Terra Ceia Aquatic Preserve

Management Plan • August 2009 - July 2019

Florida Department of Environmental Protection
Coastal and Aquatic Managed Areas

This publication funded in part through a grant agreement from the Florida Department of Environmental Protection, Florida Coastal Management Program by a grant provided by the Office of Ocean and Coastal Resource Management under the Coastal Zone Management Act of 1972, as amended, National Oceanic and Atmospheric Administration Award No. NA05NOS4191074-CZ625, NA06NOS4190129-CZ709, NA06NOS4190129-CZ726. and NA07NOS4190071-CZ823. The views, statements, finding, conclusions, and recommendations expressed herein are those of the author(s) and do not necessarily reflect the views of the State of Florida, National Oceanic and Atmospheric Administration, or any of its sub-agencies.

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Mission Statement

The mission of the Office of Coastal and Aquatic Managed Areas in relation to Florida's 41 Aquatic Preserves, three National Estuarine Research Reserves, National Marine Sanctuary, and Coral Reef Conservation Program is to protect Florida's coastal and aquatic resources.

Long-term goals of the Aquatic Preserve Program

Protect and enhance the ecological integrity of the Aquatic Preserves.

Restore areas to their natural condition.

Encourage sustainable use and foster active stewardship by engaging local communities in the protection of aquatic preserves.

Improve management effectiveness through a process based on sound science, consistent evaluation, and continual reassessment.

Executive Summary

Terra Ceia Aquatic Preserve Management Plan	
Lead Agency	Florida Department of Environmental Protection Office of Coastal and Aquatic Managed Areas
Common Name of Property	Terra Ceia Aquatic Preserve
Location	Manatee County, Florida
Acreage Total	21,736
Acreage Breakdown According to Florida Natural Areas Inventory Natural Community Types	
FNAI Natural Communities	*Acreage according to GIS*
Consolidated Substrate	Acreage unknown
Unconsolidated Substrate	Acreage unknown
Mollusk Reef	Acreage unknown
Octocoral Bed	Acreage unknown
Sponge Bed	Acreage unknown
Algal Bed	Acreage unknown
Seagrass Bed	3,417 acres
Tidal Marsh	Acreage unknown
Tidal Swamp	Acreage unknown
Composite Substrate	Acreage unknown
Total acreage	21,736 acres, resource inventories still pending
Management Agency	DEP's CAMA
Designation	Aquatic Preserve
Unique Features	Terra Ceia has some of the most diverse hardbottom habitat in Tampa Bay. Regionally significant bird nesting sites are located in Terra Ceia Bay.
Archeological/Historical	The adjacent uplands are rich in pre-Columbian archaeological sites. Submerged sites are likely.
Management Needs	
Ecosystem Science	Building on the research begun in the five year U.S. Geological Survey Tampa Bay Study is planned.
Resource Management	Balancing increasing access and development with resource protection will be challenging.
Education & Outreach	Efforts will be concentrated at access points, unless an interpretive facility becomes available.
Public Use	Boat access is a major issue at Terra Ceia, as well as in southeast Tampa Bay.
Public Involvement	The Terra Ceia Aquatic Preserve formed and advisory committee consisting of a variety of stakeholders to provide guidance throughout the development of this management plan. In addition to the four advisory committee meetings, two public meetings were held to capture the public's concerns and input. The plan was presented to the Acquisition and Restoration Council and the Governor and Cabinet at public hearings for approval.

Coastal Zone Management Issues - Historically, Terra Ceia has remained relatively pristine by virtue of its remote location and limited access. Shoreline development and demand for increased access will raise issues seen in more urban areas of Tampa Bay. Baseline information on resources and water quality, as well as ongoing monitoring, will be key to identifying and addressing issues.

Goals - Using scientifically-derived information, Terra Ceia Aquatic Preserve staff will address resource protection issues through partnerships and public engagement/education. Trends in water quality improvement will be maintained, disturbances to habitats and wildlife will be minimized, and environmentally-sound access will be accommodated.

CAMA / BTIITF Approval

CAMA approval date: March 19, 2009 **BTIITF approval date:** August 11, 2009

Comments:

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Butterfly orchids bloom on overhanging branches.

Part One

Basis for Management

Chapter One

Introduction

The Florida aquatic preserves are administered on behalf of the state by the Florida Department of Environmental Protection's (DEP) Office of Coastal and Aquatic Managed Areas (CAMA) as part of a network that includes 41 aquatic preserves, 3 National Estuarine Research Reserves (NERRs), a National Marine Sanctuary, the Coral Reef Conservation Program, and the Florida Oceans and Coastal Council. This provides for a system of significant protections to ensure that our most popular and ecologically important underwater ecosystems are cared for in perpetuity. Each of these special places is managed with strategies based on local resources, issues, and conditions.

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

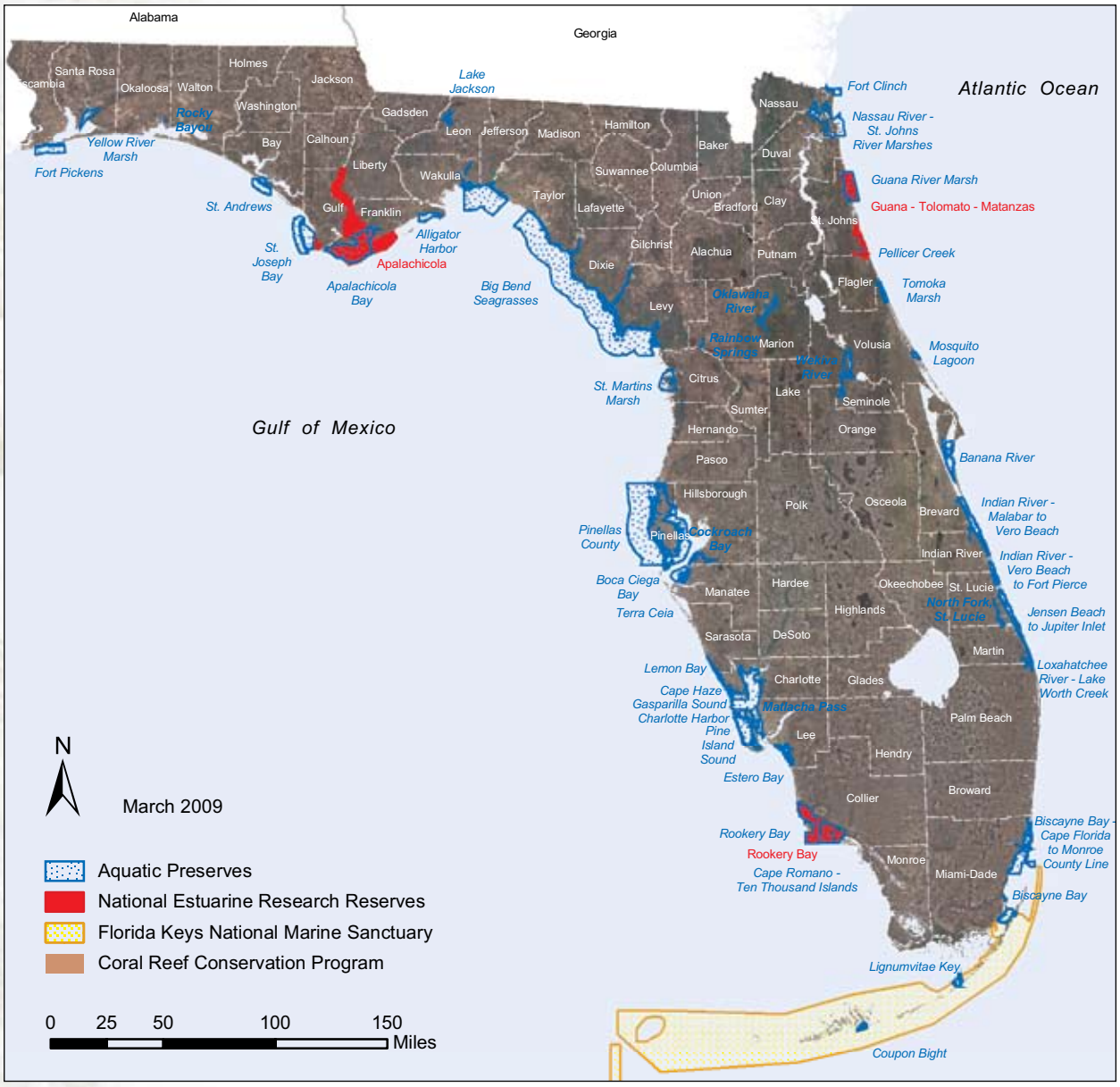
Title to submerged lands not conveyed to private landowners is held by the Board of Trustees of the Internal Improvement Trust Fund (the Trustees). The Governor and Cabinet, sitting as the Trustees, act as guardians for the people of the State of Florida (§253.03, Florida Statutes [F.S.]) and regulate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

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

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

1.1 / ***Management Plan Purpose and Scope***

With increasing development, recreation, and economic pressures, our aquatic resources have the potential to be significantly impacted, either directly or indirectly. These potential impacts to resources can reduce the health and viability of the ecosystems that contain them, requiring active management to ensure the long-term health of the entire network. Effective management plans for the aquatic preserves are essential to address this goal and each site's own set of unique challenges. The purpose of these plans is to incorporate, evaluate, and prioritize all relevant information about the site



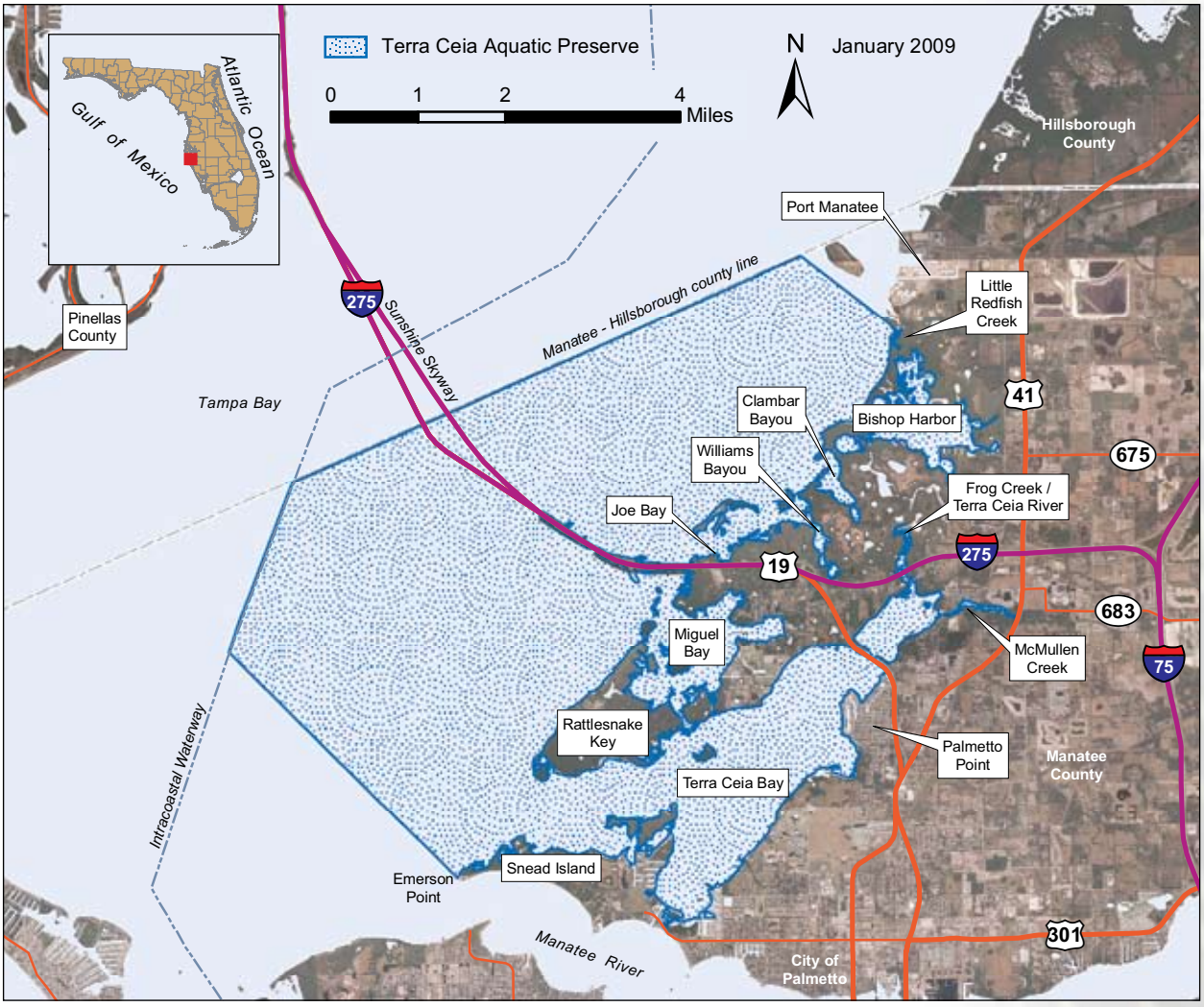
Map 1 / Coastal and Aquatic Managed Areas System

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 resource information from historical data, research and monitoring and includes input from individual CAMA managers and staff, area stakeholders, and members of the general public. The statistical data, public comment, and cooperating agency information is then used to identify management issues and threats affecting the present and future integrity of the site, its boundaries, and adjacent areas. This information is used in the development and review of the management plan, which is examined for consistency with the statutory authority and intent of the Aquatic Preserve Program. Each management plan is evaluated periodically and revised as necessary to allow for strategic improvements. Intended to be used by site managers and other agencies or private groups involved with maintaining the natural integrity of these resources, the plan includes scientific information about the existing conditions of the site and the management strategies developed to respond to those conditions.

To aid in the analysis and development of the management strategies for the site plans, four comprehensive management programs are identified. In each of these management programs, relevant information about the specific sites is described in an effort to create a comprehensive management plan. It is expected that the specific needs or issues are unique and vary at each location, but the four management programs will remain constant. These management programs are:

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



Map 2 / Terra Ceia Aquatic Preserve

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

This document is a revision of the management plan for the Terra Ceia Aquatic Preserve which originally was written in 1987.

1.2 / ***Public Involvement***

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

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

Several key steps are to be taken during management plan development. First, staff organizes an advisory committee comprised of key stakeholders. Next, staff advertises and conducts one or more public meetings to receive input from stakeholders on the concerns and perceived issues affecting each of the sites. This input is used in the development of a draft management plan that is reviewed by CAMA staff and the advisory committee. After the initial reviews, the staff advertises and conducts, in conjunction with the advisory committee, additional public meetings to engage the stakeholders for feedback on the draft plan and the development of the final draft of the management plan. For additional information about the advisory committee and the public meetings refer to Appendix C - Public Involvement.

The Florida horse conch is one of several large snails commonly found in the preserve and its shells are often found in pre-Columbian archaeological sites.

Chapter Two

The Florida Department of Environmental Protection's Office of Coastal and Aquatic Managed Areas

2.1 / ***Introduction***

The Florida Department of Environmental Protection (DEP) protects, conserves, and manages Florida's natural resources and enforces the state's environmental laws. The DEP is the lead agency in state government for environmental management and stewardship and commands one of the broadest charges of all the state agencies, protecting Florida's air, water, and land. The DEP is divided into three primary areas: Regulatory Programs, Land and Recreation, and Planning and Management. 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 Coastal and Aquatic Managed Areas (CAMA) is the unit within the DEP that manages more than four million acres of submerged lands and select coastal uplands. This includes 41 aquatic preserves, 3 National Estuarine Research Reserves (NERRs), the Florida Keys National Marine Sanctuary and the Coral Reef Conservation Program. The three NERRs, the Florida Keys National Marine Sanctuary, and the CRCP are managed in cooperation with the National Oceanic and Atmospheric Administration (NOAA).

CAMA 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. CAMA is a strong supporter of the NERR system and its approach to coastal ecosystem management. The State of Florida has three designated NERR sites, each encompassing at least one aquatic preserve within its boundaries. Rookery Bay NERR includes Rookery Bay Aquatic Preserve and Cape Romano - Ten Thousand Islands Aquatic Preserve; Apalachicola NERR includes Apalachicola Bay Aquatic Preserve; and Guana Tolomato Matanzas NERR includes Guana River Marsh Aquatic Preserve

and Pellicer Creek Aquatic Preserve. These aquatic preserves provide discrete areas designated for additional protection beyond that of the surrounding NERR and may afford a foundation for additional protective zoning in the future.

Each of the Florida NERR managers serves as a regional manager overseeing multiple other aquatic preserves in their region. This management structure advances CAMA's ability to manage its sites as part of the larger statewide system.

The Tampa Bay Aquatic Preserve program has a staff of three Full-Time Equivalent positions (two field and one administrative) and one Other Personnel Services position to manage four aquatic preserves, totaling nearly 400,000 acres in three counties. Two of these preserves (the Pinellas County Aquatic Preserve and Boca Ciega Bay Aquatic Preserve) are located within one of Florida's most densely urbanized counties. The Terra Ceia Aquatic Preserve and the Cockroach Bay Aquatic Preserve require different management approaches from their more urbanized counterparts. The management goals for the TCAP must be balanced with the program's other responsibilities, and it must be done with new issues emerging frequently. To this end, an effective and efficient planning cycle has evolved.

*2.2 / **Management Authority***

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

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

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

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

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

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

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

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

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

2.3 / ***Statutory Authority***

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

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

Preserves staff use accurate GPS technology to map resources.

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. CAMA staff serves as the primary managers who implement provisions of the management plans and rules applicable to the aquatic preserves. CAMA does not "regulate" the lands per se; rather, that is done primarily by the DEP Districts (in addition to the Water Management) 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 aquacultural 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.

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

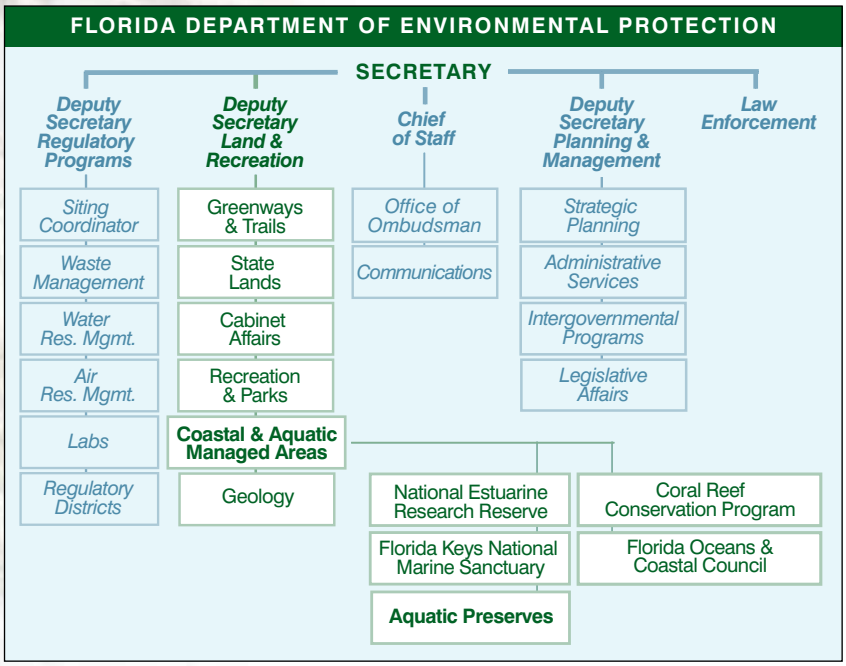


Figure 1/ State structure for managing aquatic preserves.

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

2.4 / Administrative Rules

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

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

agement; to insure that all public and private activities on sovereignty lands which generate revenues or exclude traditional public uses provide just compensation for such privileges; and to aid in the implementation of the State Lands Management Plan."

To that end, Chapter 18-21, F.A.C., contains provisions on general management policies, forms of authorization for activities on sovereignty lands, and fees applicable for those activities. "Activity," in the context of the rule, includes "construction of docks, piers, boat ramps, boardwalks, mooring pilings, dredging of channels, filling, removal of logs, sand, silt, clay, gravel or shell, and the removal or planting of vegetation" (Rule 18-21.003, F.A.C.). To be authorized on sovereignty lands, activities must be not contrary to the public interest (Rule 18-21.004, F.A.C.).

