecosystem Science	2024-2025	Ongoing	\$500-5,000				\$500	\$5,000	\$5,000	\$5,000	\$500	\$500	\$5,000	\$500
Strategy 5: Identify needs and funding sources for restoration and enhancement efforts to address seagrass resource degradation identified within the NCAP.	Resource Management	2025-2026	Ongoing	Included in other strategy											
Goal 3: To understand, protect, and maintain hardbottom (coral/sponge bed) resources.															
Objective 1: Protect and manage hardbottom communities to ensure long term survivorship and ecological functions continue within the NCAP.															

Goals, Objectives & Integrated Strategies	Management Program	Implementation Date (Planned)	Length of Initiative	Estimated Average Yearly Cost	Funding Source	2022 - 2023	2023- 2024	2024- 2025	2025- 2026	2026- 2027	2027- 2028	2028- 2029	2029- 2030	2030- 2031	2031- 2032
Strategy 1: Identify, implement, and support research into ecosystem function and significance of hardbottom communities.	Ecosystem Science	2024-2025	Ongoing	\$500-5,000				\$500	\$5,000	\$5,000	\$5,000	\$500	\$500	\$5,000	\$500
Strategy 2: Continue comprehensive assessments of the spatial extent of hardbottom habitat within NCAP.	Partnering (Ecosystem Science)	2024-2025	1 year (repeated every 10 years)	\$500,000				\$500,000							
Strategy 3: Establish and implement hardbottom community monitoring in collaboration with neighboring aquatic preserves programs (i.e., assess coral and sessile invertebrate abundance and composition on hardbottom habitat and analyze monitoring data for trends).	Ecosystem Science	2023-2024	Ongoing	\$4,000			\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000
Strategy 4: Characterize hardbottom habitats, including areas of special significance and areas of incompatible use.	Resource Management	2025-2026	2	\$500-5,000				\$5,000	\$5,000						
Strategy 5: Explore use of spatial management areas including sea turtle, coral, and sponge refugia, areas that are most appropriate for non-consumptive ecotourism, no-anchoring areas, as well as areas where moorings and/or designated anchoring may be provided for sport fishing and non-consumptive tourism.	Public Use	2025-2026	As needed	\$500 – 15,000				\$500	\$500	\$15,000	\$500	\$500	\$500	\$500	\$500
Goal 4: Monitor the distribution and abundance of macroalgae within NCAP.															
Objective 1: Establish a baseline understanding of macroalgae components of the NCAP ecosystem.															
Strategy 1: Develop a catalog of macroalgal species that occur within NCAP and identify taxa of special concern (e.g., species with nuisance/bloom potential, ecological indicator species).	Ecosystem Science	2024-2025	1	\$6,000				\$6,000							
Strategy 2: Explore the use of volunteer-based science programs to monitor the abundance of drifting macroalgae.	Education and Outreach	2024-2025	Ongoing	\$1,500				\$4,000	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500
Goal 5: Preserve the conditions of Nature Coast Aquatic Preserve's submerged resources.															
Objective 1: Work toward establishing minimum thresholds/monitoring criteria/benchmarks for NCAP's submerged resources in coordination with scientists and managers from other agencies and institutions.															
Strategy 1: Identify/map sensitive submerged habitats like seagrass, hardbottom sponge communities, and submerged marine vents, for management purposes.	Resource Management	2025-2026	3	\$30,000				\$30,000	\$30,000	\$30,000					
Strategy 2: Establish baselines of habitats that are linked to water quality such as seagrass, sponges, oyster reefs (distributions, community structure, densities, biomass estimates, etc.).	Ecosystem Science	2025-2026	3	Included in other strategy											
Strategy 3: Implement adaptive management tools and restoration projects when/if minimum thresholds/benchmarks are not met.	Resource Management	2024 - 2025	Ongoing	\$0 – 60,000				\$5,000	\$1,000	\$61,000	\$61,000	\$61,000			
Objective 2: Identify and protect submerged and intertidal cultural resources.															

Goals, Objectives & Integrated Strategies	Management Program	Implementation Date (Planned)	Length of Initiative	Estimated Average Yearly Cost	Funding Source	2022 - 2023	2023- 2024	2024- 2025	2025- 2026	2026- 2027	2027- 2028	2028- 2029	2029- 2030	2030- 2031	2031- 2032
Strategy 1: Partner with federal and state cultural resource agencies, NGOs and universities to ensure cultural resources are accurately documented and protected.	Resource Management	2023-2024	Ongoing	\$250-\$1,000			\$1,000	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250
Strategy 2: Work with cultural resource partners to identify and address threats to cultural resources from human impacts such as looting, boat wake erosion, climate change, and other NCAP user group activities.	Resource Management	2023-2024	Ongoing	\$250			\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250
Strategy 3: Support cultural resource partners in establishing and implementing submerged cultural resource monitoring comparable to programs utilized by neighboring aquatic preserves.	Resource Management	2023-2024	Ongoing	\$250			\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250	\$250
Goal 6: Provide scientific data and information on the current and projected status of submerged resources to Nature Coast communities, businesses, and officials to improve stewardship of the NCAP in decision-making for coastal development and conservation.															
Objective One: Improve community understanding of submerged resources and factors that impact the Nature Coast Aquatic Preserve by improving data dissemination and accuracy.															
Strategy 1: Upload all eligible data into DEP's Statewide Ecosystem Assessment of Coastal and Aquatic Resources (SEACAR) database, as well as other science-based databases to improve reach.	Ecosystem Science	2021	Ongoing	No additional cost											
Strategy 2: Collaborate with partners to develop information briefs on submerged resources with executive summaries that are readily accessible and written for public distribution.	Education and Outreach	2024-2025	Ongoing	No additional cost											
Issue 3: Climate Change															
Goal 1: Ensure that the NCAP remains resilient to expected impacts from climate change, including tropicalization and climate-induced habitat migration.															
Objective 1: Track and predict climate factors such as sea level rise, increases in sea surface temperature, storm frequency and intensity, and alterations in drought/flood cycles as they pertain to all NCAP's submerged and coastal resources.															
Strategy 1: Expand and build new collaborative research and monitoring partnerships with universities, their research stations, and other state agency programs whereby data collection, research equipment, volunteers, student training, and other human resources are shared to achieve monitoring objectives.	Partnering (Ecosystem Science)	2023-2024	Ongoing	\$1,000			\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Strategy 2: Develop a steering committee of academic experts and resource managers to review climate-related ecosystem research in the region and provide science-based guidance for submerged resource management planning and program development.	Ecosystem Science	2024-2025	Ongoing	\$2,000			\$2,000	\$5,000	\$2,000	\$2,000	\$2,000	\$2,000	\$5,000	\$2,000	\$2,000
Objective 2: Establish processes to track and predict climate-driven changes to all NCAP's submerged resources to guide adaptive management approaches.															
Strategy 1: Establish monitoring for tidally influenced communities, like salt marsh and mangroves, to better understand factors such as accretion and erosion rates and habitat transitions/migrations (e.g., mangrove encroachment or uplands to salt marsh/mangroves).	Ecosystem Science	2025-2026	Ongoing	\$3,000 (startup/equipment = \$100,000)	S				\$100,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000

Goals, Objectives & Integrated Strategies	Management Program	Implementation Date (Planned)	Length of Initiative	Estimated Average Yearly Cost	Funding Source	2022 - 2023	2023- 2024	2024- 2025	2025- 2026	2026- 2027	2027- 2028	2028- 2029	2029- 2030	2030- 2031	2031- 2032
Strategy 2: Review and incorporate partner projects to develop recommendations and incorporate adaptive planning tools that address shifting submerged resources (e.g., USFWS/ANERR SET stations, FWC Estuary Restoration Teams to support habitat suitability modelling).	Partnering (Ecosystem Science)	2024-2025	Ongoing	Included in other strategy	S										
Strategy 3: Explore citizen science data collection to augment research and monitoring programs (examples: temperature, water levels, climate-driven species shifts, photo posts, drone imagery or other parameters like elevation, pre-post storm documentation).	Ecosystem Science	2025-2026	As needed	\$3,000					\$3,000			\$3,000			\$3,000
Strategy 4: Identify knowledge gaps in climate-vulnerable resources including seagrasses and western offshore regions of stony corals, hardbottom, and sponge habitats. Pursue collaborative research to address gaps.	Ecosystem Science	2023-2024	Ongoing	Included in other strategy											
Strategy 5: Work with partners to model the impact of sea level rise on the NCAP's submerged lands and resources including documented cultural sites and tidal wetlands using the most appropriate models and frameworks (e.g., NOAA 2040 and 2070 predictions).	Ecosystem Science	2025-2026	3	\$100,000					\$100,000	\$100,000	\$100,000				
Strategy 6: Based on predictive modeling, identify areas where submerged and intertidal habitats will be likely to shift due to sea level rise and apply a response framework (e.g., RAD, stakeholder-driven adaptation plans) to guide resource management decisions.	Resource Management	2027-2028	Ongoing	Included in other strategy											
Strategy 7: Identify known submerged and intertidal cultural resource sites that may be affected by climate change impacts such as sea level rise and storm damage and consult with cultural resource partners to determine priorities for documenting and, if warranted, protecting at risk sites due to climate change.	Resource Management	2026-2027	As needed	Included in other strategy											
Issue 4: Human Dimensions															
Goal 1: Identify the impacts of, remove, and reduce the presence of marine debris (litter, derelict vessels, ghost traps, aquaculture and discarded fishing gear) within the aquatic preserve.															
Objective 1: Identify implications to the natural resources of the various types of marine debris occurring within the aquatic preserve.															
Strategy 1: Conduct surveys assessing types of marine debris, documenting areas of high concentration, and noting habitat impacts of each type.	Public Use	2022-2023	Ongoing	\$1000		\$1,000	\$500	\$250				\$500	\$500		
Strategy 2: Analyze data collected from marine debris removal efforts (both Aquatic Preserve and partner hosted events).	Public Use	2023-2024	Ongoing	No additional cost											
Strategy 3: Apply results of analyses to prioritize of marine debris removal and educational efforts for contributing user groups.	Public Use	2023-2024	Ongoing	\$1,000-\$3,000			\$1,000	\$1,500	\$3,000	\$1,500	\$1,500	\$3,000	\$1,500	\$1,500	\$1,500