Chapter 18-21, F.A.C., also sets policies on aquaculture, geophysical testing (using gravity, shock wave and other geological techniques to obtain data on oil, gas or other mineral resources), and special events related to boat shows and boat displays. Of particular importance to CAMA site management, it additionally addresses spoil islands, preventing their development in most cases.

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

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

Chapter 18-20, F.A.C., directs management plans and resource inventories to be developed for every aquatic preserve. Further, the rule provides provisions specific to certain aquatic preserves and indicates the means by which the Trustees can establish new or expand existing aquatic preserves.

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

Conservation of adjacent upland areas is important to the health of the aquatic preserve.

Chapter Three

The Terra Ceia Aquatic Preserve

*3.1 / **Description of Representative Ecosystem Region***

3.1.1 / Historical Background

The earliest archaeological evidence of human use of the Terra Ceia Aquatic Preserve (TCAP) area dates to about 8,000 BC and was recovered from spoil dredged from Terra Ceia Bay. Subsequent aboriginal occupations produced shell middens and mounds dating from 500 BC to the late 1400s. Sixteenth century explorers, including Narvaez and Desoto, found the Tampa Bay region settled by the Tocobaga, Pooy, Uzita, Yagua and Neguarete Indians.

After the virtual extinction of the Florida natives by the mid-1700s, Creek Indians from Georgia and Alabama, who later became known as Seminoles, moved south into the state, and the Tampa Bay area saw limited use as their hunting territory. Even though most of their operations centered on Charlotte Harbor, Cuban fishermen also established seasonal, shoreline camps around Tampa Bay. Under the Armed Occupation Act of 1842, homesteaders began to claim the land in the area south of the Fort Brooke (Tampa). Arriving on April 12, 1843, by way of Tampa, Joseph and Julia (Madam Joe) Atzeroth, along with their daughter Eliza, established a claim on Terra Ceia Island, not far from the camp of Miguel Guerero, a Cuban fisherman after whom Miguel Bay is named. They were the first permanent settlers on Terra Ceia Island. By the 1880s farming was well established in the area. The majority of the uplands surrounding the TCAP were historically farmed for vegetable and citrus crops, and were later the birthplace of the Florida gladiolus flower industry.

In the late 1880s, pebble phosphate deposits were discovered in the Peace River, then later in Polk County. Much of the acreage surrounding the TCAP was purchased by phosphate speculators, who found no significant deposits. Phosphate extraction elsewhere and its shipment became a major

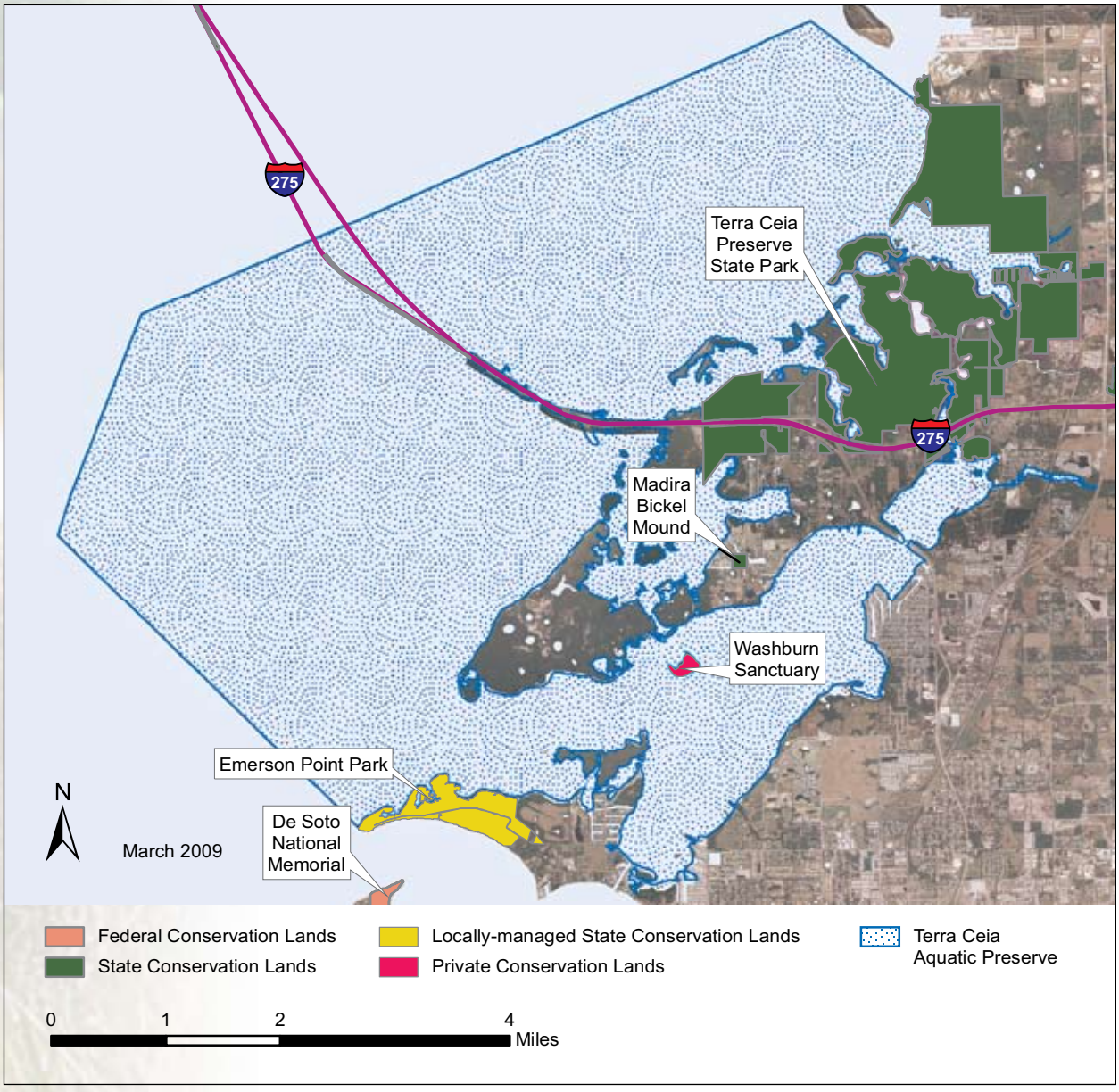
economic focus and an incentive for construction of both railroad and port facilities. In 1966, Borden Chemical Company constructed the now defunct Piney Point phosphate plant. In 1969, a 40 foot deep channel was extended from the Tampa Bay shipping channel to Port Manatee. This channel separates the Terra Ceia and Cockroach Bay aquatic preserves (Burger, 1982; Department of Natural Resources, 1987; Tampa Bay Agency on Bay Management, 2002).

3.1.2 / General Description

International/National/State/Regional Significance

By virtue of its location along southeast Tampa Bay, Terra Ceia represents much of the remaining undeveloped shoreline of one of Florida's most densely populated watersheds. With increasing urbanization, it is becoming more important that residents and visitors be able to drive a short distance down I-75 or I-275 and experience Tampa Bay in its natural state. For many, visiting the Terra Ceia area is like "stepping back in time" to experience the natural beauty that attracted early settlers to the Tampa Bay area. Such experiences create a public appreciation for the natural functions of ecosystems that do so much to provide clean water, clean air and abundant seafood for people.

The preserve contains a considerable amount of Tampa Bay's seagrass and much of the bay's hardbottom acreage. As a temperate/subtropical climatic transition zone, the area provides a natural



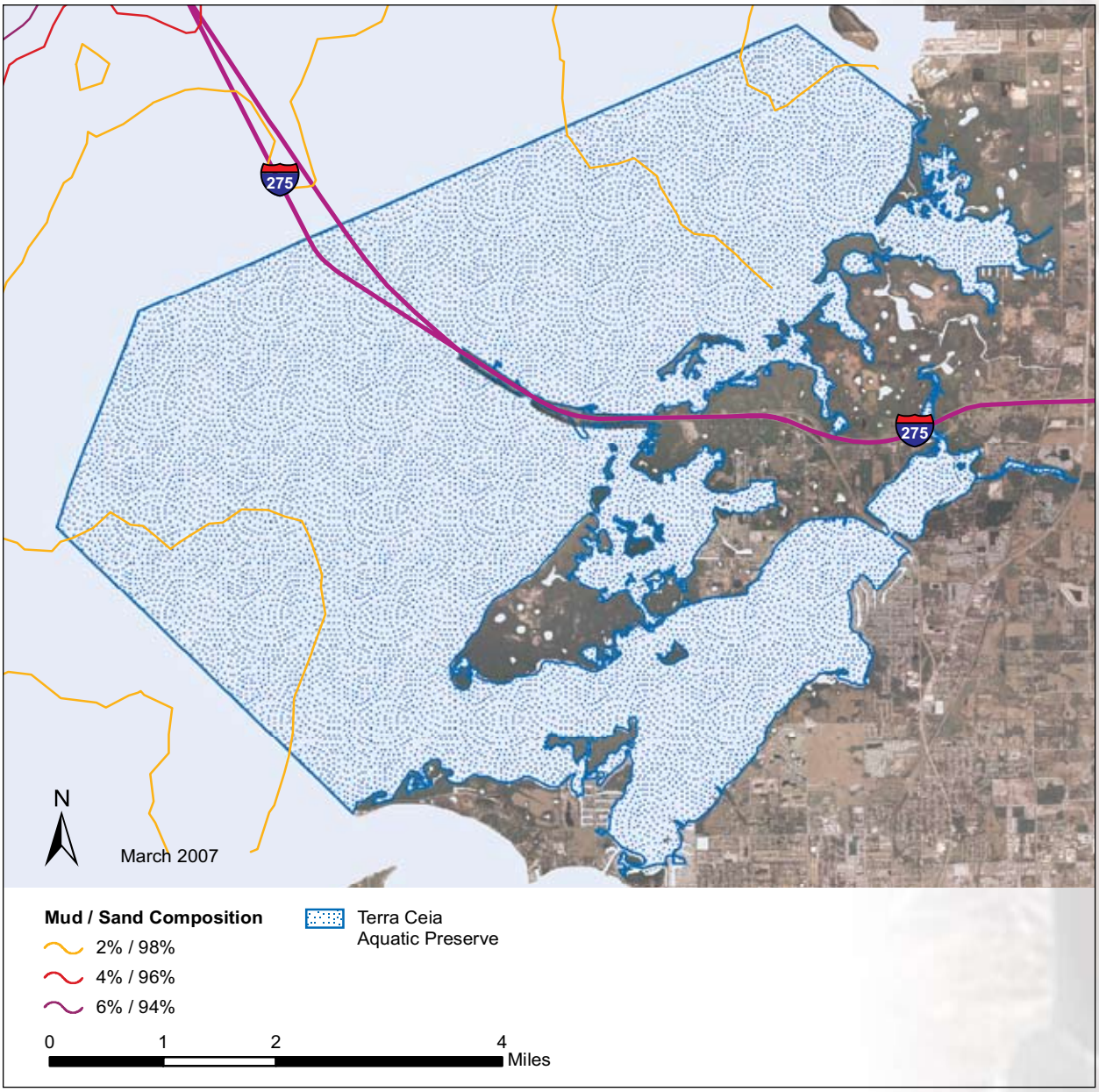
Map 3 / Conservation Lands near Terra Ceia Aquatic Preserve

workshop for the study of effects of climate change and urbanization that is yielding science-derived information of gulf-wide significance. This site provides a unique opportunity to study the effects of climate change in regards to genetic adaptation, diversity, interaction, dominance shifts due to parasite/disease interaction, and changes in reproduction trends.

In placing resource management emphasis on the Terra Ceia area, the State of Florida is providing protection for resources under unique threats as well as facilitating research with implications far beyond the geographic boundaries of the preserve.

Location/Boundaries

The TCAP is located entirely within northwestern Manatee County. The preserve encompasses several inlets of southeastern Tampa Bay, as well as much of the southeastern Tampa Bay shoreline. Situated on either side of the Sunshine Skyway, the preserve is central to the Bradenton/St. Petersburg/Tampa area. The preserve's northern boundary begins just south of the mouth of Little Redfish Creek at Port Manatee. The southern boundary lies between the mouths of Terra Ceia Bay and the Manatee River at Emerson Point on Snead Island. The boundary extends northwesterly from these points out to the Manatee-Hillsborough County line and the Intracoastal Waterway, respectively, which then crosses and forms the outer most corner of the preserve. With the exception of the City of Palmetto and the Palmetto Point



Map 4 / Sediments of Terra Ceia Aquatic Preserve

subdivision, most of the adjacent uplands are within the Terra Ceia Florida Forever project. Bishop Harbor, Clambar Bay, Williams Bayou and the Terra Ceia River are bordered by state-owned uplands. Palmetto is the only incorporated city bordering the preserve.

The preserve is comprised of an area of state-owned submerged lands totaling 21,736 acres of predominately pristine submerged and wetland areas within Tampa Bay, Terra Ceia Bay, Miguel Bay, Joe Bay, Bishop Harbor and tidal waters of all tributaries including Frog Creek/Terra Ceia River and McMullen Creek. TCAP has open water, several inlet bays, and tidally influenced creeks and rivers and contains a diverse variety of natural communities, including seagrass, mangroves, salt marsh, tidal flats, hardbottom, oyster bars and clam beds.

The TCAP is in close proximity to other publicly owned sites, including the Terra Ceia Preserve State Park (managed by the Florida Department of Environmental Protection's (DEP) Division of Recreation and Parks), Emerson Point Nature Park (managed by Manatee County), and the Madira Bickel Mound State Archaeological Site (managed by Division of Recreation and Parks and the Port Manatee conservation easement). The National Audubon Society's Washburn Sanctuary, a colonial rookery, on Bird Key is within the preserve. The TCAP is also adjacent to and within a Strategic Habitat Conservation Class III Area as designated by the Florida Fish and Wildlife Conservation Commission (Department of Environmental Protection [DEP], 2001).

The variety of ownerships and management entities for conservation lands in southeast Tampa Bay add administrative boundaries into an otherwise ecologically contiguous area. This makes it especially important for managing agencies and organizations to maintain effective mechanisms for planning, collaboration and communication.

The TCAP is managed by the Tampa Bay Aquatic Preserves program. The Tampa Bay Aquatic Preserves program manages three aquatic preserves in addition to the TCAP, and is housed in the historic Haley House at Terra Ceia. This places the program headquarters in a location where sites in southern Hillsborough County and those in Pinellas County are nearly equally accessible.

3.1.3 / Resource Description

Surrounding Population Data and Future Projected Changes

The majority of the TCAP is adjacent to uplands in unincorporated Manatee County. As of 2000, the population for the county was 264,002. The U.S. Census Bureau 2005 estimate for the county was 306,779. This was an increase of 16.2% from the 2000 census. A portion of the preserve is adjacent to the City of Palmetto. As of 2000, the population for the city was 12,571. The estimated population in July 2005 was 13,510. This was an increase of 7.5%. The population change in the 1990s for Palmetto was an increase of 2,837 people or 29.1% (U.S. Census Bureau, 2005).

Like most of central Florida, Manatee County is expected to continue its present surge in population growth. A recent study by the University of Florida projected that Manatee County will build out to the extent that there will be limits on the ability to accommodate the population, in the time period from 2020 to 2040 (Zwick & Carr, 2006). As a result, demand for water, watershed pollution, impermeable surface, and recreational activity may be expected to increase in the watershed of the preserve.

Topography and Geomorphology

As part of Tampa Bay, the TCAP is characterized by the inlets and embayments of a drowned shoreline. The preserve has open water, several inlet bays, and tidally influenced creeks and rivers. Inlet bays include Bishop Harbor, Miguel Bay and Terra Ceia Bay. Adjacent to Bishop Harbor, two additional inlets can be found: Williams Bayou and Clambar Bay. Miguel Bay is formed from the mainland and Rattlesnake Key. The largest inlet, Terra Ceia Bay is bisected by the U.S. 19 bridge. The open water of the preserve is bisected by the Sunshine Skyway and its southern causeway approach. The Terra Ceia River/Frog Creek and McMullen Creek provide freshwater to the system. The tidally influenced portions of these water bodies are part of the preserve.

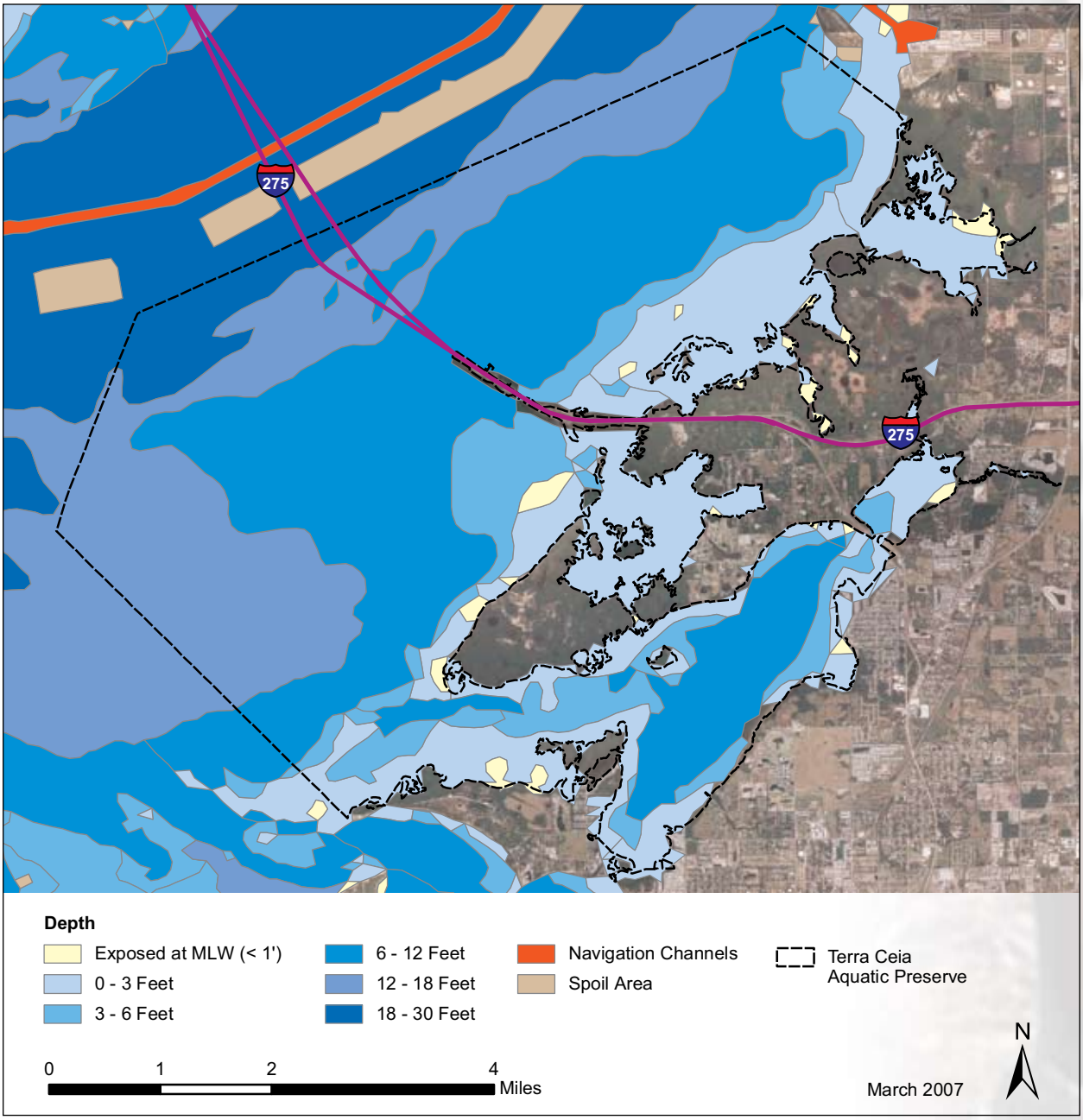
Within the preserve, submerged land of open Tampa Bay is largely unconsolidated sediments with sand as the predominant grain size at the sediment surface. Often less than 3 foot (1m) below grade, a mixture of silicoclastic and weathered carbonate clay forms a distinct hardpan layer. Arcadia limestone of the Hawthorne group forms a low-relief trend roughly parallel to the Tampa Bay shoreline, and hardbottom habitat patches of varying sizes are found where shoaling of sediment does not cover the limestone.

Mosquito ditching, agricultural berms and remnants of dredge and fill projects have altered the geomorphology of the area. In many cases, historical sheet flow patterns have been channelized, and freshwater areas have been connected to tidal flushing. Most of these impacts are confined to upland areas, but they affect the hydrology and sediment influx of the aquatic preserve.

Geology

Like most estuaries, Tampa Bay is a product of the fluctuations in sea level caused by glaciation. During times of lowered sea level, the river valley of Tampa Bay was cut into underlying limestone by its tributary rivers. As sea level rose during glacial retreat, the area was flooded and became Tampa Bay. Underlying Tampa Bay are limestone and dolomite. The Hawthorn Formation, a gray-greenish clay layer, is present at the surface throughout two-thirds of Tampa Bay, including the TCAP. The Hawthorn Formation is moderately thick to thin in some portions of the preserve which is evident by the occurrence of hardbottom communities off Rattlesnake Key and by the approximately 50 karst depressions located in the buffer preserve.

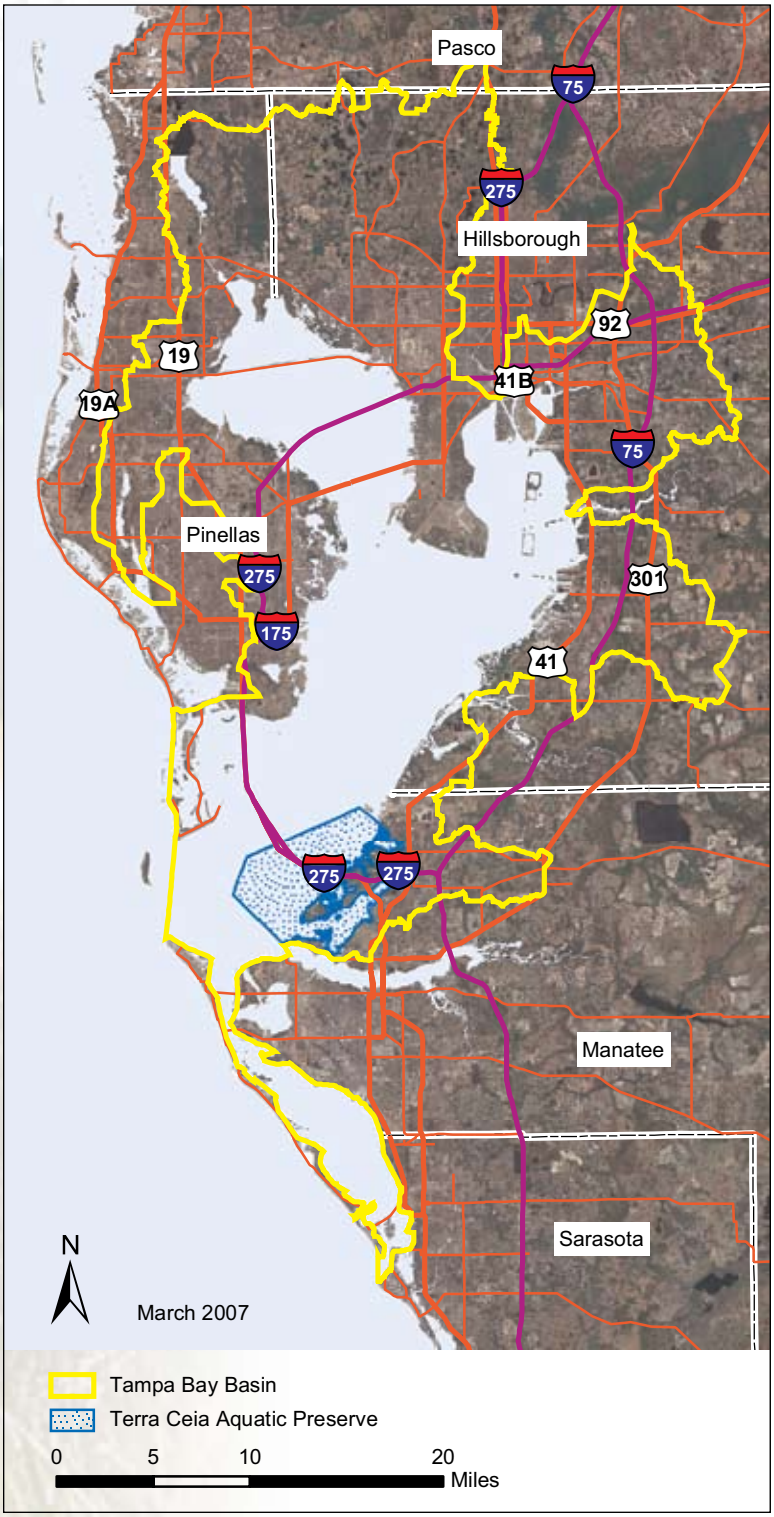
The geomorphological landscape of Terra Ceia is a classic karst coastal terrain. Submerged lands and uplands are punctuated by relict sinkholes from past times when lower groundwater levels encouraged



Map 5 / Bathymetry of Terra Ceia Aquatic Preserve

active karst processes. These deeper areas may serve as warm-water refugia for overwintering fishes. Within the preserve, large areas of exposed limestone from the Arcadia Formation provide attachment areas for a large number of hard substrate species. Clastic unconsolidated sediments form productive open bottom, and where depths and light penetration are appropriate, they support vast seagrass and algal beds. Unfortunately, the unimpeded, undeveloped nature of Frog Creek that supports such a great diversity of wildlife and fisheries species has become very uncommon in the Tampa Bay watershed.

Surface sediments are composed of fine to very fine quartz sand with varying amounts of organic muds and coarse carbonates, mostly in the form of mollusk shells. A band of phosphate-bearing rock runs parallel to the shore of the preserve. The sand-size sediments in Tampa Bay were probably derived from the major river tributaries during the last rise in sea level. At the present time, essentially no sand size material is being added to the system from the rivers but input from the Gulf of Mexico may occur in the Terra Ceia area. Streams carry only small loads of fine sediments but it may be that considerable amounts of fine materials are added through surface runoff. As development in the area increases, the contribution of fine silt materials into the TCAP will also increase.



Map 6 / Drainage of Terra Ceia Aquatic Preserve

Hydrology and Watershed

Drainages and Embayments

Bishop Harbor is located in the north portion of the preserve and is a 1.5-mile (2.5 km) bay-like waterbody with depths of 1 to 5 feet (0.3 to 1.7 meters), referenced to National Geodetic Vertical Datum (NGVD). The substrate is sandy/organic. Hell's Half Acre is a shallower waterbody with a number of small mangrove islands formed off Bishop Harbor to the north.

Williams Bayou and Clambar Bay are finger-like lagoons, approximately 1 to 1.5 miles (1.6 to 2.4 km) long. They are located between Joe's Island and Mariposa Key on the west coast of the preserve. Depths range from -3 feet (.9 m) NGVD in Williams Bayou to 5 feet (1.5 m) NGVD in Clambar Bay. Both have sand/silt substrates, but Clambar Bay has an additional organic component.

With the exception of the open water of Tampa Bay, Terra Ceia Bay is the largest waterbody in the aquatic preserve boundary. It spans approximately 6 miles (9.7 km) long and one mile at its widest point. Bay channel depths are more than 5 feet (1.5 m) NGVD, with surrounding depths of 1 to 3 feet (.9 m) NGVD. Silty sands with some organics comprise the substrate.

With its mouth located at the northern end of Terra Ceia Bay, the Terra Ceia River/Frog Creek extends in a north/northeast direction for approximately 2 miles (3.2 km), then continues east approximately 5 miles (8.1 km). The tidally influenced portion of the river is part of the aquatic preserve. The headwaters are a wetland complex located north of Moccasin Wallow Road. Cabbage Slough, Buffalo Canal, and Cedar Drain are channelized systems which drain into Frog Creek. These systems efficiently drain large agricultural areas. The creek banks are incised and lack a developed floodplain. Depths range from -1 to-3 feet (.3 to .9 m) NGVD in the lagoons and -2- to -6 feet (.6 to 1.8 m) NGVD in the creek proper. A few lagoons branch off from the creek in estuarine waters, and are characterized by shallow depths, mangrove perimeters, and hammock ridges. The lagoons appear to be collapsed limestone (karst) formations which have been connected to the main waterway. (DEP, 2001)

Outstanding Florida Waters Designation

Outstanding Florida Waters are defined as waters designated by the DEP as worthy of special protection because of their natural attributes. DEP affords the highest protection to these waters. No degradation of water quality, other than that allowed by rule, is to be permitted. TCAP was designated as an Outstanding Florida Water on May 22, 1986.

Shellfish Harvesting: Class II Waterbody

Water quality in Class II waters is protected to provide for shellfish propagation or harvesting in addition to recreation, and propagation and maintenance of fish and wildlife. The areas under Class II designation have been classified as conditionally approved, except for those waters in Bishop Harbor, Miguel Bay and Terra Ceia Bay which have been classified as prohibited.

Climate

The preserve is located along mid-peninsular Florida, and, therefore, the overall climate borders between temperate and subtropical. The last major hurricane to impact the area was in 1938. Tropical Storm Gabrielle caused severe flooding in 1997. While tropical weather systems have not been frequent in the area, the warm climate makes them likely at some time in the future.

Climate data for the nearby City of Palmetto reasonably reflects that of the aquatic preserve. The average low temperature is 61° F (16° C) and generally occurs in January; the average high is 82° F (28° C) and occurs in July/August. The average low precipitation is 2 inches (5.1 cm) in April; the average high is 9 inches (22.9 cm) in August. The average low wind speed is 6.9 miles per hour (11.1 km per hour) and occurs in July; the average high is 9.5 miles per hour (15.3 km per hour) in March. The Gulf of Mexico significantly affects the climate of the area. Summer thunderstorms are frequent. The area's historical tornado activity is slightly higher than the Florida average. It is 87% greater than the overall U.S. average (City-Data.com, 2009).

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 DEP. 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 (Florida Natural Areas Inventory & Florida Department of Natural Resources, 1990). 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). Appendix B.6 provides an explanation of the FNAI Community Types and the ranking system.

The marine and estuarine communities in the TCAP are ecologically important as wildlife habitat, storm protection and land stabilization. Mangrove communities are abundant, hosting all four species of mangroves (red, black, white, and buttonwood). Worth noting are the historic mangroves on the coastlines surrounding Williams Bayou and Clambar Bay which display extensive prop roots and heights up to 25 feet. Seagrass and algal beds are also found throughout the preserve. Salt marsh communities are few in the preserve, but are productive in terms of biomass and providing a transition zone between terrestrial and aquatic habitats. Common vegetative species include black needlerush (*Juncus roemerianus*), saltmarsh hay (*Spartina patens*), and saltgrass (*Distichlis spicata*). Extensive hardbottom acreage is present within the preserve, but as observed by Ash and Runnels (2005), the existing accounts of acreage, distribution and biota are not accurate. The lack of accurate information on hardbottom,

FNAI Natural Community Type	# Acres	%of Area	Federal Rank	State Rank	Comments
Consolidated Substrate	Unknown	Unknown	G3	S5	
Unconsolidated Substrate	Unknown	Unknown	G3	S3	
Mollusk Reef	Unknown	Unknown	G2	S1	Typically oyster reefs, oyster-lined channels and oysters on mangrove prop roots.
Octocoral Bed	Unknown	Unknown	G2	S2	
Sponge Bed	Unknown	Unknown	G3	S2	
Algal Bed	Unknown	Unknown	G2	S2	
Seagrass Bed	3417	15.7	G4	S4	
Tidal Marsh	Unknown	Unknown	G3	S3	
Tidal Swamp	Unknown	Unknown	G3	S3	
Composite Substrate	Unknown	Unknown	G3	S3	Typically a mixture of hardbottom, unconsolidated sediments, seagrasses and algae.

Table 1 / Summary of Natual Communities on Terra Ceia Aquatic Preserve

relative to seagrass, likely reflects the difficulty in mapping low relief hardbottom through interpretation of aerial photographs. The known hardbottom areas are located offshore of Rattlesnake Key, Joe Island, Mariposa Key and Bird Key. Native limestone outcroppings support a diverse assemblage of algae, sponges, compound ascidians, soft corals and hard corals. These hardbottom areas also support a variety of fishes and motile invertebrates not found on nearby unconsolidated sediments. While a few cursory hardbottom studies have been published for Tampa Bay, the areal extent and faunal assemblages of these areas are still largely unknown.

The following are the community types found within the preserve. Descriptions were taken from the 1990 FNAI Guide to the Natural Communities of Florida, and site-specific comments have been added.

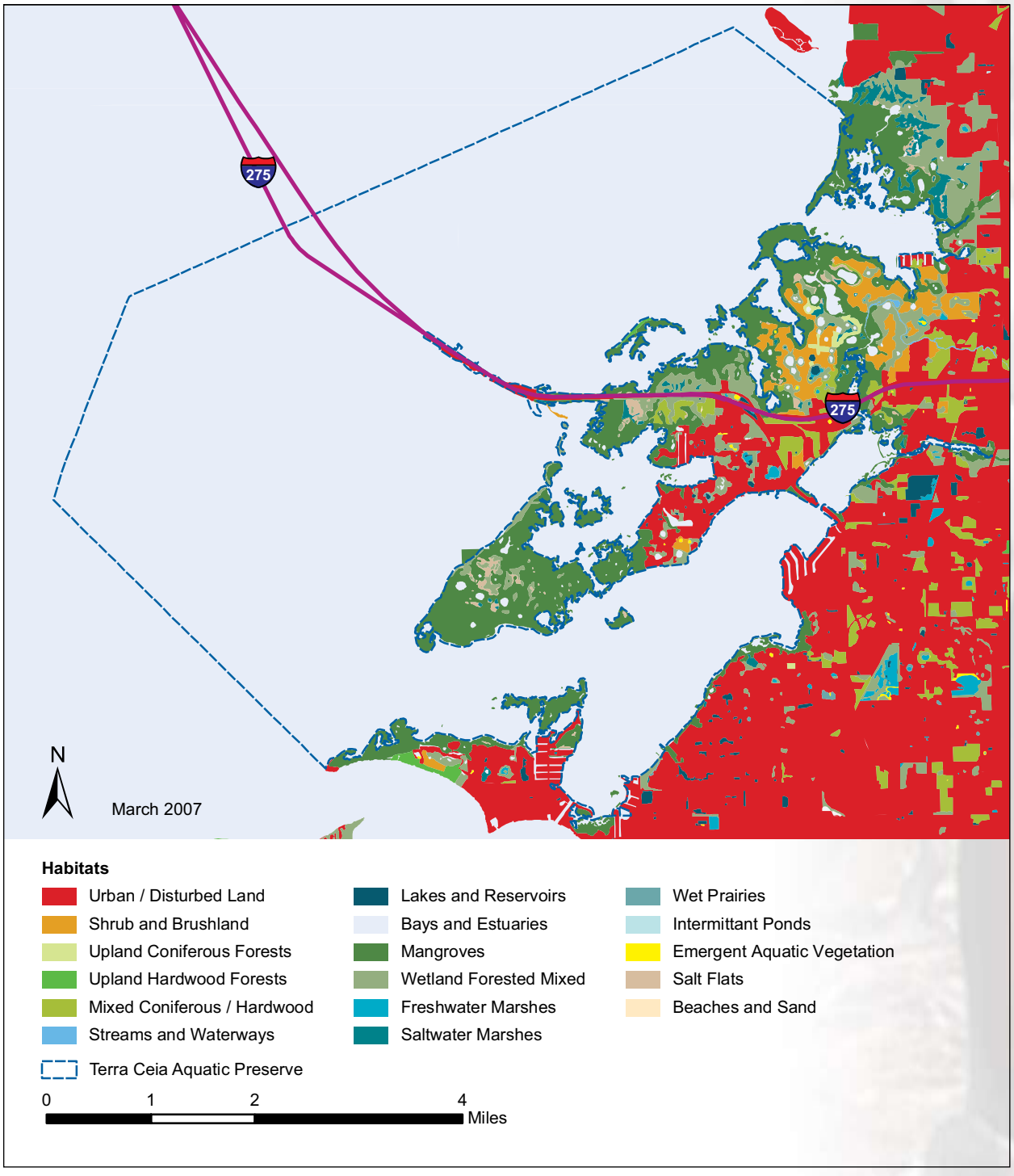
Tidal Swamps - (synonyms: mangrove forest, mangrove swamp, mangrove islands). Marine and estuarine tidal swamps are floral based natural communities characterized as dense, low forests occurring along relatively flat, intertidal and supratidal shorelines of low wave energy along southern Florida. The dominant plants of tidal swamps are red mangrove, black mangrove, white mangrove and buttonwood. These four species occasionally occur in zones which are defined by varying water levels, with red mangrove occupying the lowest zone, black mangrove the intermediate zone, and white mangrove and buttonbush the highest zone. Other vascular plants associated with tidal swamps include saltgrass, black needlerush, spike rush, glasswort, Gulf cordgrass, sea purslane, saltwort and sea oxeye. Typical animals of the tidal swamp include mangrove water snake, brown pelican, white ibis, osprey, bald eagle, and a variety of shorebirds, herons, egrets, and raccoon. Also included are sponges, oysters, marine worms, barnacles, mangrove tree crabs, fiddler crabs, mosquitoes, and numerous other invertebrates. Fishes are likewise diverse in this community. Those most frequently occurring include black-tipped shark, lemon shark, nurse shark, bonnethead shark, rays, tarpon, ladyfish, bonefish, menhaden, sardines, lookdown, permit, snapper, sheepshead, porgies, pinfish, and mullet.

The prop roots of red mangroves, the extensive pneumatophores (aerial roots) of black mangroves and the dense root mats of the white mangrove serve to entrap sediments and recycle nutrients from upland areas and from tidal import. This process serves in “island formation” and is a part of the successional process involved in land formation in south Florida. These root structures also provide substrate for the attachment of and shelter for numerous marine and estuarine organisms.

Temperature, salinity, tidal fluctuation, substrate and wave energy are five physical factors influencing the size and extent of tidal swamps. Mangroves require an annual average water temperature above 66° F (19° C) to survive. They do not tolerate temperatures below freezing or temperatures which fluctuate widely over the course of a year. Saltwater is a key element in reducing competition from other plants and allowing mangroves to flourish. In addition, mangroves have adapted to the saltwater environment by either excluding or excreting salt from plant tissues. Mangroves can survive in freshwater but are usually not found in large stands under such conditions in nature because they succumb to competition. Tidal swamps are closely associated with and often grade into seagrass beds, unconsolidated substrates, tidal marshes, shell mounds, coastal berms, maritime hammocks, and other coastal communities. Seagrass beds and unconsolidated substrates are usually found in the subtidal regions surrounding tidal swamps.

The marine and estuarine tidal swamp communities are significant because they function as nursery grounds for most of the state's commercially and recreationally important 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, tidal swamps help protect other inland communities by absorbing the impact of tropical storms and hurricanes. Tidal swamps have been and continue to be areas of environmental concern because many acres were destroyed at Terra Ceia through diking and flooding, ditching for mosquito control, and dredging and filling activities.

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.



Map 7 / Habitats Surrounding Terra Ceia Aquatic Preserve

Seagrasses are not true grasses. The three most common species of seagrasses in Florida are turtle grass, manatee grass, and shoal grass. 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 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. 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 seatrout, spot, sheepshead, and redfish. The dense seagrasses also serve as shelter or nursery grounds for many invertebrates and fish, including marine snails, clams, scallops, polychaete worms, pink shrimp, blue crab, starfish, sea urchins, tarpon, bonefish, seahorses, pompano, jack, permit, snapper, grunt, mullet, barracuda, filefish, and cowfish.

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, 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 between 68° and 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 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 extremely vulnerable to human impacts. Seagrass beds can be destroyed through dredging and filling activities and may be damaged by sewage outfalls and industrial wastes. In these instances, the seagrass beds can be physically destroyed, or succumb as a result of decreased solar radiation resulting from increased water turbidity. Seagrass beds are also highly vulnerable to oil spills. Low concentrations of oil can greatly reduce the ability of seagrasses to photosynthesize. Extreme high temperatures may have adverse impacts on seagrass beds. The area surrounding power plant outfalls, where water temperatures can 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, damaged seagrasses have the ability to regenerate and recolonize areas. Some successful replantings of seagrass beds have been conducted. However, the best management is to preserve and protect seagrass beds in their natural state.