Goals, Objectives & Integrated Strategies	Management Program	Implementation Date (Planned)	Length of Initiative	Estimated Average Yearly Cost	Funding Source	2022 - 2023	2023- 2024	2024- 2025	2025- 2026	2026- 2027	2027- 2028	2028- 2029	2029- 2030	2030- 2031	2031- 2032
Strategy 4: Review County comprehensive plans regarding the reduction of marine debris and attend meetings of local and state government boards and agencies to provide guidance and discuss relevant issues within NCAP.	Public Use	2024-2025	As needed	Included in other strategy											
Objective 2: Remove marine debris from the resource by physical means.															
Strategy 1: Apply for funding to offset cost of marine debris removal efforts.	Public Use	2023-2024	Ongoing	\$12,000			\$12,000	\$500	\$1,000	\$500	\$1,000	\$500	\$1,000	\$500	\$1,000
Strategy 2: Conduct community-based marine debris removal events and invite partners/source contributors to attend and assist (e.g., members of the public for shoreline cleanups; law enforcement, recreational and commercial fishers, and aquaculture industry for fishing gear cleanups, etc.).	Public Use	2023-2024	Ongoing	Included in other strategy			\$12,000	\$500	\$1,000	\$500	\$1,000	\$500	\$1,000	\$500	\$1,000
Objective 3: Reduce marine debris at the source.															
Strategy 1: Assess types of marine debris within the NCAP, quantify the data and determine the sources.	Public Use	2023-2024	2	No additional cost											
Strategy 2: Work with community members to reduce quantity of debris entering the NCAP.	Public Use	2023-2024	Ongoing	\$1,250			\$1,250		\$1,250		\$1,250		\$1,250		\$1,250
Strategy 3: Host community-based cleanup events to improve user group interest.	Public Use	2023	Ongoing	Included in other strategy											
Strategy 4: Engage with local government natural resource and planning departments to reduce or prevent the creation of litter/marine debris outright and attend meetings of local/state government boards and agencies to provide updates and discuss relevant issues within NCAP as appropriate to influencing factors of litter/marine debris production as they are identified.	Public Use	2024-2025	As needed	Included in other strategy											
Objective 4: Promote community education regarding implications of marine debris in the Aquatic Preserve and of solutions/impactful debris reduction actions they can take.															
Strategy 1: Involve local decision makers and community influencers in marine debris removal events and provide information about marine debris interventions that can be implemented upstream.	Education and Outreach	2023-2024	Ongoing	Included in other strategy											
Strategy 2: Promote community education and awareness by attending and/or facilitating community events relating to marine debris.	Education and Outreach	2023-2024	Ongoing	Included in other strategy											
Goal 2: Support community engagement to foster sustainable stewardship of NCAP's resources.															
Objective 1: Improve community understanding of the Nature Coast Aquatic Preserve's water quality and submerged and intertidal resources including factors that impact the Aquatic Preserve.															
Strategy 1: Create and disseminate accurate information via community outreach, media and signage.	Education and Outreach	2024-2025	Ongoing	\$5,000				\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000