Composite Substrate - Marine and estuarine composite substrates consist of a combination of natural communities such as “beds” of algae and seagrasses or areas with small patches of consolidated and unconsolidated bottom with or without sessile floral and faunal populations. Composite substrates may be dominated by any combination of marine and estuarine sessile flora or fauna, or mineral substrate type. Typical combinations of plants, animals and substrates representing composite substrates include soft and stony corals with sponges on a hardbottom such as a limerock outcrop; psammophytic algae and seagrasses scattered over a sand bottom; and patch reefs throughout a coralgal bottom. Any of the remaining marine and estuarine natural communities can grade into composite substrate communities. Although composite substrates can occur in any marine or estuarine area in Florida, some combinations are common while others are extremely rare. Combinations of consolidated and unconsolidated substrate components offer the greatest opportunity for diversity, and should be high priority areas for protection. Management requirements are small if the composite substrate is adequately protected. Protection efforts will vary slightly based on components of the composite substrate community. Generally, degradation of physical and chemical water quality factors should be prevented, as well as mechanical disturbance from anchoring, dredging, trawling and similar activities.

At Terra Ceia, composite substrates consist of silicoclastic sands mixed with calcareous gravel, shell fragments and limestone rocks. Biotic components include seagrasses, algae, bivalves, hard corals (primarily *Siderastrea* and sponges).

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 plant species include star algae*, Argardhiella*, *Avrainvellea*, *Batophora*, *Bryopsis*, *Calothrix*, *Caulerpa*, *Chondria, Cladophora*, *Dictyota*, *Digenia*, *Gracilaria*, *Halimeda*, *Laurencia*, *Oscillatoria*, shaving brush, *Rhipocephalus*, and *Sargassum.* This community may occur in subtidal, intertidal, and supratidal zones

on soft and hardbottom 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. A large threat to algal beds can be dredging and filling activities which can physically remove or bury the beds. Other damage can occur from increased turbidity in the water column which reduces available light; pollution, particularly from oil spills; and damage from boats.

During the winter, large patches of drift macroalgae become concentrated in parts of the preserve. Winter is also the period of growth for *Sargassum* on hard substrates. This brown macroalgae, which may exceed 6 feet (1.8 m) in height, begins attached growth in the fall and detaches in the spring. Fluxes of nutrients and carbon resulting from the dynamics of macroalgae are poorly understood in the preserve, but they appear to be substantial.

Consolidated Substrate - (synonyms: hardbottom, 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 infaunal organisms (i.e., animals living within the substrate). Consolidated substrates are important because they form the foundation for the development of other marine and estuarine natural communities when conditions are appropriate. Consolidated substrate communities are easily destroyed through siltation or placement of fill, and deliberate removal by actions such as blasting or nondeliberate destruction by forces such as vehicular traffic. Another type of disturbance involves the accumulation of toxic levels of heavy metals, oils, and pesticides in consolidated substrates. Pollutants on consolidated substrates can make these areas unsuitable for colonization by marine and estuarine flora and fauna. Such problems can occur in some of the major port cities, in areas where there is heavy industrial development, and along major shipping channels where oil spills are likely to occur.

Hardbottom communities at Terra Ceia include hard corals, soft corals, sponges and compound ascidians. Community structure in Tampa Bay appears to be related to the location of a particular site along physical gradients of the bay. Sediment dynamics may also play a role in hardbottom community structure. Because of the low relief of the limestone substrate it is likely that some hardbottom areas experience occasional shoaling that may exclude some species. This may shape community structure according to the tolerance of burial and re-recruitment abilities of individual taxa.

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 unsolidified 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). 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, tidal marshes, tidal swamps, grass beds, coral reefs, mollusk reefs, worm reefs, octocoral beds, sponge beds, and algal beds.

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 (12.2 m). In Florida, the most developed mollusk reefs are generally restricted to estuarine areas and are dominated by the American oyster. Numerous other sessile and benthic invertebrates live among, attached to, or within the collage of mollusk shells. Most common are burrowing sponge, anemones, mussels, clams, boring clam, oyster drill, lightning whelk, polychaetes, mud worms, oyster leech, barnacles, blue crab, mud crab, stone crab, pea crab, amphipods, and starfish. Several fish also frequently occur near or feed among mollusk reefs, including cownose ray, menhaden, lizardfish, gafftopsail catfish, pinfish, seatrout, spot, black drum, and mullet. Mollusk reefs that are exposed during low tides (e.g., oysters) are frequented by a multitude of shorebirds, wading birds, raccoons, and other vertebrates.

The most common kind of mollusk reef, oyster mollusk reefs, occur in water salinities from just above freshwater to just below full strength sea water, but develop most frequently in estuarine water with salinities between 15 and 30 parts per thousand. 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 2 parts per thousand) 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.

Within the preserve, this community is represented by distinct oyster reef structures, as well as by oyster shelves along the margins of bays and tidal creeks and by oyster clumps on mangrove prop roots. Oysters provide additional habitat rugosity on the prop roots of mangroves. Because of this varied nature of oyster reefs, they are difficult to quantify with any accuracy.

Octocoral Bed - (synonyms: gorgonians, sea fans, sea feathers, sea fingers, sea pansies, sea plumes, sea rods, sea whips, soft corals). Marine and estuarine octocoral beds are soft faunal based natural communities characterized as large populations of sessile invertebrates of the Class Anthozoa, Subclass Octocorallia, Orders Gorgonacea and Pennatulacea. The dominant animal species are soft corals such as gorgonians, sea fans, sea feathers, sea fingers, sea pansies, sea plumes, sea rods, and sea whips. This community is confined to the subtidal zone since the sessile organisms are highly susceptible to desiccation. Other sessile animals typically occurring in association with these soft corals are sea anemones. An assortment of non-sessile benthic and pelagic invertebrates and vertebrates (e.g., sponges, mollusks, tube worms, burrowing shrimp, crabs, isopods, amphipods, sand dollars, and fishes) are associated with octocoral beds. Sessile and drift algae can also be found scattered throughout octocoral beds. Octocoral beds require hardbottom (consolidated) substrate (i.e., coquina, limerock, relic reefs) on which to anchor.

Within the preserve, octocoral and sponge beds are present as one community. Additionally, compound ascidians, otherwise known as colonial sea squirts, often cover a considerable portion of hardbottom habitat.

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, Florida loggerhead sponge and sheepswool sponge. 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, sea anemones, mollusks, tube worms, isopods, amphipods, burrowing shrimp, crabs, sand dollars, and fishes. Sessile and drift algae can also be found scattered throughout sponge beds. Sponge beds require hardbottom (consolidated) substrate (i.e., coquina, limerock, relic reefs) on which to anchor. Hardbottom substrate occurs sparsely throughout Florida in marine and estuarine areas; however, sponges prefer the warmer waters of the southern portion of the state, significantly limiting their distribution severely.

Tidal Marsh - (synonyms: salt marsh, brackish marsh, coastal wetlands, coastal marshes, tidal wetlands). Marine and estuarine tidal marshes are floral based natural communities generally characterized as expanses of grasses, rushes and sedges along coastlines of low wave energy and river mouths. They are most abundant and most extensive in Florida north of the normal freeze line, being largely displaced by and interspersed among tidal swamps below this line. Black needlerush and smooth cordgrass are indicator species which usually form dense, uniform stands. The stands may be arranged in well-defined zones according to tide levels or may grade subtly over a broad area, with elevation as the primary determining factor. Other typical plants include saltgrass, saltmeadow cordgrass (marsh hay), gulf cordgrass, soft rush and other rushes, salt myrtle, marsh elder, saltwort, sea oxeye daisy, cattail, big cordgrass, bulrushes, seashore dropseed, seashore paspalum, shoregrass, glassworts, seablight, seaside heliotrope, saltmarsh boltonia, and marsh fleabane. Typical animals include marsh snail, periwinkle, mud snail, spiders, fiddler crabs, marsh crab, green crab, isopods, amphipods, diamondback terrapin, saltmarsh snake, wading birds, waterfowl, osprey, rails, marsh wrens, seaside sparrows, muskrat and raccoon. Fishes frequently found in this community include blacktip shark, lemon shark, bonnethead shark, hammerhead shark, southern stingray, yellow spotted ray, tarpon, ladyfish, bonefish, menhaden, sardines, anchovy, catfish, needlefish, killifish, bluefish, blue runner, lookdown, permit, snapper, grunts, sheepshead, porgies, pinfish, seatrout, red drum, mullet, barracuda, blenny, goby, triggerfish, filefish, and puffers.

Tidal marsh soils are generally very poorly drained muck or sandy clay loams with substantial organic components and often a high sulfur content. The elevation of tidal marshes range from just below sea level to slightly above sea level with vegetation occupying the intertidal and supratidal zones. The frequently high density of plant stems and roots effectively traps sediments derived from upland runoff or from littoral and storm currents. The decaying, dead marsh plants and the transported detritus which the living plants trap, accumulate to form peat deposits. Together, these accretion processes may build land.

Tidal marsh plants live under conditions which would stress most plants. High salt content in the soil, poor soil aeration, frequent submersion and exposure, intense sunlight, and occasional fires make the tidal marsh community inhospitable to most plants and require a wide tolerance for its inhabitants. The landward extent of tidal marsh along the shoreline is directly related to the degree of bottom slope; the more gradual the slope the broader the community band. Typical zonation in this community includes smooth cordgrass in the deeper edges, grading to salt tolerant plants such as black needlerush that withstand less inundation.

Tidal fluctuation is the most important ecological factor in tidal marsh communities, cycling nutrients and allowing marine and estuarine fauna access to the marsh. This exchange helps to make tidal marsh one of the most biologically productive natural communities in the world. A myriad of invertebrates and fish, including most of the commercially and recreationally important species such as shrimp, blue crab, oysters, sharks, grouper, snapper and mullet, also use tidal marshes throughout part or all of their life cycles.

Tidal marsh habitat is not common within the preserve. While small amounts of black needlerush (*Juncus romerianus*) are present in some low-salinity areas, and small amounts of cordgrass (*Spartina alterniflora*) recruit into open shorelines, these typically are rapidly overgrown by mangroves. Tampa Bay represents a climatic transition zone where occasional freezing temperatures rarely reach areas as far south as Terra Ceia. As a result, the area represents transition from temperate salt marshes to subtropical mangrove forests. Even within the timeframe of aerial photography, there has been a transition from tidal marsh to mangrove fringe with changing climate. Because of its location at a latitude of climatic transition, and because of the low gradation in shoreline elevation, the Aquatic Preserve Manager feels that the Terra Ceia area is one of Florida's most likely locations to experience profound floral and faunal changes with anticipated changes in climate and sea level.

Native Species

Because of its somewhat subtropical climate the TCAP supports considerable biodiversity. In addition to 4 species of mangroves and 5 species of seagrasses, over 30 species of algae have been identified. Approximately 300 species of invertebrates and 70 species of fishes have been identified within the preserve boundary.

Approximately 70 species of birds either nest in the preserve or frequent it. Foraging within the habitats of the TCAP and adjacent upland wetland habitats is critical to sustaining the populations of colonial waterbirds that nest on islands within the bay or on the nearby rookery islands. Three colonial waterbird nesting islands occur within the boundaries of the TCAP. Several other colonies are within foraging distance. The estuary open-water foragers, including brown pelicans and double-crested cormorants, rely on high water clarity to find fish prey. The importance of water quality and quantity of freshwater inflows to protect the fishery resource prey base is easily understood, and needs to be emphasized in developing management plans for the bay. Also, reddish egrets, the rarest heron in North America, have a small population in Florida of only about 400 nesting pairs. Reddish egrets forage only in estuaries, on open mudflats, and exposed sand and grass flats. Therefore, the value of the nesting islands with habitat suitable for reddish egret foraging activity within Terra Ceia Bay, and within foraging distance of the Bay, is significant.

The habitats of the Terra Ceia Bay system are also very important to other bird species. During the winter, the bay is extensively used by winter migrant bird populations and other duck species. Nesting prairie warblers rely on the mangrove forest habitats. Mangrove cuckoos have also been observed in the mangrove forests during the nesting season, and are suspected of nesting. Shorelines of islands, especially along the west side of Miguel Bay and Rattlesnake Key, are important to wintering and migratory shorebirds. Wilson's plovers use these shorelines and salt barrens for nesting in the spring and summer and are residents all year long. In the spring and fall, neotropical migrants and other songbirds use the mangroves and coastal hammock habitats of Terra Ceia Bay and its watershed extensively. For a complete list of the native species found in the aquatic preserve see Appendix B.

Listed Species

Listed species include the West Indian manatee, which may be seen foraging along the grass flats. A bald eagle pair that nests in the adjacent uplands has been spotted sitting atop mangrove trees overhanging the preserve. At least a dozen state or federally listed bird species frequent the preserve. Most of these are arboreal nesters, and they thrive on the area's mangrove islands. TCAP has little open island habitat for ground nesting birds like least terns. Raccoons and other predators prevent ground nesting in most mainland areas.

American oystercatchers, a state-listed Species of Special Concern, forage on the exposed oyster bars and mudflats in Terra Ceia Bay as year-long residents. Mottled ducks also rely on habitats within

Terra Ceia Bay. Terns also forage in the waters of Terra Ceia Bay (Hodgson, Paul, & Rachal, 2006). For a complete list of the listed species found in the aquatic preserve see Appendix B.

Invasive Non-native Species

A study done by the University of Florida identified approximately 60 potential non-native, or exotic, invaders of the Tampa Bay area (Tampa Bay Agency on Bay Management, 2004). Of these, at least 41 are known to occur in Tampa Bay. A thorough analysis of invasive exotics has not been done for Terra Ceia, but the area's proximity to shipping makes it likely that invasive non-native species have been and will continue to be introduced into waters of the preserve through ballast water discharge and hull fouling. Additionally, the urban nature of Tampa Bay makes it likely that aquarium species, like the African cichlids already found in Frog Creek, will be introduced.

In low-salinity areas of the preserve, water hyacinth has been the most disruptive invasive exotic species. Hyacinth can clog channels to the point that they become un-navigable. Other invasive aquatic plants are found in Appendix B. Several upland and transitional species displace native species, and, in addition to facilitating erosion, reduce the complexity of submerged habitat for fisheries use. The most problematic of these are Brazilian pepper and Australian pine.

Invasive non-native marine life includes the Asian green mussel (*Perna viridis*). This species, while prevalent in parts of upper Tampa Bay, still appears to be spreading at Terra Ceia. The ultimate level of infestation within the preserve remains uncertain. At present, the green mussel forms dense aggregations on manmade substrates. It is present on natural hardbottom, and it may reach large sizes in this habitat, but it has not become pervasive. For a complete list of the invasive non-native species found in the aquatic preserve see Appendix B.

Problem Species

Two native species are especially problematic in parts of the preserve. Cattail (*Typha dominguensis)* forms large monospecific stands, to the exclusion of other native species, in disturbed low-salinity areas. Occasional increases in salinity leave large amounts of decaying biomass from the cattails killed by the salt.

Raccoons (*Procyon lotor)* are a likely cause of nesting failure in some island bird colonies. It is believed that the raccoons swim to the islands where they disturb nesting birds and eat unhatched eggs. Control measures are conducted by the National Audubon Society's Coastal Islands and Sanctuaries program.

Archaeological and Historical Resources

Approximately 90 prehistoric archaeological sites have been identified within the Terra Ceia Florida Forever project boundary, and approximately 60 of these are presently under state ownership (DEP, 2001). While these sites are not within the aquatic preserve, they may shed light on its importance to prehistoric man. Developed sites adjacent to the aquatic preserve include Madira Bickel Mound State Archaeological Site on Terra Ceia Island and the Portevant Indian Mound at Emerson Point Park.

According to local resident and historian Bill Burger, Terra Ceia includes sites dating back to 8,000 B.C., mostly small hunting and camping sites. Larger shell middens have been found dating to around 1200 B.C. Most of these middens are now underwater, reflecting sea-level rise. More permanent settlements - including temple and burial mounds still present on site - were established by Indians between 800 and 1200 A.D., long before Europeans landed on our shores. By the 17th century, Cuban fishermen were harvesting redfish, sea trout and pompano from the estuary, and shipping catches back to their homeland (B. Burger personal communication with Shelly Allen).

But it wasn't until the 1840s, when the Atzeroth family settled land on the west end of Terra Ceia, that the first European settlement was documented. Julia Atzeroth - or "Madame Joe" as she was known - ran a riverfront boarding house and store in Palmetto where she sold vegetables grown on Terra Ceia Island. The industrious matriarch later purchased a coastal sloop and hired one Samuel Bishop, after whom Bishop Harbor is thought to be named, to captain the vessel. During the Civil War, Madame Joe's sloop was used for blockade running, ferrying mail from Fort Brooke in Tampa to Bradenton. As legend has it, on one particular trip with Union officers in hot pursuit, Bishop ran the sloop aground but managed to make it ashore and deliver the mail (B. Burger personal communication with Shelly Allen).

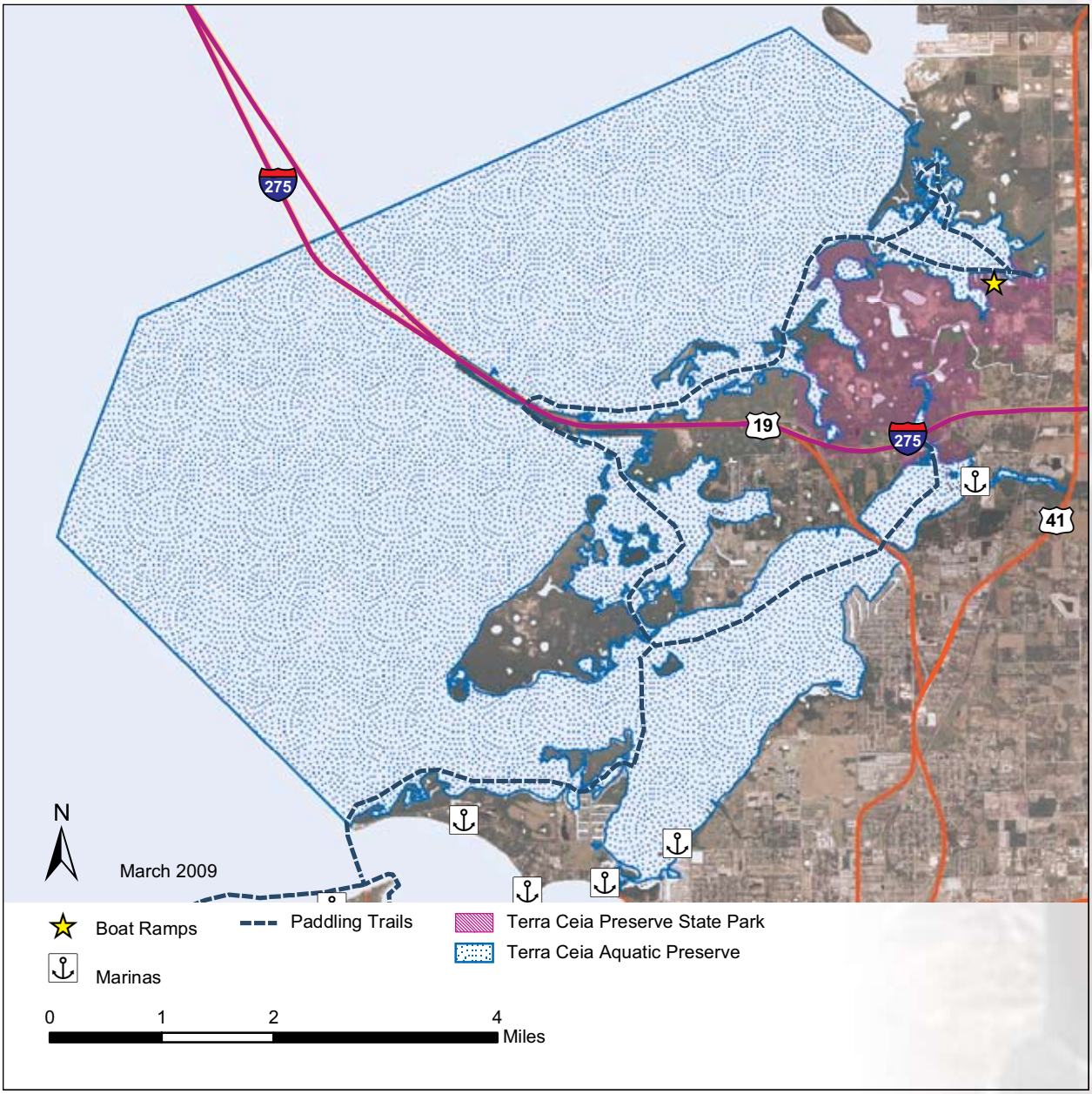
The tiny farming community grew in the late 1880s, with vegetables and citrus transported by steamship from wharfs on Terra Ceia Bay to Tampa. With the extension of a railroad line to the island in the early

1900s, the community flourished. During Prohibition, whisky runners shuttled liquid contraband through Terra Ceia Bay. Critical Creek, which bisects Rattlesnake Key, got its name from smugglers who used the tiny shortcut to Miguel Bay to escape the U.S. Coast Guard (B. Burger personal communication with Shelly Allen).