Goals, Objectives & Integrated Strategies	Management Program	Implementation Date (Planned)	Length of Initiative	Estimated Average Yearly Cost	Funding Source	2022 - 2023	2023- 2024	2024- 2025	2025- 2026	2026- 2027	2027- 2028	2028- 2029	2029- 2030	2030- 2031	2031- 2032
Strategy 2: Develop appropriate media communications associated with water quality and submerged resource topics of concern to broaden information dispersal.	Education and Outreach	2023-2024	Ongoing	Included in other strategy											
Strategy 3: Hold/support workshops on subjects such as shoreline protection, green infrastructure, coastal-friendly living, coastal resilience, and ecosystem services.	Education and Outreach	2023-2024	Ongoing	\$2,000			\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000
Strategy 4: Provide educational on-water site visits to the NCAP for community leaders to aid them in making informed decisions about coastal development and conservation; and members of the public to broaden awareness regarding the Nature Coast Aquatic Preserve.	Education and Outreach	2023-2024	Ongoing	\$500			\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500
Strategy 5: Support community driven resource protection programs to encourage user-driven education (e.g., Blue Star Fishing Guides, Florida Society for Ethical Tourism, Florida Friendly Fishing Guide, etc.).	Education and Outreach	2023-2024	Ongoing	Included in other strategy											
Strategy 6: Support local education programs that enhance and foster sustainable stewardship practices within the NCAP (e.g., STEAM programs in public schools, Citrus County Marine Science Station, Florida Sea Grant 3rd Grade Manatee Curriculum, Sea-level Rise in the Classroom, Hook Line and Thinker, etc.).	Education and Outreach	2023-2024	Ongoing	Included in other strategy											
Objective 2: Engage with law enforcement to maintain and improve conditions of NCAP's water quality and submerged resources.															
Strategy 1: Participate in cultural and natural resource education of local and state law enforcement officers.	Education and Outreach	2024-2025	Ongoing	Included in other strategy											
Strategy 2: Develop communication and partnerships with law enforcement officers to assist in identifying and addressing emerging and ongoing resource threats.	Partnering (Resource Management)	2024-2025	Ongoing	No additional cost											
Objective 3: Improve community education regarding implications of climate change in the aquatic preserve and of adaptation/resilience efforts.															
Strategy 1: Engage local decision makers and community influencers in discussions about ways to reduce and adapt to the impacts of climate change.	Partnering (Resource Management)	2024-2025	Ongoing	No additional cost											
Strategy 2: Track climate change interaction opportunities and promote behavior changing stewardship through education and other interventions.	Education and Outreach	2024-2025	Ongoing	\$2,000			\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000
Goal 3: Promote diverse, sustainable use of the Nature Coast Aquatic Preserve's submerged natural resources.															
Objective 1: Anticipate impacts related to increased use and identify potential conflicts/impacts (environmental) like construction, pipelines, development and roadways, etc. and collaborate to mitigate or prevent habitat damage related to increased use/development.															
Strategy 1: Provide input to state and local decision makers on future establishment of access points for both motorized and paddle craft points of entry.	Public Use	2023-2024	Ongoing	\$250	S		\$250		\$250		\$250		\$250		\$250