"The death knell of Terra Ceia's booming economy," says Bill Burger, a local archaeologist, "was a massive storm locals called the tidal wave, which flooded the island in the early 1930s." The railroad line was discontinued, and while farming continued, the area has become increasingly residential (Hoppe, 2002).

Other Associated Resources

The Terra Ceia area is one of the best locations in the Tampa Bay region for a cross section of local submerged habitat types. All local species of marine and estuarine seagrasses may be found within the preserve. Hard corals, soft corals, sponges and other hardbottom species are found in close proximity to seagrass beds, algal beds and open sand bottom. The patchiness of these habitats provides valuable transitional habitat, or ecotones, where an increased diversity of organisms may be found.



Map 8 / Public Access Points in Terra Ceia Aquatic Preserve

3.1.4 / Values

The Terra Ceia ecosystem is a major driver for economics and quality of life in the Tampa Bay area. The total annual economic contribution of coastal fish and wildlife activities to Florida's economy in 2006 was $32 billion and 357,559 jobs. Specifically, boating contributed $18.9 billion and 220,000 jobs; saltwater fishing $5.4 billion and 54,508 jobs; wildlife viewing $3.3 billion and 34,683 jobs; commercial fishing $589 million and 9,787 jobs; and seafood processing $644 million and 3,108 jobs (Florida Fish and Wildlife Conservation Commission, 2009). This does not include the many restaurants, hotels and other businesses that benefit from related tourism. Tampa Bay alone contributes more than $5 billion annually from trade, tourism, development and fishing, and boasts three major seaports. More than 100,000 boats are registered to fishermen and sailing enthusiasts in Pinellas, Hillsborough and Manatee counties (Tampa Bay Agency on Bay Management, 2004). The emergent and submerged habitats of the preserve are critical to many commercial and recreational fish species as well as many bird species.

Humans as a component of the preserve ecosystem are very important. Residents and visitors are inseparable from the function and well-being of the preserve, and TCAP strives to help them understand the responsibility to protect the resources that comes with their use and enjoyment.

3.1.5 / Adjacent Public Lands and Designated Resources

The Terra Ceia Preserve State Park serves as a buffer preserve for the protection of the aquatic preserve. It totals over 1,900 acres and it is part of the larger Terra Ceia Florida Forever project, which is a joint acquisition project between the State of Florida and the Southwest Florida Water Management District. Infrastructure development, recreational activities and habitat restoration within the preserve state park all affect the aquatic preserve. It is important for these activities to be coordinated with the aquatic preserve and to be planned and executed in a manner that mutually benefits both the park and the preserve, while avoiding or minimizing any harmful effects.

Washburn National Audubon Sanctuary is located in Terra Ceia Bay and has been protected by National Audubon wardens since 1939. Now owned by the National Audubon Society, this beautiful natural mangrove key supports a large breeding colony of up to 4,000 pairs of pelicans, cormorants, anhingas, herons, egrets, ibis, and spoonbills. With 16 nesting species, this colony is ranked the second most important in Florida by the Florida Fish and Wildlife Conservation Commission (National Audubon Society, 2009). TCAP staff has supported management activities in this area, and must continue to help protect this important component of the Terra Ceia ecosystem.

Emerson Point Park is a 195-acre site acquired as public conservation lands by the State of Florida and Manatee County and managed by Manatee County for public use as a passive recreation, conservation, and education park. It is located at the tip of Snead Island and its northern shoreline borders the aquatic preserve. The site has a combination of cultural and natural resources with six Indian mounds and middens, a 19th century plantation settlement, hardwood hammocks, extensive mangroves, and saltwater marsh areas (Manatee County, 2009). In addition to providing valuable wildlife habitat and water quality maintenance functions, this site provides an archaeological context within which the pre-Columbian history of the Terra Ceia area can be understood.

Madira Bickel Mound State Archeological Site was the first site in Florida to be designated a State Archaeological Site. Karl and Madira Bickel donated the mound and surrounding property to the state in 1948. The flat-topped ceremonial mound, composed of sand, shell, and village debris, measures 100 by 170 feet (30.5 m by 51.8 m) at the base and is 20 feet (6.1 m) in height. Archaeological excavations have disclosed at least three periods of Native American cultures, the earliest dating back 2,000 years (Department of Environmental Protection, 2009). In addition to providing valuable insights into the pre-Columbian history of Terra Ceia Island, the site contains several acres of mangrove and upland habitat.

Port Manatee is located along the northern border of the preserve and separates the TCAP from the Cockroach Bay Aquatic Preserve. The channel into the port is 2.9 miles (4.7 km) in length with a width of 400 feet (121.9 m) and a depth of more than 40 feet (12.2 m) (with a mean low water line of 2 feet (.2 m)). As an environmental component of port development, considerable acreage of uplands and transitional habitat south of the port has been protected under a conservation easement. Activities and development at the port have the potential to impact preserve resources, and the conservation easement provides a valuable buffer between preserve resources and port operations.

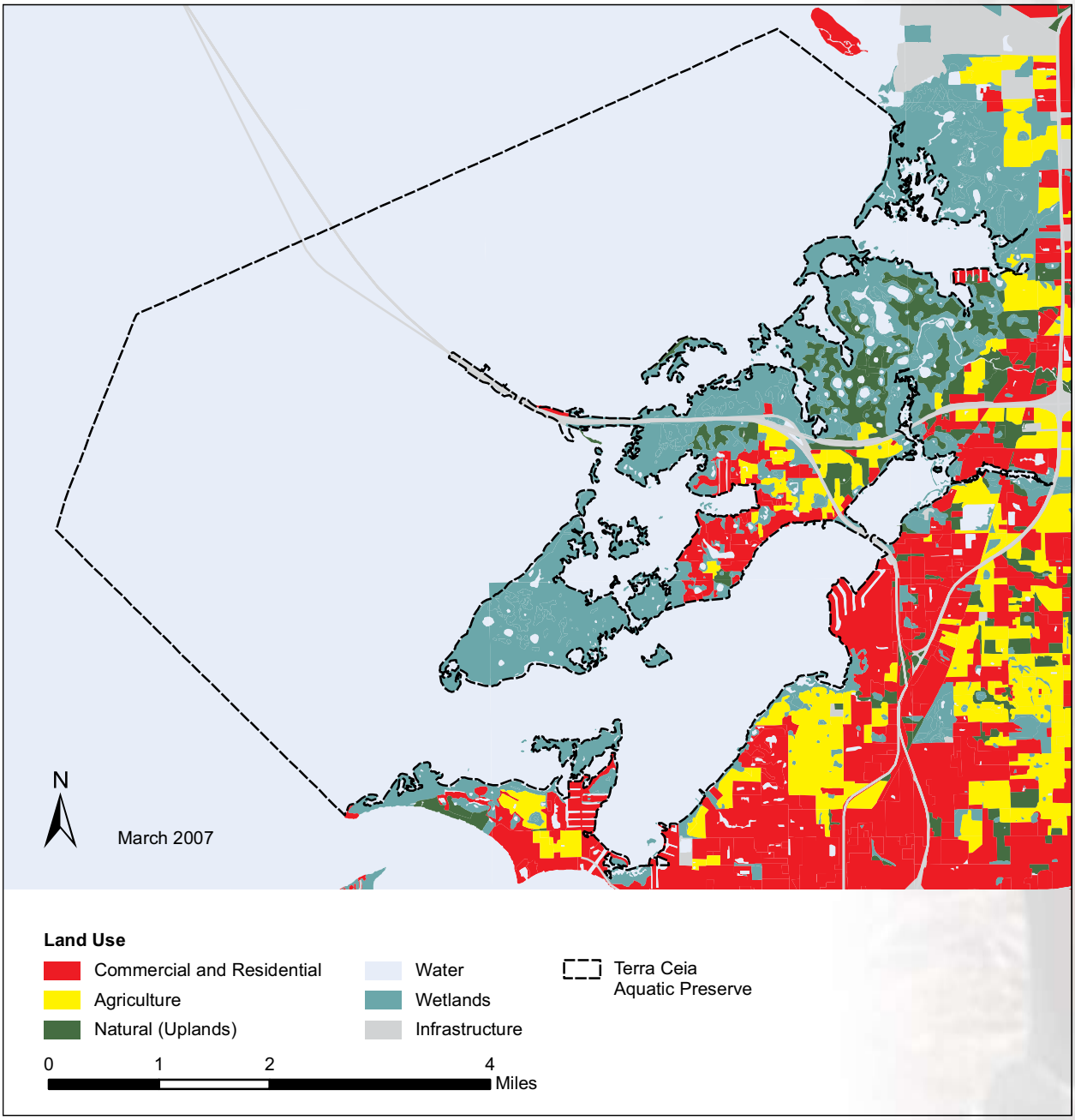
The Sunshine Skyway Bridge and Skyway State Fishing Pier bisects the preserve. Traveling south on the Skyway, the TCAP is the first thing one sees after the high point of the bridge. The undeveloped

beauty of the aquatic preserve and the buffer preserve is further highlighted by its urban counterpart in Pinellas County. The fishing pier provides structure to attract a variety of game fishes. Common catches include snook, tarpon, grouper, black sea bass, Spanish mackerel, king mackerel, cobia, sheepshead, red snapper and pompano. The pier also allows access to the preserve without the associated boating impacts.

3.1.6 / Surrounding Land Use

Much of the land adjacent to the TCAP is state-owned conservation land acquired to act as a buffer from coastal development. Several commercial nurseries are near the preserve and a number of shoreline homes and housing developments are clustered in various locations adjacent to or near the preserve shoreline. Port Manatee lies immediately adjacent to the northern boundary of the preserve. Several specialized facilities near the preserve include a commercial riding stable and a small racing test track.

All of these enterprises must be encouraged to minimize impermeable ground cover and to retain stormwater, nutrients and sediments on-site.



Map 9 / Land Use Surrounding Terra Ceia Aquatic Preserve

Tidal creeks in the preserve are both picturesque and ecologically important.

Part Two

Management Programs

Chapter Four

CAMA's Management Programs

The work performed by the Office of Coastal and Aquatic Managed Areas (CAMA) 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.

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. CAMA ensures that, when applicable, consistent techniques are used across sites to strengthen the State of Florida's ability to assess the relative condition of coastal resources. This enables decision-makers to more effectively prioritize restoration and resource protection goals. In addition, by using the scientific method to create baseline conditions of aquatic habitats, the Ecosystem Science Management Program allows for objective analyses of the changes occurring in the state's natural and cultural resources.

4.1.1 / Background of Ecosystem Science at Terra Ceia Aquatic Preserve

Ecosystem Science is relatively young in the Terra Ceia Aquatic Preserve (TCAP), but recent years have seen establishment of groundwork for a very robust program in which science and resource management goals are tied together. Until relatively recently, most of the shoreline at Terra Ceia was in private ownership, and a combination of poor access and little on-site support for field activities was a deterrent to field research. Over the past decade, the purchase of thousands of acres of shoreline conservation land and the relocation of the Tampa Bay Aquatic Preserves (TBAP) office from Tampa to Terra Ceia has provided a much-improved "jumping off" point, as well as other logistical support and experimental design assistance, for researchers. Additionally, the placement of adjacent uplands into conservation has allowed development of an "open ecosystem" context for studying the aquatic preserve as a continuous landscape of interconnected habitats.

In 2002, The U.S. Geological Survey (USGS) established the "Tampa Bay Pilot Study" as a collaborative effort with TCAP and other entities. This three-month interdisciplinary study was largely focused on Terra Ceia, and it was intended to establish and evaluate equipment and techniques for coastal studies. The study was extended to one year, and it eventually evolved into the five-year Tampa Bay Study. Visits from USGS central office staff and congressional aides highlighted the importance of the project. The project has expanded to include comparative studies between Terra Ceia and other Tampa Bay sites like Weedon Island and Mobbly Bayou.

The Tampa Bay Study has been a truly interdisciplinary effort, and it has been used as a model of integrated and collaborative science within USGS. Topics either directly or indirectly tied to this effort include:

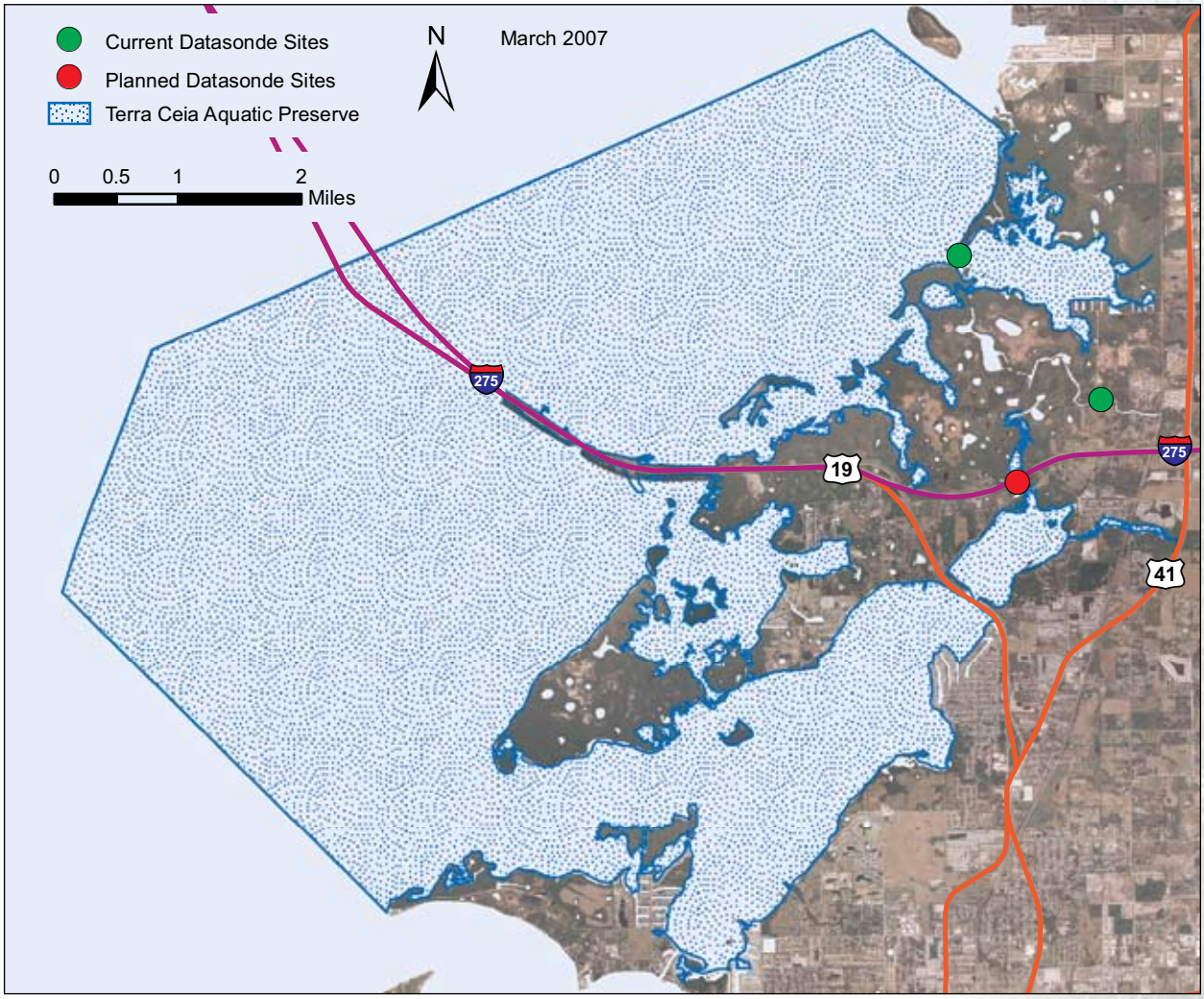
- studies of coastal historical geology to better understand the formation and evolution of Terra Ceia and of Tampa Bay as a whole;
- archaeological studies of paleo shorelines at Terra Ceia to reconstruct pre-Columbian human interactions with sea level;
- topobathymetric mapping using soundings, LIDAR (Light Detection and Ranging) and a variety of methods to provide more accurate three-dimensional representations of the shoreline;
- multispectral image analysis ground truthed to study its accuracy in habitat characterization under a variety of conditions;
- georeferencing of 150 year-old descriptions of witness trees and other historical analytical tools to detect coastal habitat changes;
- comparisons of LIDAR, EARL LIDAR (Eye-safe Atmospheric Research LIDAR) and conventional survey data to gain insights on the relative accuracies of these techniques for different Terra Ceia habitat types;
- studies of groundwater movement through wells and surface resistivity for new insights into groundwater salinities and fluxes through the Terra Ceia coastline;
- studies of wetland wildlife use, including fish use of disturbed and natural areas, which already have yielded preliminary data of use in prioritizing wetland habitat restoration and land acquisition.
- *in situ* respirometry of submerged habitat, using a device called the SHARQ (Submersible Habitat for Analyzing Reef Quality), which already has indicated higher levels of productivity in Terra Ceia seagrass beds than in similar deployments of the system in Florida Bay and Hawaii;
- studies of genetics of mangrove populations, in particular albinism mutations in red mangroves, which have revealed unusually high mutation rates in Bishop Harbor of the preserve;
- analysis of sediment cores for pollen, chemical contaminants and other markers for valuable insights into the lasting effects of deforestation, industrial development and other past activities at Terra Ceia and in Tampa Bay;
- sediment pore water characterization which should give insights into hydrological effects of habitat alteration and restoration projects;
- monitoring of groundwater fluxes, measured through such tracers as radon, to quantify exchange between ground water and surface water;
- hydrological modeling of tidal creek function to support decision making in the environmental tradeoffs of habitat creation projects; and
- supercomputer modeling of submerged resource changes with changing shoreline ground cover has shown strong correlations in such parameters as seagrass and impermeable surface.

As experimental designs were developed for individual research projects, TCAP staff was engaged in defining informational needs, locating appropriate study sites, discussing methods and results and pulling stuck researchers out of the mud. Collaboration truly has been on all levels. At the time this management plan is being drafted, data from these and other components of the Tampa Bay Study are being processed and analyzed. TCAP staff is working with USGS and collaborating scientists to determine how best to make the information available to future researchers, resource managers and to the public. While still tentative, much of the information from the Tampa Bay Study can be found on the USGS Tampa Bay Study web site. As the full extent of this information is processed, TCAP staff will use the information in decision making for adaptive management and for the next management plan revision of the TCAP.

4.1.2 / Current Status of Ecosystem Science at Terra Ceia Aquatic Preserve

As with other sites, ecosystem science at the TCAP has evolved to use and build upon the results of a variety of external research and monitoring efforts. Rather than duplicate other efforts, TCAP staff focuses on matching resource management informational needs with existing data, identifying data gaps and locating collaborators to address those gaps. While TCAP staff often serves as a coinvestigator and/or logistical support on various studies, limited program staffing and resources keep the internal research program at a minimum. The abundance of academic institutions and nonprofit organizations in the Tampa Bay area make this approach particularly successful in areas like Terra Ceia. Because of this wealth of information and willing partners, TCAP staff is able to focus on holistic perspectives like ecosystem function and cumulative impacts.

The Tampa Bay Study was concluded in 2007. As data analysis nears completion, work is being refocused toward two goals: to tie together the data into useful “tools” for resource managers and



Map 10 / Datasonde Sites in Terra Ceia Aquatic Preserve

Development still threatens some shoreline along the preserve.

to create a context within which future research will continue and flourish. A major area of emphasis within the timeframe of the present management plan will be to develop management tools and define additional informational needs from Tampa Bay Study data.

The TCAP program is collaborating on several ecosystem science initiatives beyond the Tampa Bay Study. These are intended to make existing information related to resource management readily available and to identify and pursue additional informational needs.

Information Management - Mining and storing existing data is becoming more practical with digital technology. In the past, preserve managers and staff were content with knowing where information could be found among a variety of outside programs. Storage space and the difficulty in locating individual documents limited enthusiasm for a more extensive literature collection. Reference management software, digital data files and digital full-text documents have led the program to begin developing a more comprehensive in-house collection that includes historical, legal, administrative and scientific documents.

Mapping and Resource Inventories - There is a significant need for resource inventories in the TCAP. This need also has been identified for the statewide program. Historically, resource inventories have been done for the footprints of individual impact areas as warranted by events and requests for regulatory input. This approach does not address the need for a “big picture” perspective of the status and trends in preserve resources. Boat based, georeferenced underwater video capability already is making it possible to do resource surveys of larger areas like proposed aquaculture leases and linear feature easements. Other remote sensing techniques, like high-resolution sidescan sonar and airborne hyperspectral imaging show promise for larger-scale, more cost-effective surveys. TCAP staff is actively engaged in forging partnerships with other agencies and private industry to evaluate and apply these and other technologies. It must be kept in mind that resource inventories are expensive, and the ephemeral nature of some habitats limits the useful lifespan of detailed resource maps. Data collection efforts must be carefully spatially and temporally scaled, as to provide only the level of detail useful in developing big-picture views of the status and trends of resource distributions. There always will be a need for staff to visit sites to evaluate impacts within footprints of specific events and activities, and the TCAP program places much emphasis on building capacity for rapid assessments.

Water Quality - Water quality has long been of interest to the Tampa Bay environmental community as both an indicator and driver of ecosystem health. A big-picture perspective has resulted in substantial reductions in nutrients and other pollutants that had seriously impaired Tampa Bay several decades ago. Past pollutant sources of concern specific to Terra Ceia have included sewage and septic effluent into Terra Ceia Bay and phosphate process water discharges into Bishop Harbor. While there is a trend toward a decrease in these impacts, new threats to water quality at Terra Ceia are increasing in the form of a domestic housing development boom in the local watershed. Additionally, increased cargo traffic resulting from the expansion of Port Manatee and additional industrialization of the port area may raise new water quality issues.

As Terra Ceia moves into a crossroads where water quality may continue to improve or may become degraded by regional growth, strategically-placed permanent monitoring stations will give valuable insights into the status and trends of such parameters as water level, salinity, dissolved oxygen, pH, temperature and turbidity. For several years, the TCAP program has been experimenting with technology and partnerships aimed at developing cost effective, reliable continual monitoring stations at key locations in the preserve. A permanent station in the low salinity region of Frog Creek had been fitted with cell phone telemetry, and data from this station was available, in nearly real-time, to TCAP staff and the public. This strategy proved to be prohibitively expensive beyond the pilot project. Present emphasis has shifted to the development of low-cost radio telemetry in partnership with University of South Florida. Similar technology is planned for other stations within the program. Additional stations in other Tampa Bay preserves will be considered, but considerable expansion outside Terra Ceia is not planned at this time. TCAP is working with the appropriate entities ultimately to incorporate these stations into the Gulf Coast Ocean Observing System and to distribute information on constructing the stations through the Alliance for Coastal Technologies.

Contingent upon the success of the fixed monitoring and data telemetry stations, TCAP also may proceed to develop a buoy-based station that can be temporarily located near dredging projects and other events. By supplying nearly real-time information to TCAP staff, this station might help prevent some of the ongoing degradation.

Water Quantity - As with the entire Tampa Bay area, anticipated changes in freshwater inflows are an important consideration at Terra Ceia. Trends in ground cover, freshwater withdrawal, climate change and overall water table levels make it likely that overall influx of freshwater into the preserve will decrease in the future. Much research focuses on the effects of salinity changes on coastal resources, and ecosystem science at Terra Ceia shall focus on providing site-specific information to which this research can be applied to predict local effects of these changes. Discharge monitoring on Frog Creek has been set up on a temporary basis to model the effects of wetland restoration projects. Long-term continuation of this monitoring would provide valuable baseline data to be used in future decision making for freshwater withdrawal and other proposed hydrological changes. Ongoing monitoring of vegetation and fisheries resources along salinity gradients can be coupled with hydrological models to anticipate the biotic responses to these changes.

Submerged Aquatic Vegetation - Algae and seagrasses are important trophic and structural components of the Terra Ceia ecosystem. Submerged aquatic vegetation (SAV) monitoring takes on several forms at the preserve. Large scale photo interpretation is done at four-year intervals to give a big-picture view of coverage and overall trends. While appropriate for coarse assessments of SAV change, these assessments often have difficulty in distinguishing between seagrass and drift algae, bryozoan reefs and other features. Photo interpretation must be complemented by extensive ground truthing to detect other habitats.

Several transects have been established at Terra Ceia to monitor seagrasses with depth. Data collected on these transects by Manatee County and Tampa Baywatch include species, coverage and fouling.

For approximately five years, quadrat and transect monitoring of SAV in Bishop Harbor have been conducted by the Florida Department of Environmental Protection's (DEP) Water Resource Management program on a monthly basis. This monitoring program was established, with input from TCAP staff, in response to issues related to the closure of the nearby Piney Point phosphate facility.

Emergent Vegetation - Relative to SAV, emergent vegetation distributional patterns are somewhat stable on the short term. However on a time scale of several decades, profound changes have occurred. *Juncus* and *Spartina* marsh have been replaced by mangrove fringe. Sea level rise, climate change and hydrological changes are occurring at rates that will continue to drive the evolution of low-lying vegetation communities.

Most present and proposed studies of emergent vegetation are more qualitative than quantitative. Monitoring of aerial coverage of emergent vegetation has not received much effort, because much of

the shoreline is protected from development by conservation land status. Research is focusing on such topics as unusually high mutation rates in mangroves and storm damage to mangroves. In general, emergent vegetation research is focusing on external influences.

Wildlife Monitoring - Water quality telemetry stations are not the only application of remote data acquisition implemented in the preserve. Technology is making a variety of wildlife-related efforts less invasive and more accurate. For example, bats are important in their foraging over preserve waters. Historically, bats have been censused through the deployment of mist nets. Some bat species may avoid these nets and those that are captured are stressed in the process. The five species of bats known to occur at the TCAP have been identified through remote acoustic monitoring. Bat vocalizations detected by a microphone are passed through an analog to digital converter, and the resulting voice pattern is displayed as a species-specific voice pattern on a laptop computer in the field.

Remote sensing technology also has enabled scientists to track the movements of sharks at Terra Ceia. Scientists from Mote Marine Laboratory implant acoustic tags into sharks and release them. An array of listening devices moored on the bottom of Terra Ceia Bay tracks the movements of tagged sharks for a synoptic picture of diurnal movement and responses to events like storms.

Bird monitoring data are available from the Tampa-based Coastal Islands Sanctuaries program of the National Audubon Society. In addition to routine monitoring of the Audubon-owned Washburn Sanctuary island in Terra Ceia Bay, the Audubon program monitors significant nesting sites like the state-owned Little Washburn site and new sites that occasionally occur within the preserve boundaries.

As with the monitoring of wildlife in general, the TCAP program relies on external partners to monitor the abundance and distribution of state and federally listed species. Florida Wildlife Research Institute monitors manatee activity through aerial observation and Geographic Information Systems (GIS) telemetry. The National Audubon Society's Florida Coastal Islands Sanctuaries program monitors listed bird species within the preserve. The primary focus of the TCAP is managing submerged habitat, but the program actively assists the wildlife agencies and organizations whose focus is on organisms.

Habitat Monitoring - There has been considerable discussion among CAMA's managed sites of the utility of creating a benthic habitat suitability index based upon empirical monitoring data. For a number of years, Hillsborough County's Environmental Protection Commission has refined and implemented such a system on a bay-wide scale. The TCAP program is investigating the suitability of the present index as a basis for management decisions within the preserve. Given the relatively small number of stations within the TCAP, staff may find it useful to enhance the efforts at Terra Ceia within Hillsborough County's existing framework.

Science from the Tampa Bay Study has been tied to habitat restoration projects in the preserve. Information on fish use of mosquito ditches, ponds and other habitats has been used in determining when restoration of disturbed areas is likely to result in ecologically valuable habitat changes. TCAP staff has been working with USGS and the Southwest Florida Water Management District (SWFWMD) to establish and maintain five datasonde and stage monitoring stations in the Frog Creek system to provide data for a hydrodynamic model of the creek. This model will be used to determine whether proposed wetland creation along the creek will result in unacceptable alteration of an exiting salinity gradient.

A strong science component now exists at Terra Ceia outside and beyond the Tampa Bay Study. Monitoring of birds, bats, fishes, algae, seagrasses and other ecosystem components by external organizations allows the TCAP program to concentrate on the ecosystem-level perspectives that are directly tied to their legislative mandate. As digital information management becomes more cost effective, more research and monitoring data will be available in-house, but TCAP staff presently has ready access to most information as needed. Local colleges and universities are applying for grants for ongoing research in the preserve. Planned studies include expanding work on the unusually high frequency of mutation rates in Bishop Harbor mangroves to include mutations in other organisms. Other work will address recovery of mangroves from storm events. TCAP staff is engaged in the design of these studies, and, in some cases, is collaborating as an associate investigator.

Climate and Sea Level Change

Changing climate likely will affect Terra Ceia in two general ways. The area has and will continue to experience biotic changes related to climatic changes, and coastal habitats will respond to changing sea level. As previously mentioned, Terra Ceia is uniquely situated at an area of climatic transition. Hard freezes are infrequent in this area, but the occasional freezes that occur roughly every 5 to 10 years are an important influence on which species can persist in the area.

Nearly every aspect of resource acquisition, restoration and management in the TCAP must be viewed within the context of changing climate and sea level. Sea level varies as a result of several factors. Eustatic sea level is the absolute level of the world's oceans. Eustatic sea level change is the predominant source of sea level variation at Terra Ceia. Current information indicates that eustatic change is causing a sea level increase of 2.4 mm per year (approximately one inch per 10 years). The second mechanism contributing to local sea level change is subsidence. While much of the Gulf Coast is experiencing subsidence rates several times the rate of eustatic change, subsidence is not a major factor at Terra Ceia. Because the area is situated on the Florida carbonate shelf, subsidence is primarily in the form of local karst collapse features (sinkholes). A third factor contributing to relative sea level changes on a local scale is sediment accretion. Mangroves, salt marshes, seagrass beds and other habitats are sensitive to microtopography. Two sediment elevation table stations have been established at Terra Ceia, but one has been vandalized. The TCAP must continue to encourage long-term monitoring of sediment elevation changes to form a more complete picture of coastal change at Terra Ceia.

Ecosystem Science is developing rapidly within the TCAP. A unique aggregation of academic, governmental and other research entities in the Tampa Bay area has come together with the research programs like the Tampa Bay Study to lay the groundwork for a truly interdisciplinary and comprehensive framework of research topics and baseline information. The TCAP will continue to be an integral part of this process by connecting research with issues.

*4.2 / **The Resource Management Program***

The Resource Management Program addresses how CAMA manages the TCAP and its resources. The primary concept of TCAP Resource Management projects and activities are guided by CAMA's mission statement: "To protect Florida's coastal and aquatic resources." CAMA'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. CAMA managed areas are especially sensitive to upstream activities affecting water quality and quantity. CAMA works to ensure that the most effective and efficient techniques used in management activities are used consistently within our sites, throughout our program, and when possible, throughout the state. The strongly integrated Ecosystem Science, Education and Outreach and Public Use Programs, provide guidance and support to the Resource Management Program. These programs work together to provide direction to the various agencies that manage adjacent properties, our partners and our stakeholders. The TCAP 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 TCAP are diverse. This section explains the history and current status of the preserve's Resource Management efforts.

4.2.1 / Background of Resource Management at Terra Ceia Aquatic Preserve

Effective resource management is especially challenging for the TCAP program. Emerging issues and unforeseen events in one of Florida's most densely urbanized watersheds necessitate the continual review and adjustment of priorities to ensure maximum resource protection from available program resources. Nevertheless, the actions of TCAP staff have resulted in protection of numerous acres of submerged resources from otherwise likely impacts. Much of the most effective resource protection afforded by the TCAP has been in the form of informing decision makers of the presence of sensitive resources and strategies to avoid and minimize impacts. Information provided by the program to residents and visitors also has resulted in positive changes in resource use.

In 1998, the Terra Ceia State Buffer Preserve was established under the management responsibility of CAMA as a Conservation and Recreational Lands project. Five full-time equivalent (FTE) positions were added to the expanded "Tampa Bay Aquatic and Buffer Preserves" program staff. However, the statutory obligations of the buffer preserve meant that most of the program's resources were committed to prioritization, acquisition and management activities associated with the uplands. Several years of creating positions, acquiring land management equipment like tractors, fencing and other startup activities placed most of the program's emphasis on upland habitats.

In 2004, management responsibilities for most of the state's buffer preserves, including the Terra Ceia State Buffer Preserve, were transferred to DEP's Division of Recreation and Parks (DRP) as part of a

By comparing fishes in disturbed areas (such as ditches) with those in undisturbed areas, the need for restoration can be assessed. Photo courtesy of USGS.

larger statewide reorganization. The local CAMA program reverted to "Tampa Bay Aquatic Preserves," and three FTE positions were transferred to DRP. In the past few years, the program has been retooling to reemphasize submerged resource management.

4.2.2 / Current Status of Resource Management at Terra Ceia Aquatic Preserve

Staffing and Management Strategic Approach - At present, the TCAP program has one select exempt service position as the manager, one FTE position as field staff, one other personal services field staff position and one FTE administrative position. These four staff manage the Terra Ceia Aquatic Preserve, in addition to the Cockroach Bay Aquatic Preserve, the Pinellas County Aquatic Preserve and the Boca Ciega Bay Aquatic Preserve.

The resource management strategy of the TBAP program is to develop a systemic understanding of Tampa Bay's four areas that have been legislatively designated for special protection as aquatic preserves. Based on this perspective, the program serves as a catalyst to define priority issues, to identify resources to address these issues and to facilitate the resolution of the issues. Because of the large geographic area of Tampa Bay's aquatic preserves, local manpower and other resources are used to identify and resolve issues. For example, with the widespread islands of the Pinellas County Aquatic Preserve, citizen groups help with debris cleanup, exotic species removal and native species planting. A network of city, county and state facilities serve as points for staff to stage equipment and to coordinate these efforts. This wide-ranging, opportunistic approach is especially successful in maximizing the effectiveness of limited program resources. A key element of this strategy is the abundance of manpower, information and other resources in the Tampa Bay area.

The management strategy in relatively pristine areas like Terra Ceia leans toward proactive, preventive actions. Understanding the functional aspects of resource dynamics at Terra Ceia provides guidance for resource restoration and management in more disturbed areas. Little restoration of submerged habitat is necessary at Terra Ceia. Emphasis is to be placed on preventing damage expected from increased use and development.

Historical and Cultural Resource Management - Terra Ceia is rich in historical and cultural resources. More than 80 archaeological sites have been identified on the upland areas bordering the aquatic preserve. Much less is known about submerged historical and cultural resources of the preserve. The aquatic preserve can help protect these submerged resources by encouraging the application of new technologies and protocols to their identification and by ensuring that any resource inventories required of construction impacts are done in a thorough manner. For example, TCAP staff was directly involved in planning and overseeing cultural resource inventories done in conjunction with the Peanut Lake Road removal and tidal creek excavation within the preserve.

Florida's Division of Historical Resources has sought site-specific advice from TCAP staff on a number of occasions. It is important that TCAP staff be trained in historical and cultural resource protection and that the program maintain a good working relationship with the division.

Regulatory Assistance - TCAP staff routinely provides technical assistance to a variety of regulatory agencies that operate within the TCAP. These agencies include DEP's Southwest Regulatory District, the regulatory section of the SWFWMD, DEP's Bureau of Beaches and Coastal Systems, the Florida Fish and Wildlife Conservation Commission, the U.S. Environmental Protection Agency and the Federal Energy Regulatory Commission.

Assistance from TCAP staff typically is in the form of permit application review, mitigation planning and suggestions for public interest and net ecosystem benefit projects related to regulatory actions that affect aquatic preserves. With relatively high staff turnover in regulatory programs, TCAP staff is increasingly seen as a source of basic information on submerged resources and ecosystem function. TCAP has put together training materials and programs in regulatory aspects of aquatic preserves, and it is important that regulatory staff receive this training. CAMA staff will work closely with regulatory agencies to develop and refine effective protocols for collaboration on aquatic preserve regulatory matters.

Enforcement Actions - Effective enforcement of laws and regulations involves the availability of law enforcement officers and their ability to operate effectively in a given area. The TCAP program seeks to improve both of these aspects of enforcement at Terra Ceia. TCAP staff has met with numerous officers and programs to highlight the need for enforcement in remote areas like Terra Ceia. Enforcement actions which staff has participated in includes illegal vegetation clearing, illegal dredge and fill, illegal narcotics farming and illegal gill netting.

By making areas accessible, the TCAP hopes to encourage more frequent visits by officers. To this end, TCAP staff has provided access to remote launch sites, provided off-road transportation, and has transported officers in a variety of boats, kayaks and other conveyances.

In addition to facilitating access, staff routinely enhances the effectiveness of law enforcement efforts by providing state-of-the-art GIS mapping, free aerial photography, unmarked boats for surveillance and expert testimony under oath. TCAP staff also allows officers to access the internet, phones and other amenities at Terra Ceia. When there are questions regarding the legality and/or enforceability of an activity, preserve staff often serves as a liaison between officers and environmental legal counsel.

Restoration of Degraded Habitats - The preserve is charged with maintaining the TCAP in "essentially natural conditions" (18-20, Florida Administrative Code). There is not widespread need for restoration of submerged lands at Terra Ceia. Increased vitality of seagrass beds, hardbottom communities and other submerged resources more likely will result from maintaining and improving water quality in the preserve.

Restoration at Terra Ceia is implemented for any of three reasons: to recover the ecological function of degraded habitats; to meet larger bay-wide goals for restoring acreage of habitats largely lost elsewhere; and to mitigate for impacts defined by regulatory entities. Restoration projects do not always provide net ecosystem benefit. Substitution of one habitat for another and efforts to engineer habitat function often are not appropriate in relatively intact areas like Terra Ceia. TCAP staff apply general and site-specific scientifically-derived information in evaluating the propriety of proposed restoration projects to the Terra Ceia ecosystem.

Impacts for which restoration may be needed include dredge and fill activities. These often bring fine sediments to the surface in an area where sorting normally has produced a coarse substrate. TCAP staff often monitor these projects, or, at the very least, ensure that the bulk properties of sediments are appropriately matched. Illegal clearing of native shoreline vegetation and colonization by invasive exotic plants often results in eroding shorelines with diminished fisheries habitat value. TCAP staff provides guidance in the restoration of these shorelines. Boat grounding sites and prop scars often heal by themselves in areas where coarse sediments rapidly refill the scars, but similar scars in low-energy areas can fill with muck and may take years to recover. TCAP staff analyze the costs and benefits of restoring specific degraded areas.

The Surface Water Improvement and Management program at SWFWMD is conducting large scale efforts in upland restoration and wetland habitat creation work at Terra Ceia that will take place over the lifetime of this plan. A major emphasis of the TCAP program has been and will continue to be supportive of this significant restoration program, while also working in partnership with SWFWMD to help ensure that restoration activities do not adversely affect key hydrological processes, do not produce turbidity and sedimentation issues and, overall, are a positive development for the function of the entire coastal ecosystem at Terra Ceia. In an ongoing collaborative effort, TCAP, USGS and SWFWMD are collecting hydrological data at stations in the Frog Creek system to create a model of creek hydrology. This model will be used to determine whether proposed creation of pocket wetlands along the creek will alter existing creek function.

To a great extent, hurricanes, oil spills and other events must be dealt with on a case-by-case basis, but contingency planning can improve the likelihood that adequate resources for response will be available and that sound options will have been considered before crisis conditions develop. TCAP considers contingencies for episodic impacts in the course of their work and seeks opportunities to plan for events in collaboration with other programs.