Goals, Objectives & Integrated Strategies	Management Program	Implementation Date (Planned)	Length of Initiative	Estimated Average Yearly Cost	Funding Source	2022 - 2023	2023- 2024	2024- 2025	2025- 2026	2026- 2027	2027- 2028	2028- 2029	2029- 2030	2030- 2031	2031- 2032
Strategy 2: Provide education to and support sustainable actions of user groups.	Public Use	2024-2025	Ongoing	\$6,000				\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000
Strategy 3: Work with subject matter experts to identify specific actions that would prevent or reduce environmental impacts and deliver information to decision makers.	Public Use	2024-2025	As needed	Included in other strategy											
Strategy 4: Work with decision makers and involved parties to prevent or reduce impacts to preserve resources and water quality.	Resource Management	2025-2026	Ongoing	\$3,000				\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000
Objective 2: Coordinate and support law enforcement to reduce or prevent impacts to natural and cultural resources.															
Strategy 1: Identify areas where resources are experiencing increased use and damage and exchange information with law enforcement.	Resource Management	2025-2026	Ongoing	\$1,000				\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Strategy 2: Aid law enforcement by working to improve criteria to increase enforceability of impacts to submerged resources.	Resource Management	2024-2025	As needed	Included in other strategy											
Goal 4: Identify impacted areas, assess impact severity, and begin to implement reduction and restoration efforts relating to propeller damage, vessel grounding, and anchoring related activities occurring to submerged resources within the Nature Coast Aquatic Preserve.															
Objective 1: Assess and identify areas of impact within the Nature Coast Aquatic Preserve.															
Strategy 1: Collaborate and/or apply for funding to conduct seasonal aerial mapping of shallow areas within the NCAP boundary.	Ecosystem Science	2024-2025	As needed	\$50,000				\$50,000		\$50,000				\$50,000	
Strategy 2: Identify user groups and spatiotemporal areas of greatest impact.	Public Use	2026-2027	As needed	Included in other strategy											
Strategy 3: Seek resources to restore damaged seagrass areas, especially for areas where new protection and prevention measures are implemented.	Resource Management	2024-2025	As needed	Included in other strategy											
Objective 2: Reduce physical damage (e.g., propeller scarring, anchor drags) to the NCAP's submerged resources.															
Strategy 1: Provide educational material on alternative methods (examples: pole and troll and less destructive anchoring and mooring methods, expansion of 'Scars Hurt' educational campaign).	Education and Outreach	2023-2024	Ongoing	\$8,000			\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000
Strategy 2: Identify and fill research gaps on effectiveness and feasibility of exclusion zones, pole and troll/no-motor zones, and/or limited access areas for resource protection.	Public Use	2025-2026	3	\$40,000				\$60,000	\$40,000	\$40,000					
Strategy 3: Utilize, where appropriate, spatially explicit approaches such as rotating vessel exclusion zones, pole and troll areas, and pole/stick anchoring zones that prevent habitat damage (e.g., propeller scarring in seagrass, anchor damage in hardbottom) and promote habitat recovery from physical damage.	Public Use	2027-2028	Ongoing	\$25,000					\$25,000		\$25,000			\$25,000	

Goals, Objectives & Integrated Strategies	Management Program	Implementation Date (Planned)	Length of Initiative	Estimated Average Yearly Cost	Funding Source	2022 - 2023	2023- 2024	2024- 2025	2025- 2026	2026- 2027	2027- 2028	2028- 2029	2029- 2030	2030- 2031	2031- 2032
Strategy 4: Collaborate with groups such as law enforcement and waterway maintenance entities to inform appropriate actions to address boating impacts.	Public Use	2024-2025	Ongoing	Included in other strategy											
Strategy 5: Incorporate management practices that prevent or reduce the creation of propeller and anchor scars by improving navigation or establishing mooring areas within NCAP waterways.	Public Use	2027-2028	Ongoing	Included in other strategy											
Strategy 6: Identify scarring hotspots and determine the best practice to reduce scarring, may include education, pole and troll zones, for both creating and enforcing poling only zones and prioritizing increased enforcement.	Public Use	2025-2026	Ongoing	Included in other strategy											

D.2 / Budget Summary Table

Fiscal Year	Ecosystem Science	Education and Outreach	Partnering	Public Use	Resource Management	Annual Total
2022-2023	\$109,000	\$0	\$4,000	\$1,000	\$0	\$114,000
2023-2024	\$311,000	\$12,500	\$6,000	\$25,500	\$2,250	\$357,250
2024-2025	\$712,000	\$16,500	\$5,500	\$7,250	\$37,000	\$778,250
2025-2026	\$361,500	\$14,000	\$5,000	\$68,500	\$6,750	\$455,750
2026-2027	\$255,500	\$14,000	\$6,000	\$72,000	\$71,750	\$419,250
2027-2028	\$170,500	\$14,000	\$5,000	\$48,000	\$5,750	\$243,250
2028-2029	\$330,500	\$14,000	\$5,000	\$32,500	\$5,750	\$387,750
2029-2030	\$123,500	\$14,000	\$6,000	\$8,250	\$5,750	\$157,500
2030-2031	\$205,500	\$14,000	\$5,000	\$32,000	\$5,750	\$262,250
2031-2032	\$123,500	\$14,000	\$5,000	\$8,250	\$5,750	\$156,500
Ten Year Totals	\$2,702,500	\$127,000	\$52,500	\$303,250	\$146,500	\$3,331,750

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

This is the first management plan for the Nature Coast Aquatic Preserve.