*4.3 / **The Education and Outreach Management Program***

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

4.3.1 / Background of Education and Outreach at Terra Ceia Aquatic Preserve

Originally, the TCAP program put more resources into individual school visits and other events that had limited effect in the big picture of the preserves geographic range. In order to increase cost-effectiveness, emphasis was shifted to major events, satellite broadcasts to classrooms and other “mass marketing” strategies. Particularly effective events included an episode of the satellite television show “Project Oceanography” that was broadcast to numerous schools in the Tampa Bay and surrounding areas. A documentary titled “Wild Tampa Bay,” which aired on government access television channels, showcased the activities of the TCAP program. Displays at the St. Petersburg Boat Show and MarineQuest have given the program regional exposure. Kiosks at preserve access points have been effective in getting information to persons entering the preserves. In all of these efforts, an initial investment of time and program resources ultimately reached a much broader audience than more limited efforts.

4.3.2 / Current Status of Education and Outreach at Terra Ceia Aquatic Preserve

Demographics of the Education/Outreach Audience - By virtue of its remote location, Terra Ceia has the advantage of a higher level of awareness among its users than some of the more urban preserves. Visitors to Terra Ceia typically know something about boating and local resources, and they are attracted to Terra Ceia by that knowledge. Ephemeral users, like one-time boat rental customers of Pinellas County are relatively uncommon, but, as development and tourism bring in an increasing number and variety of users, a need for more basic information on the preserve’s resources and their protection is anticipated.

Remote areas like Terra Ceia also attract a few visitors with less commitment to protecting their public resources. These include those who employ illegal fishing techniques and those who illegally disturb submerged lands and shoreline habitats. While education and outreach efforts may have some direct impact, their behavior is more likely to change by the knowledge that other visitors have been educated to recognize illegal activities.

An important, and often overlooked, target audience for preserve education/outreach efforts is law enforcement officers from various agencies. Conventional law enforcement training often does not include the statutory basis of environmental law enforcement. TCAP staff, often in consultation with attorneys from DEP’s Office of General Counsel, educates law enforcement officers on enforceable

Underwater respirometry devices like the one shown are used for studying ecosystem function in the Tampa Bay Study. U.S. Geological Survey.

laws that protect the natural, cultural and historical resources of Terra Ceia. Additionally, TCAP staff conveys site-specific information to law enforcement officers that facilitates their access to remote areas of the preserve.

The Big Picture - Special attention must be given to the basic nature of the outreach message. The preserve program must maintain the focus of its outreach message on the natural functions that these areas provide for the health of the bay and, in turn for the quality of life of residents and visitors. Public support for protection of large areas of habitat beyond those necessary for recreation is dependent on the public's understanding of the often less-tangible "ecosystem services" these habitats provide. In the past two years, the formation of the Gulf of Mexico Alliance as a consortium of Gulf states has demonstrated that resource managers must view coastal systems as components of a much larger Gulf of Mexico ecosystem. The health of areas like Terra Ceia should be inextricably tied to the health and fate of Tampa Bay, the Gulf of Mexico and the global ocean ecosystem.

Messages for Visitors - While visitors to Terra Ceia likely have some level of awareness of the submerged resources of the preserve, several types of information are important. Even for the majority of visitors who want to uphold the rules, some specifics must be available on-site or at access points.

In areas where boat impacts to seagrasses, hardbottom and other resources are frequent, information on the importance, location and avoidance of these resources must be provided at access points. Aerial photographs of seagrass scarring are particularly effective on kiosks.

Fisheries management information, while scientifically-derived, often is not intuitive. It is important to make information on size and catch limits, as well as open and closed seasons for fish species, available at access points. These will be posted and distributed to boaters launching into the preserve.

TBAP was one of the first CAMA programs to promote Florida's Clean Boating Partnership. This coalition of public and private entities educates boaters and marina operators in practices for keeping their waterways clean. TCAP is active in this partnership by distributing materials on-site, advising marinas on best management practices and distributing information at events and water-based businesses. The preserve is committed to continuing and enhancing this worthwhile collaboration.

In addition to helping those who want to operate legally, information on laws and regulations can also help visitors serve as "eyes and ears" for preserve management and law enforcement. Along

Visitors from the Seminole Nation of Oklahoma learn about natural history aspects of their heritage.

with resource protection information, contact information will be posted to enable those who witness unauthorized activities to report them.

Messages for Homeowners – Most homeowners adjacent to the preserve wish to maintain the relatively pristine conditions that initially drew them to Terra Ceia. Numerous homeowners have sought out information on appropriate mangrove trimming, seagrass-friendly dock designs, native shoreline vegetation and other means by which they can help keep Terra Ceia natural. TCAP has made, and will continue to make, this information readily-available, regardless of its source from within or outside the agency. Homeowners will be reached through local homeowner associations, civic groups and local events. One of the most effective ways to inform homeowners and to raise awareness among them is to include them in volunteer events. Local residents will be targeted for recruitment into the TCAP volunteer database.

Getting the Message Out - Despite some regional successes, there still is a need for more place-based education and outreach efforts specific to Terra Ceia. High-quality kiosks and signage at more access points likely will be effective in reaching more preserve visitors. Participation in more local events like Rubonia Mardi Gras and the Terra Ceia Mullet Smoke-off could reach more local citizens who not only use the preserve but can serve as the program's "eyes and ears".

Presentations by TCAP staff, when targeted to specific audiences, remain an important part of the place-based strategy for managing the TCAP. TCAP staff often speaks to local audiences, like the Terra Ceia Village Improvement Association, Rotary Clubs, kayak clubs and local school groups.

The biggest challenge in outreach/education has been the lack of a research interpretation facility. As the Tampa Bay Study comes to a close, such a facility would showcase the fascinating results of the work in a format that would be interesting to the public. The public would be able to see a timeline of man's changing relationship with Terra Ceia and Tampa Bay from pre-Columbian times to supercomputer projections of the future. Current plans include the development of a site master plan to include education and interpretive opportunities. At present, the most effective strategy is to provide information at access points, through kiosks and signs, and to provide information at events and invited presentations. Information specific to the Tampa Bay Study may be accessed over the internet, and, hopefully, at some other outreach facilities in the Tampa Bay Area. TCAP will support the development of these exhibits regardless of the venues.

*4.4 / **The Public Use Management Program***

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

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

Historically, public use of TCAP has primarily been consumptive uses by local residents and some visitors. Activities include line and net fishing, crabbing, oystering, harvesting hard clams and scalloping. Associated activities have included cast netting and digging fiddler crabs for bait. The scallop population declined decades ago, and has not recovered, but fishing activities are increasing with increasing population size and increasing awareness of, and access to, the water. While local residents have engaged in some nonconsumptive activities like waterskiing and swimming, these are relatively infrequent. Kayaking likely is the most prevalent nonconsumptive use of the preserve. The preserve is recognized as an outstanding site for snorkeling and watching birds and other wildlife.

4.4.2 / Current Status of Public Use at Terra Ceia Aquatic Preserve

Limited access to the water continues to be a major concern. Overall, the submerged resources of the TCAP have benefited from the preserve's remote location, but there are some disadvantages as well. Illegal gill netting is common in secluded areas of the preserve. Unauthorized shoreline development, artifact hunting and other deleterious activities often go undetected, because there aren't as many "eyes on the water." In the event of an oil spill, poor access to some areas may cause unacceptable delays in the deployment of containment booms.

Over the lifetime of this plan, decisions vital to the balance between resource protection and public access will have to be made. Boating access in southeast Tampa Bay will have to be addressed with a regional perspective. Intense access at a few unimproved launch facilities like the Bishop Harbor (TCAP) and Cockroach Bay (Cockroach Bay Aquatic Preserve) ramps must be addressed. To take pressure off these small local-use launches, consideration will be given to enhancing boat access at existing facilities like E.G. Simmons Park. Some new facilities, like a ramp at the Skyway Bridge, have been proposed, and these will require careful consideration because of their potential to cause widespread impacts to submerged resources. The TCAP program must stay actively engaged with this process, because the preserve's site knowledge will be important to understanding and protecting local resources in the face of increasing use.

It is essential that the aquatic preserve program work closely with DRP in the planning and development of land-based and water-based public access opportunities. Launch areas and other access points are all portals to the aquatic preserve, and as such, aquatic preserve access, impacts and visitor experiences must be considered in developing carrying capacities and vessel draft restrictions for these facilities.

Boating and Fishing – Boating is an important means of accessing much of the preserve. Small, shallow-draft boats necessary to access much of the nearshore area cannot come from long distances in uncertain weather conditions. It is important to accommodate historic use of the area by small boats, but access needs to be spread among several access points to avoid intense impacts at any one point. Bishop Harbor and the Manatee River presently provide some access, but launch facilities often are created by boaters in unapproved areas. While additional access point possibilities are limited, there is considerable potential for making existing facilities more functional and environmentally-sound.

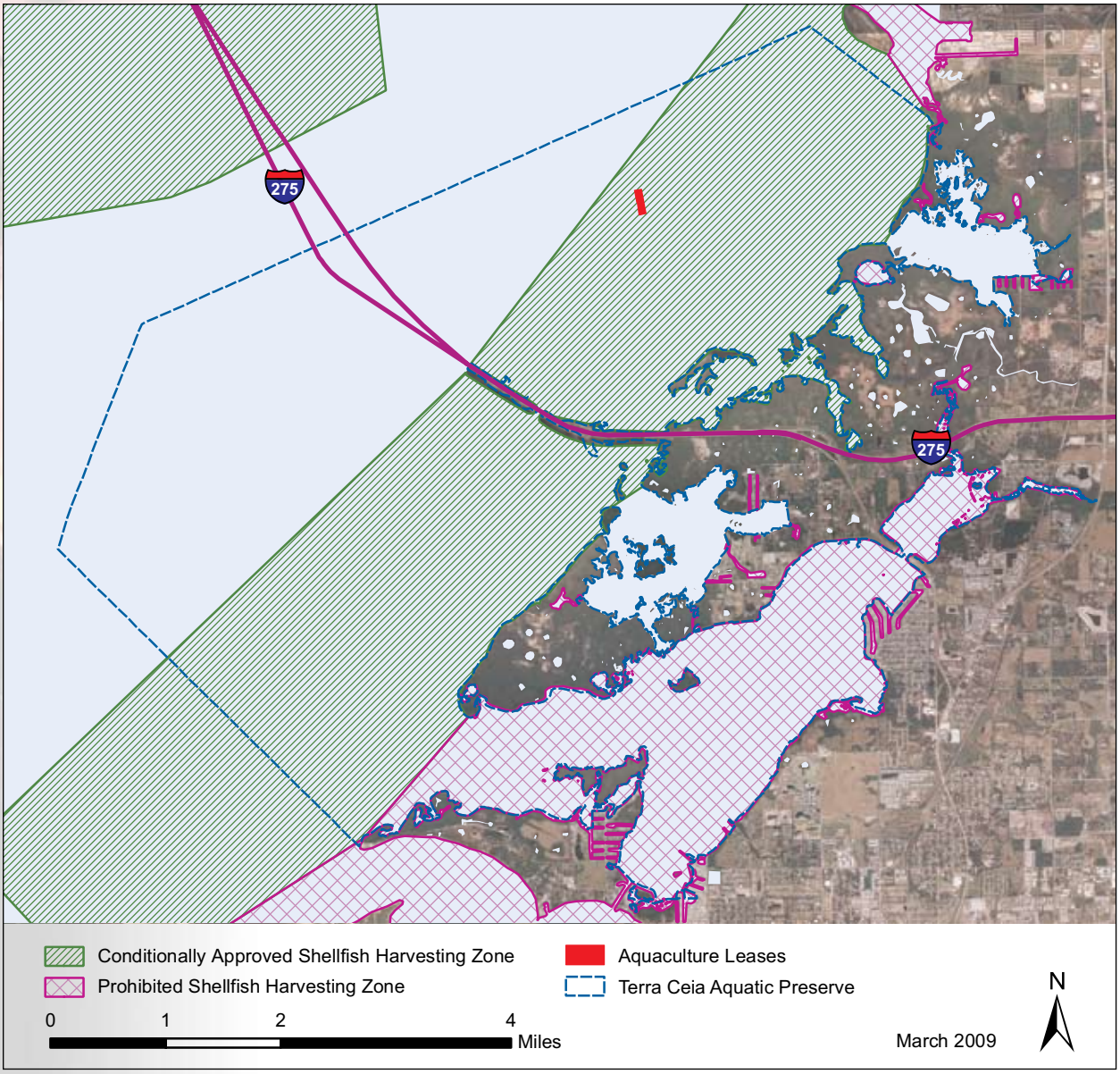
In recent years, there have been several proposals to develop additional boating access points on or near the preserve. Lack of road access to the water places severe limitations on options for new access points. By virtue of this limited access, the preserve has maintained some of the best-quality

submerged resources in Tampa Bay. Any proposals for new access points and new boat traffic patterns will be evaluated with extreme caution. In addition to direct impacts at proposed access facility sites, careful consideration must be given to secondary and cumulative impacts to resources in the larger area.

Intense direct impacts to submerged resources often are concentrated in specific areas where shortcuts and/or sudden changes in depth cause prop-scarring and groundings. Marking of areas like the Bishop Harbor swash channel can help lead boats through the deeper areas. However, depth at Terra Ceia is relative, and additional information like posted controlling depths, tidal staffs and posted tide tables must be provided to complement any waterway marking efforts in a comprehensive package.

Public safety considerations must play an important role in accommodating boats in the preserve. The likelihood of conflicts between powerboats and paddlers can be minimized by locating paddling launches and paddling trails in shallow areas out of the paths of typical boat traffic. In confined areas like Frog Creek, where large boats pose a hazard to paddlers, safety precautions like horsepower limitations may have to be considered.

Legal fishing is one of the most important public uses of the preserve. By providing fisheries regulations at access points and by facilitating law enforcement activities, TCAP staff will help ensure the sustainability of fisheries resources at Terra Ceia.



Map 11 / Shellfish Harvesting Zones in Terra Ceia Aquatic Preserve

Illegal fishing by gill netters and ghost fishing by abandoned crab traps are pervasive forms of fisheries degradation at Terra Ceia. TCAP staff supports law enforcement efforts. Derelict trap removal has specific legal requirements, but TCAP staff will play a bigger role in addressing this growing problem.

Bait collecting efforts at Terra Ceia have some negative impacts on preserve resources, but the degree and trends in these are uncertain. Cast netting often results in unwanted fish bycatch and oysters being left on shorelines and bridges. Digging for fiddler crabs appears to be causing increasing disturbance of intertidal sediments. TCAP staff will research whether these problems are substantial and whether education and/or enforcement actions are warranted.

Canoeing and Kayaking - Paddling is one of the lowest-impact means of experiencing the TCAP. Kayaks and canoes are the conveyances of choice for increasing numbers of fishermen, sightseers and wildlife watchers. Several paddling trails have been marked within the preserve as part of the Manatee County Blueways Network. Unfortunately, while a great deal of planning went into these trails, a number of markers were not installed in the intended locations. Additionally, many trail signs are missing from their posts. To avoid confusion among paddlers, markers within the TCAP will either be maintained or removed. A possible alternative to signed trails in areas where sign maintenance is problematic would be "virtual trails," for which paddlers can download Global Positioning System (GPS) waypoints from a web site.

Several paddling launches have been planned at Terra Ceia. At present, kayaks and canoes are launched in a variety of inconvenient and somewhat unsafe locations. Paddling launches are relatively easy to design and to permit. TCAP staff will work to ensure that paddling launches are developed and with environmentally-sound features.

Aviation - Aviation impacts include flushing birds and direct impacts of aircraft. An ultralight has been observed to swoop down at shoals in apparent attempts to flush loafing birds. However these instances are not common, and, in general, the popularity of ultralights appears to have diminished. Overall, ultralight user groups appear to be effective in addressing abuses by their peers. Kite surfing is popular at the Skyway Bridge, but impacts are not apparent at this time. In 2006, a small plane conducted an emergency landing in shallow waters outside Bishop Harbor, but the landing and subsequent removal did not appear to be very destructive. Hovercraft have been an issue in other parts of Tampa Bay, but there is no indication that they are likely to visit the Terra Ceia area.

Aquaculture - Aquaculture, in the forms of floating platforms and bay bottom grow-out bags for shellfish, has been present at Terra Ceia for less than 10 years, but the issues related to this activity fit within existing areas of program emphasis. While any activity within the preserve has the potential to impact resources, aquaculture also offers some benefits. Aquaculture activities put more "eyes on the water" to detect changes in water quality and biota. Efforts to enhance native fisheries like the bay scallop population may benefit from local brood stock provided by aquaculture activities. The ecological footprint of various forms of aquaculture on nearby natural areas is poorly understood, but much research attention is being focused in that area. Potential direct impacts from aquaculture activities include wastewater discharge, preemption of submerged habitats and introduction of non-native species/varieties. Wastewater discharge is limited to zero degradation within the Outstanding Florida Water, and it is regulated. TCAP staff has provided input as to how impacts to sensitive resources can be minimized during the process of defining individual lease areas. Non-local species require special attention, because of their potential to displace native species in similar niches. The northeastern quahog (*Mercenaria mercenaria)* is used in local aquaculture, because it has a longer shelf life, and recent research has focused on its ecological and genetic relation to the local variety, the southern quahog (*Mercenaria campechiensis*) (Arnold, Walters, Fajans, Peters & Bert, 2004). TCAP staff will continue to work with local and state aquaculture entities to look for the most environmentally-sound practices. TCAP staff will monitor aquaculture lease areas and work with DACS to ensure that operations follow defined guidelines and are contained within lease boundaries.

Mooring Fields and Liveaboards - Mooring fields and liveaboards pose little problem at present, but conditions warrant monitoring their status in areas like Terra Ceia. In addition to decreasing availability of wet slips, the insurance necessary to keep boats in marinas is increasingly unavailable. As a result, the movement of boats into open water mooring fields is anticipated. This trend could be especially problematic in areas like Terra Ceia where pumpout facilities are scarce. TCAP staff will monitor increases in mooring activities and associated impacts within the preserve.

Overall, public use management at Terra Ceia must focus on minimizing the *per capita* impacts of an increasing number of visitors. TCAP faces a monumental challenge of helping residents and visitors to appreciate Terra Ceia without "loving it to death."

Shoreline development along Terra Ceia Bay.

Chapter Five

Issues

5.1 / ***Introduction to Issue Based Management***

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

Issue-based management is a means through which any number of partners may become involved with an aquatic preserve in addressing an issue. Because most aquatic preserves are endowed with very few staff, partnering is a necessity, and by bringing issues into a broad public consciousness partners who wish to be involved are able to do so. Involving partners in issue-based management ensures that a particular issue receives attention from angles that the aquatic preserve may not normally address.

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

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

*5.2 / **Issues***

5.2.1 / Issue One: Marine Debris

Marine debris presents a real and chronic threat to wildlife and public safety. Entanglement, ingestion and toxins are issues related to debris of various materials. Additionally, the presence of debris detracts from the aesthetic value of natural landscapes.

Goal 1.1: Develop a better understanding of debris at the TCAP. Debris in the preserve poses varying degrees of environmental hazard, and it likely originates from distant, as well as local sources. While distant sources may be intractable, local sources like fishing and port operations will be addressed. By developing an idea of the nature and sources of debris, TCAP will focus limited resources on addressing those sources that pose the most serious threat.

Objective 1.1.1: Study the environmental hazards of debris in the preserve. A number of resource protection efforts have resulted in assessments of debris as a basis for prioritizing solutions. As a part of a study associated with shoreline cleanup efforts, a student researcher can categorize materials and other factors related to the threat of various types of debris, and these will be evaluated in the context of current literature.

Strategies:

- Recruit a student researcher.
- Categorize debris from shoreline cleanup activities in the preserve with regard to material, amount, nature, etc.
- Use published information to assess the environmental hazards for the categories of debris found.
- Partner with the adjacent preserve state park in defining informational needs and in organizing cleanup activities.

Performance Measure: A report on environmental hazards posed by debris at Terra Ceia.

Objective 1.1.2: Investigate the sources of debris in the preserve. The nature of debris often gives valuable clues about its source. For example, fishing tackle and port debris likely are products of certain activities. A student researcher will tabulate likely sources and amounts of different types of debris in conjunction with shoreline cleanup efforts.

Strategies:

- Recruit a student researcher (may be the same student as in the previous objective).
- Categorize debris from shoreline cleanup efforts in terms of likely source.
- Identify sources of debris in the Tampa Bay watershed.
- Partner with the adjacent preserve state park in defining informational needs and in organizing debris collection activities.

Performance Measure: A report on likely sources of debris at Terra Ceia.