Appendix E / 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

Section A: Acquisition Information Items

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
1	The common name of the property.	18-2.018 & 18-2.021	Executive Summary
2	The land acquisition program, if any, under which the property was acquired.	18-2.018 & 18-2.021	1
3	Degree of title interest held by the Board, including reservations and encumbrances such as leases.	18-2.021	1, 7-9
4	The legal description and acreage of the property.	18-2.018 & 18-2.021	Executive Summary
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	14
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	59-71
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)	7-8
10	Proximity of property to other significant State, local or federal land or water resources.	18-2.021	2, 13-14, 61

Section B: Use Items

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
11	The designated single use or multiple use management for the property, including use by other managing entities.	18-2.018 & 18-2.021	3
12	A description of past and existing uses, including any unauthorized uses of the property.	18-2.018 & 18-2.021	11-13, 74-80, 86-88, 93-98, 101-108
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	3
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	54-55
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	74-111
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)	101-111
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	7-9
19	Letter of compliance from the local government stating that the LMP is in compliance with the Local Government Comprehensive Plan.	BOT requirement	
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	101-111
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)	

*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

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
24	A statement concerning the extent of public involvement and local government participation in the development of the plan, if any.	18-2.021	Appendix 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)	Appendix C
27	Summary of comments and concerns expressed by the advisory group for parcels over 160 acres	18-2.021	Appendix 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)	Appendix 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>	259.036	N/A
30	Summary of comments and concerns expressed by the management review team, if required by Section 259.036, F.S.	18-2.021	N/A
31	If manager is not in agreement with the management review team's findings and recommendations in finalizing the required 10-year update of its management plan, the managing agency should explain why they disagree with the findings or recommendations.	259.036	N/A

Section D: Natural Resources

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
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	20-28
33	Insert FNAI based natural community maps when available.	ARC consensus	40
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	Executive Summary

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	15-42
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	20
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	42-46, Appendix B.3
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	46-51, Appendix B.3
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	29-42
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)	74, 82, 85-86, 90, 92, 100-101, 109
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)	73-111
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)	Appendix D.1
42-C.	The associated measurable objectives to achieve the goals.	259.032(10) & 253.034(5)	80-86, 89-93, 98-101, 108-111, Appendix 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)	80-86, 89-93, 98-101, 108-111, Appendix 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)	Appendix D.2
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)	
44	Sustainable Forest Management, including implementation of prescribed fire management	18-2.021, 253.034(5) & 259.032(10)	N/A

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
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)	73-111
45-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	80-86, 89-93, 98-101, 108-111, Appendix D.1
45-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	80-86, 89-93, 98-101, 108-111, Appendix D.1
45-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	80-86, 89-93, 98-101, 108-111, Appendix D.1
45-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	Appendix D.2
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)	
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	Appendix 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)	80-86, 89-93, Appendix D.1
48-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	80-86, 89-93, Appendix D.1
48-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	80-86, 89-93, Appendix D.1
48-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	80-86, 89-93, Appendix D.1
48-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	Appendix D.2

Section E: Water Resources

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
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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	N/A
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	22-28
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	29-33
52	***Quantitative description of the land regarding an inventory of hydrological features and associated acreage. <i>See footnote.</i>	253.034(5)	Map 7: page 27
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)	80-86, 89-93, Appendix 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)	80-86, 89-93, Appendix D.1
53-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	80-86, 89-93, Appendix D.1
53-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	80-86, 89-93, Appendix D.1
53-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	Appendix D.2

Section F: Historical Archaeological and Cultural Resources

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
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	Appendix B.5
55	***Quantitative data description of the land regarding an inventory of significant land, cultural or historical features and associated acreage.	253.034(5)	
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	92
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)	82-86, 90-92, Appendix 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)	82-86, 90-92, Appendix D.1
57-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	82-86, 90-92, Appendix D.1

57-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	82-86, 90-92, Appendix D.1
57-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	Appendix D.2

**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)

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
58	***Quantitative data description of the land regarding an inventory of infrastructure and associated acreage. <i>See footnote.</i>	253.034(5)	
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)	114-117
59-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	114-117
59-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	
59-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	
59-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	
60	*** Quantitative data description of the land regarding an inventory of recreational facilities and associated acreage.	253.034(5)	
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)	108-111; Appendix 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)	108-111; Appendix D.1
61-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	108-111; Appendix D.1
61-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	108-111; Appendix D.1
61-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	Appendix D.2

Section H: Other/ Managing Agency Tools

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
62	Place this LMP Compliance Checklist at the front of the plan.	ARC and managing agency consensus	Before Executive Summary
63	Place the Executive Summary at the front of the LMP. Include a physical description of the land.	ARC and 253.034(5)	Executive Summary
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	N/A

65	Key management activities necessary to achieve the desired outcomes regarding other appropriate resource management.	259.032(10)	Appendix D.1
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)	Appendix D.2
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)	Appendix D.2
68	A statement of gross income generated, net income and expenses.	18-2.018	

*** = 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.

E.2 / Management Procedures for Archaeological and Historical Sites on State-Owned or Controlled Lands

(revised June 2021)

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

A. Historic Property Definition

Historic properties include archaeological sites and historic structures as well as other types of resources. Chapter 267, Florida Statutes states: “ *‘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 Chapter 267, F.S. and state policy related to historic properties, state agencies of the executive branch must provide the Division of Historical Resources (Division) the opportunity to comment on any undertakings with the potential to affect historic properties that are listed, or eligible for listing, in the National Register of Historic Places, 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 undertaking. (267.061(2)(a))

State agencies must consult with the Division when, as a result of state action or assistance, a historic property will be demolished or substantially altered in a way that will adversely affect the property. State agencies must take timely steps to consider feasible and prudent alternatives to the adverse effect. If no feasible or prudent alternatives exist, the state agency must take timely steps to avoid or mitigate the adverse effect. (267.061(2)(b))

State agencies must consult with Division to establish a program to locate, inventory and evaluate all historic properties under ownership or controlled by the agency. (267.061(2)(c))

State agencies are responsible for preserving historic properties under their control. State agencies are directed to use historic properties available to the agency when that use is consistent with the historic property and the agency’s mission. State agencies are also directed to pursue preservation of historic properties to support their continued use. (267.061(2)(d))

C. Statutory Authority

The full text of Chapter 267, F.S. and additional information related to the treatment of historic properties is available at:

<https://dos.myflorida.com/historical/preservation/compliance-and-review/regulations-guidelines/>

D. Management Implementation

Although the Division sits on the Acquisition and Restoration Council and approves land management plans, these plans are conceptual and do not include detailed project information. Specific information for individual projects must be submitted to the Division for review and comment.

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. The Division’s recommendations may include, but are not limited to: approval of the project as submitted, recommendation for a cultural

resource assessment survey by a qualified professional archaeologist, and modifications to the proposed project to avoid or mitigate potential adverse effects.

Projects such as additions or alterations to historic structures as well as new construction must also be submitted to the Division for review. Projects involving structures fifty years of age or older must be submitted to the Division for a significance determination. In rare cases, structures under fifty years of age may be deemed historically significant.

Adverse effects to historic properties must be avoided when possible, and if avoidance is not possible, additional consultation with the Division is necessary to develop a mitigation plan. Furthermore, managers of state property should make preparations for locating and evaluating historic properties, both archaeological sites and historic structures.

E. Archaeological Resource Management (ARM) Training

The ARM Training Course introduces state land managers to the nature of archaeological resources, Florida archaeology, and the role of the Division in managing state-owned archaeological resources. Participants gain a better understanding of the requirements of state and federal laws with regard to protecting and managing archaeological sites on state managed lands. Participants also receive a certificate recognizing their ability to conduct limited monitoring activities in accordance with the Division's Review Procedure, thereby reducing the time and money spent to comply with state regulations. Additional information regarding the ARM Training Course is available at:

<https://dos.myflorida.com/historical/archaeology/education/arm-training-courses/>

F. Matrix for Ground Disturbance on State Lands

The matrix is a tool designed to help streamline the Division's Review Procedure. The matrix allows state land managers to make decisions about balancing ground disturbance and stewardship of historic resources. The matrix establishes types of undertakings that are either minor or major disturbances and then guides the land manager to consult the Division, conduct ARM-trained project monitoring, or proceed with the project.

Additional information regarding the matrix is available at:

<https://dos.myflorida.com/historical/archaeology/education/dhr-matrix-for-ground-disturbance-on-state-lands/>

G. Human Remains Treatment

Chapter 872, *Florida Statutes* makes it illegal to willfully and knowingly disturb human remains. In the event human remains are discovered, cease all activity in the area that may disturb the remains. Leave the bones and nearby items in place. Immediately notify law enforcement or the local district medical examiner of the discovery and follow the provisions of Chapter 872, FS. Additional information regarding the treatment of human remains and cemeteries is available at:

<https://dos.myflorida.com/historical/archaeology/human-remains/>

<https://dos.myflorida.com/historical/archaeology/human-remains/abandoned-cemeteries/what-are-the-applicable-laws-and-regulations/>

H. Division of Historical Resources Review Procedure

Projects on state owned or controlled properties may submit projects to the Division for review using the streamlined State Lands Consultation Form. The form provides instructions to submit projects for review and outlines the necessary information for the Division to complete the review process. The State Lands Consultation Form and additional information about the Division's review process is available at:

<https://dos.myflorida.com/historical/preservation/compliance-and-review/state-lands-review/>

* * *

Questions relating to the treatment of archaeological and historic resources on state lands should be directed to:

Compliance and Review Section
Bureau of Historic Preservation Division of Historical Resources
R. A. Gray Building
500 South Bronough Street
Tallahassee, FL 32399-0250

StateLandsCompliance@dos.myflorida.com

Phone: (850) 245-6333
Toll Free: (800) 847-7278
Fax: (850) 245-6435

E.3 / Letters of Compliance with County Comprehensive Plans

Pearson, Earl

From: Jennifer L. Perkins <Jennifer.Perkins@citrusbocc.com>
Sent: Wednesday, November 9, 2022 9:50 AM
To: Pearson, Earl
Subject: Nature Coast Aquatic Preserve Management Plan

EXTERNAL MESSAGE

This email originated outside of DEP. Please use caution when opening attachments, clicking links, or responding to this email.

Good morning, Earl,

Thank you for your voicemail yesterday. I have finished reviewing the Nature Coast Aquatic Preserve Management Plan. It is consistent with the Citrus County Comprehensive Plan. Please let me know if I can be of any further assistance.

Jen Perkins
Planner
Citrus County Land Development Division
Citrus County Board of County Commissioners
352.527.7656



DEVELOPMENT SERVICES DEPARTMENT
PLANNING DIVISION

1653 BLAISE DRIVE ♦ BROOKSVILLE, FLORIDA 34601
P 352.754.4057 ♦ F 352.754.4420 ♦ W www.HernandoCounty.us

November 17, 2022

(via email)

Earl Pearson, Planning Manager
Florida Department of Environmental Protection
Office of Resilience and Coastal Protection
2600 Blair Stone Road, MS #235
Tallahassee, FL 32399-2400

RE: Nature Coast Aquatic Preserve Management Plan Compliance with Hernando County's
Comprehensive Plan

Dear Mr. Pearson:

Hernando County Staff have participated in public outreach meetings regarding the development of the Management Plan. Hernando County has reviewed the Nature Coast Aquatic Preserve (NCAP) Management Plan and find the Plan to be consistent with the Hernando County 2040 Comprehensive Plan.

Thank you for the opportunity to participate and review the NCAP Management Plan. Please feel free to contact me, or my staff with any questions.

Sincerely,

A handwritten signature in blue ink, appearing to read "Michelle L. Miller".

Michelle L. Miller, MS
Planning Administrator,
Development Services Department

dmv

cc: Chris Linsbeck, Hernando County Community Services Director



(01/20/2023) *Sent via email*

Earl Pearson, Planning Manager
Florida Department of Environmental Protection
Office of Resilience and Coastal Protection
Earl.Pearson@FloridaDEP.gov

RE: Nature Coast Aquatic Preserve Management Plan

Dear Mr. Pearson,

Pasco County is pleased to provide a review of the Florida Department of Environmental Protection, Office of Resilience and Coastal Protection's Nature Coast Aquatic Preserve Management Plan. Planning staff has reviewed the Management Plan and finds that the plan is in compliance with Pasco County's 2025 Comprehensive Plan.

Thank you for the opportunity to review the proposed management plan. If you need anything further, please contact me at jjenkins@pascocountyfl.net or 727-847-8140 x 7889.

Sincerely,

Jeffrey R. Jenkins, MPA, AICP
Long Range Planning Executive Planner

PLANNING AND DEVELOPMENT – Long Range Planning

727.847.8140 | West Pasco Government Center | 8731 Citizens Drive, Suite 360 | New Port Richey, FL 34654



FLORIDA DEPARTMENT OF Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, FL 32399

Ron DeSantis
Governor

Jeanette Nuñez
Lt. Governor

Shawn Hamilton
Secretary

December 13, 2022

Mr. Earl Pearson
Office of Resilience and Coastal Protection
Florida Department of Environmental Protection
3900 Commonwealth Boulevard, MS 235
Tallahassee, Florida 32399-3000

RE: Nature Coast Aquatic Preserve Management Plan

Dear Mr. Pearson:

On **December 9, 2022**, the Acquisition and Restoration Council recommended approval of the **Nature Coast Aquatic Preserve** management plan. Please advise Mr. James Parker of this office when the plan has been approved by the Board of Trustees.

Sincerely,

Deborah Burr

Digitally signed by
Deborah Burr
Date: 2022.12.13
12:06:24 -05'00'

Deborah Burr
Office of Environmental Services
Division of State Lands



Nature Coast Aquatic Preserve Management Plan
Florida Department of Environmental Protection
Office of Resilience and Coastal Protection
2600 Blair Stone Road, MS #235
Tallahassee, FL 32399
www.floridacoasts.org