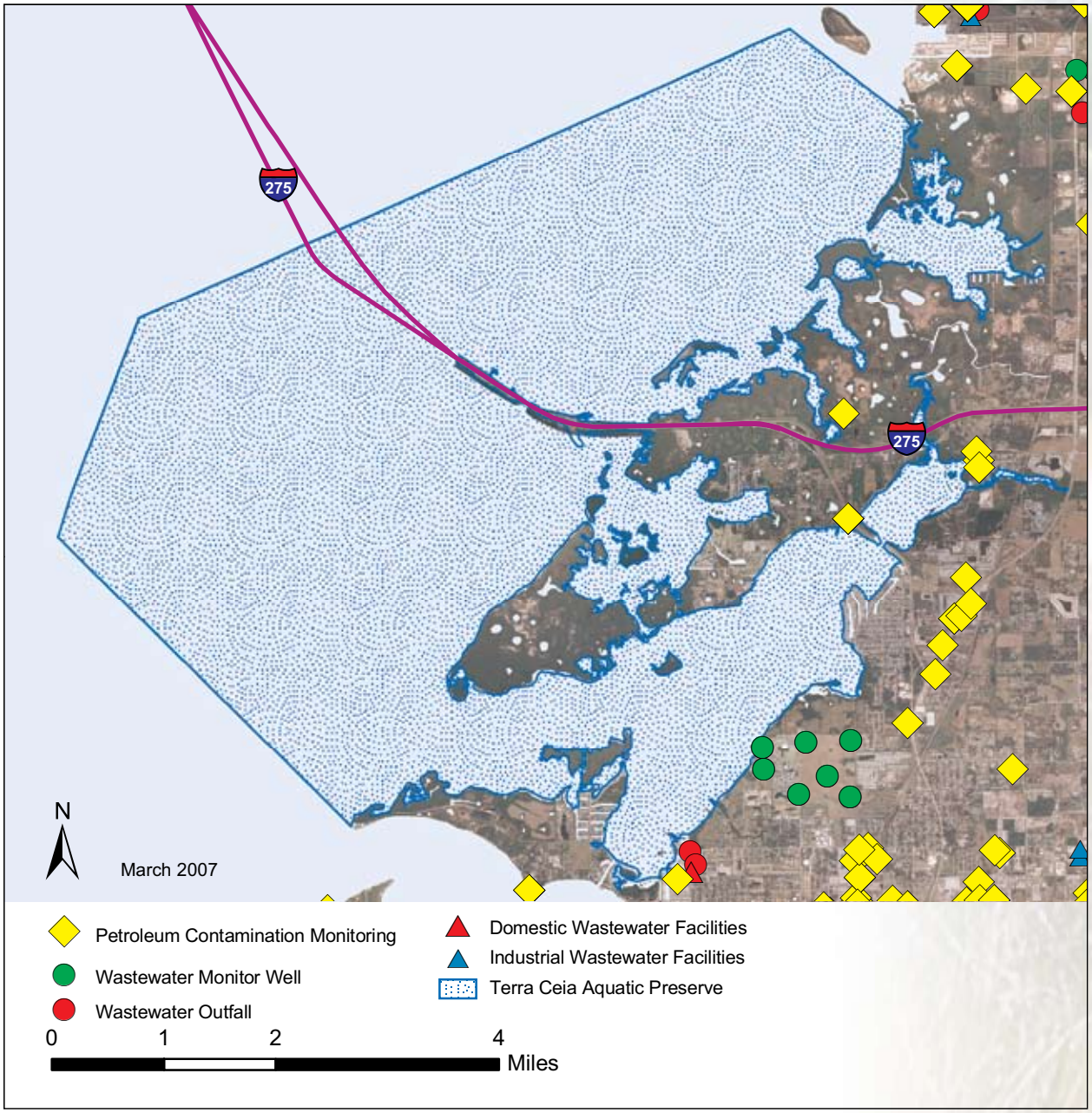
Goal 1.2: Reduce the amount of debris in the preserve. Unlike more populated, more accessible areas of Tampa Bay, the shorelines of Terra Ceia rarely are cleaned of debris. The logistics of getting volunteers to remote shorelines and islands within the timeframes of events like the International Coastal Cleanup leave little time for actual removal of debris. The importance of removing debris from sensitive wildlife habitat necessitates special cleanup events. The archaeological sensitivity of many areas of Terra Ceia demands special attention to the selection and initial orientation of volunteer groups.

Objective 1.2.1: Control debris at the sources. While much debris is generated by sources outside the preserve, some of the most detrimental material is from local, definable and preventable sources. The popularity of Terra Ceia among fishermen increases the likelihood that monofilament line, lead weights and other fishing-related debris will occur in preserve waters. Increasing use of the adjacent Terra Ceia Preserve State Park and the Skyway Fishing Pier increases the likelihood that plastic bags, bottles and other debris will enter the aquatic preserve from adjacent upland areas.

Strategies:

- Guarantee that access points to the preserve (boat launches, fishing piers, etc.) have monofilament line depositories.
- Encourage local parks, marinas and other facilities to equip trash receptacles with lids.
- Ensure that, whenever possible, public access points to the preserve include signage on the threats and prevention of debris.

Performance Measure: Debris is reduced by being retained in receptacles at preserve access points.



Map 12 / Point Source Pollution Monitoring in Terra Ceia Aquatic Preserve

Objective 1.2.2: Remove debris that has made it into the preserve. One of the most effective approaches to debris removal is to collect debris trapped on shorelines. Native vegetation is effective in trapping debris among prop roots, pneumatophores and coastal vegetation. Experience has shown that, after an initial cleanup of a shoreline, the shoreline should be cleaned at least once a year and preferably twice.

Strategies:

- Recruit volunteers to help with cleanup events.
- Work with park staff and volunteers to achieve initial cleanups of all accessible shorelines and to establish a maintenance schedule.

Performance Measure: Debris cleaned from shorelines along the preserve on a regular basis.

Objective 1.2.3: Coordinate derelict vessel removal as needed. Derelict vessels include boats, buoys and dredge pipeline floats. Derelict vessels pose several problems in the preserve. They may begin to leak fuel and oil at any time. They also tend to batter mangroves, oyster beds and other resources when driven by wind and waves into shoreline areas. The removal of vessels also poses a threat, as the vessels used to tow them may damage seagrasses, hardbottom and other submerged resources. Safe, efficient removal of vessels requires site and resource knowledge, appropriate approval, and sometimes expensive equipment.

Strategies:

- Post contact information for reporting derelict vessels at preserve access points.
- Once inspected for leaks and other hazards, vessels either will be boomed and stabilized or towed to the nearest access point for removal.

Performance Measure: Identified derelict vessels removed.

5.2.2 / Issue Two: Water Quality

In addition to debris, sediment and chemical pollution pose an increasing threat to water quality in the preserve. Unlike more urbanized preserves, pollutant sources of the TCAP often are easily detected and addressed. Those sources that historically have been important likely will continue to increase as development and public use increase in the watershed.

Goal 2.1: Improve understanding of water quality status and trends in the preserve. In order to set targets for improving and/or maintaining water quality in the preserve, TCAP must develop a better understanding of historic conditions and the degree of ongoing reversible degradation.

Objective 2.1.1: Determine the status and trends in preserve water quality. A good deal of information on historic water quality in the preserve exists with Manatee County, the Tampa Bay Estuary Program and other entities. By locating and reviewing these data, TCAP staff will create a historical context for present day water quality values and trends.

Strategies:

- Appropriate agencies will be contacted, and, where possible, their water quality data will be obtained to be archived in digital form.

Performance Measure: A database of existing water quality data.

Goal 2.2: Further develop long-term, continual, synoptic water quality monitoring at key locations. Manatee County has an ongoing water quality monitoring program, and they have responded promptly and effectively to degradation events identified by TCAP staff. County data has been adequate, and there is no need for the preserve to duplicate the county program. While anecdotal information, like increased occurrence of scallops, octopus and other species sensitive to water quality is encouraging, there has been no long-term, continuous, in-situ monitoring of water quality parameters.

Objective 2.2.1: Improve, integrate and maintain Frog Creek datasonde station. The Frog Creek datasonde station, located near the Bishop Harbor Road Bridge, is an established permanent station that had a prototype cellular telephone telemetry system. The telemetry worked, but the hardware and

the data handling partnership were too costly to be practical. This station now is equipped with radio telemetry equipment.

Strategies:

- Datasonde station hardware will be upgraded as needed and new equipment becomes available.
- Protocols for operation and maintenance of the datasonde station will be updated to standards acceptable to the National Oceanic and Atmospheric Administration Centralized Data Management Office (CDMO) Manual or Department of Environmental Protection (DEP) standards, whichever are more appropriate.
- Investigate the possible utility of stage information to paddling trail users if linked to internet-based information.

Performance Measure: Fully-functioning station sending consistent data from Frog Creek.

Objective 2.2.2: Establish a permanent datasonde station at the mouth of Bishop Harbor. The persistence and management of the station at the mouth of Bishop Harbor has been inconsistent, because TCAP staff has relied on other agencies to maintain the TCAP datasonde. For long-term monitoring, TCAP staff will set up and maintain this station with data radio telemetry capability.

Strategies:

- A datasonde-based permanent water quality station will be located at the site of previous temporary stations on a piling at the mouth of Bishop Harbor.
- This station will be equipped with wireless data telemetry.
- Protocols for operation and maintenance of the datasonde station will be updated to match the National Oceanic and Atmospheric Administration Centralized Data Management Office (CDMO) Manual or DEP standards, whichever are more appropriate.
- If appropriate and useful, make this data available to fishermen on the Internet.

Performance Measure: Fully-functioning station sending consistent data from Bishop Harbor.

Objective 2.2.3: Establish a permanent datasonde station at mouth of the Terra Ceia River. In addition to tracking parameters of water flowing between the Terra Ceia River and Terra Ceia Bay, a station at this important confluence will complement the existing permanent station in the low-salinity segment of the same drainage.

Strategies:

- A datasonde-based permanent water quality station will be installed with a platform near the mouth of the Terra Ceia River.
- Protocols for operation and maintenance of the datasonde station will be updated to match the National Oceanic and Atmospheric Administration Centralized Data Management Office (CDMO) Manual or DEP standards, whichever are more appropriate.
- If appropriate and useful, make this data available to fishermen and paddlers on the Internet.

Performance Measure: Fully-functioning station sending consistent data from the mouth of the Terra Ceia River.

Objective 2.2.4: Integrate monitoring stations with the Gulf Coast Ocean Observing System program. By standardizing equipment and quality control, TCAP will ensure that data from local monitoring stations is compatible with the system. This placement of local data within a larger context will improve TCAP's ability to distinguish between local changes and trends associated with larger scale phenomena like climate change.

Strategies:

- Integrate the experimental design of TCAP monitoring efforts to be compatible with other monitoring programs in the area. These efforts will help solve regional problems.
- Encourage the public to take an interest in the water quality of their preserve, and enhance public involvement through web access of the data.

Performance Measure: General access to TCAP's Terra Ceia water quality data through the Gulf Coast Ocean Observing System.

Good water quality is necessary for seagrass beds to thrive.

Objective 2.2.5: Develop a buoy-based water quality station with turbidity sensor for temporary deployment. The development of a buoy-based datasonde station that will be moored in areas where short-term monitoring of water quality changes is needed. Example applications will include dredging project sites and discharge points from construction sites. Radio telemetry capability will allow TCAP staff to keep track of changes before they pose continuing threats to preserve resources.

Strategies:

- Develop an adequate mooring system for anticipated site conditions.
- Add wireless telemetry for prompt notification of changes in water quality.

Performance Measure: A functioning buoy-based datasonde with telemetry capability and a secure, portable mooring mechanism.

Objective 2.2.6: Investigate, and if feasible, employ benthic data as a tool in preserve management decisions. Hillsborough County's Environmental Protection Commission has established and refined a benthic habitat quality index that includes species diversity, physical parameters and contamination of benthic sediments. Such an index, if applied intensively and long-term within the TCAP, will be a useful tool in tracking degradation as well as recovery of submerged resources.

Strategies:

- Investigate the availability, suitability and adequacy of existing data and their usefulness in assessing benthic habitat health.
- Collaborate with Hillsborough County Environmental Protection Commission to evaluate the applicability of their benthic habitat quality index in monitoring preserve conditions.
- Acquire additional data sets from agencies and universities and evaluate its suitability for determining habitat change and health.

Performance Measure: An informed definitive decision on whether to proceed with the use of a specific benthic habitat index.

Goal 2.3: Reduce the amount of untreated human and animal waste that goes into the preserve. Organic waste poses threats from nutrients as well as from pathogens that may enter the waters of the preserve. By virtue of its remoteness, much of Terra Ceia cannot be connected to existing sewer systems. Inquiries into local health offices have indicated that new innovative technology may be difficult to permit.

Objective 2.3.1: Encourage effective wastewater treatment systems in the preserve watershed. TCAP staff will collaborate with Manatee County staff to minimize the effect of septic systems, grease traps and other domestic discharges within the watershed. The adequacy of setbacks and other requirements for these systems will be reviewed for land adjacent to the preserve. Whenever possible, connection to city sewer systems or advanced wastewater treatment on-site will be encouraged.

Strategies:

- Seek out information on state-of-the-art wastewater treatment approaches for homes without available sewer connections.
- Seek information (preferably geographic information systems (GIS)-based maps) on the abundance and distribution of septic systems in the TCAP watershed.
- Encourage local health agencies to consider new state-of-the-art wastewater treatment ideas.

Performance Measure: Incorporation of advanced wastewater treatment technologies and approaches as alternatives at Terra Ceia.

Objective 2.3.2: Encourage proper pet sanitation on waterfront areas. Pets like dogs and horses can contribute significant levels of nutrients and coliform bacteria to coastal areas. Managers of preserve access points (launches, waterfront parks, etc.) will be encouraged to provide waste pickup stations for dog owners. Should equestrian activities become popular adjacent to the preserve, riders will be encouraged to keep wastes out of the aquatic environment.

Strategies:

- Add literature addressing pet sanitation in coastal areas to TCAP literature database.
- TCAP staff will encourage management entities to monitor pet cleanup stations.
- Include informational signs on the hazards of pet waste at access points.

Performance Measure: An up-to-date review of the status of pet sanitation around the preserve.

Goal 2.4: Reduce sediment influx into the preserve. The increase in watershed development practically ensures that unnatural sediment influx into the TCAP will become an increasing problem unless measures are taken to promote best management practices (BMPs) at the sources.

Objective 2.4.1: Strengthen regulatory partnerships that deal effectively with sediment sources.

Strategies:

- Baseline turbidity ranges will be established through mining existing data and through long-term monitoring.
- Enforcement entities will be made aware of the availability of nearly real-time turbidity data through datasonde telemetry.
- Training on BMPs for contractors and regulators will be encouraged.
- TCAP will seek opportunities to educate local residents on the threats of sediments to the preserve.
- Boat launches, trails and other access points will be designed, built and operated to minimize erosion

Performance Measure: Interagency action plans developed and acted upon to resolve sedimentation.

5.2.3 | Issue Three: Direct Impacts to Preserve Habitats

In addition to the indirect, pervasive results of water quality issues, direct, definable impacts offer some opportunity for prevention. Shallow nearshore areas comprise the most diverse and productive habitat acreage of the TCAP. They also are the most susceptible to prop scarring, vessel grounding and other direct impacts.

Goal 3.1: Assess the distribution and biotic composition of shallow submerged areas of the preserve. As with most of Florida's aquatic preserves, a comprehensive submerged resource inventory of the

TCAP has never been done. Reasons for this include the lack of equipment for large-scale shallow water surveys and the lack of sufficient staff. While seagrasses routinely are mapped through interpretation of aerial photographs, ground truthing is needed for management decisions in specific areas. Past attempts to map hardbottom areas through aerial interpretation have been found by TCAP staff to be grossly inaccurate in the Terra Ceia area. In addition to "snapshot" maps of hardbottom areas, knowledge of changes in hardbottom community distribution over time is needed. While rock doesn't move, hard substrates in the TCAP are of such low profile that they often are covered by unconsolidated sediments. The hardbottom species that recruit and/or persist appear to be related to the sediment thickness. The degree to which shoaling of sediments over underlying rock allows the recruitment and persistence of corals, sponges and other hardbottom species is not understood. Additional temporal changes include annual overgrowth of hardbottom by *Sargassum* during the winter.

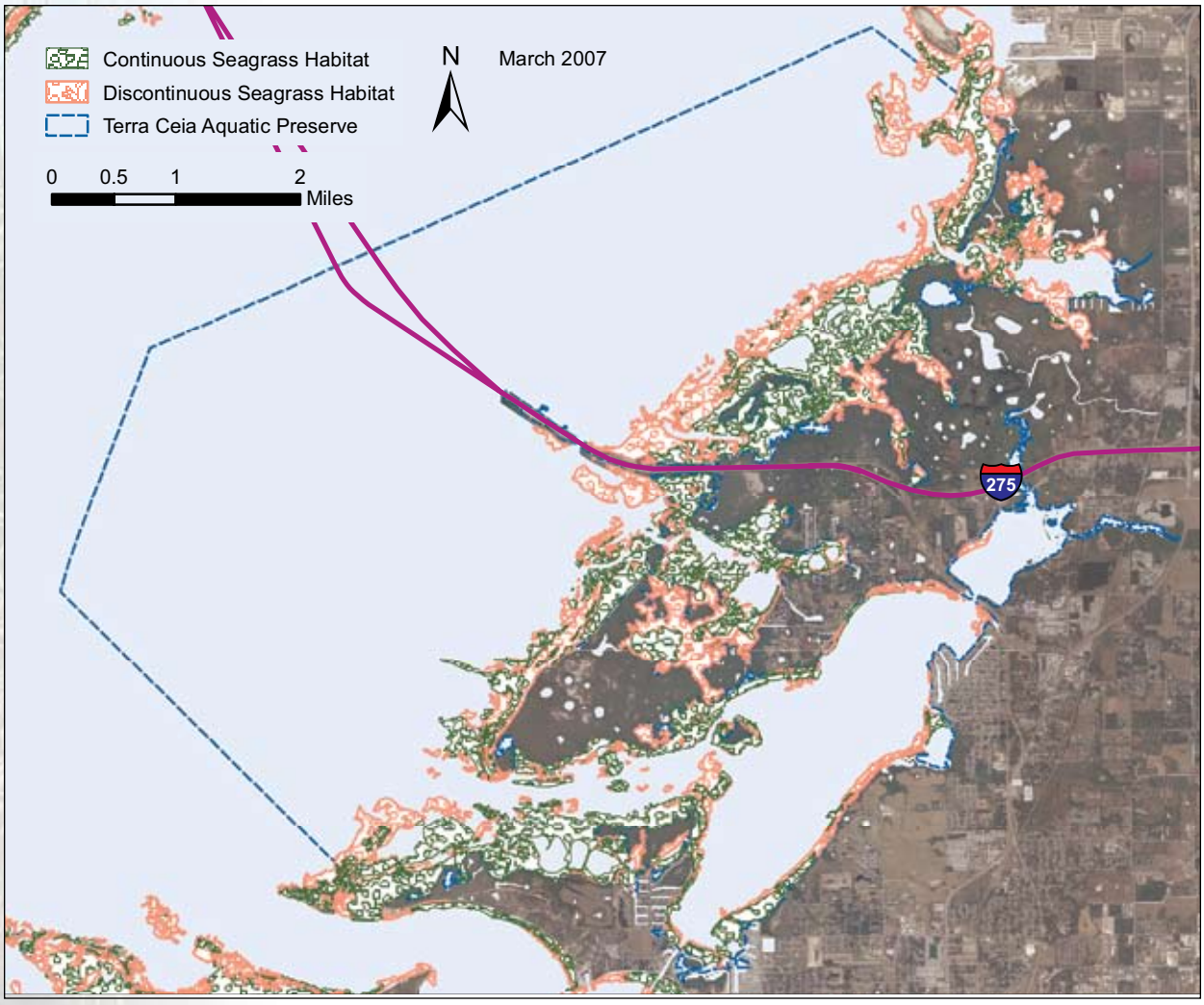
Objective 3.1.1: Organize existing resource survey information into a readily-available database.

Strategies:

- When possible, habitat and distribution data will be georeferenced. This likely will be a component of a larger geodatabase being created by TCAP.
- TCAP will mine existing databases to include seagrass scarring (Fish and Wildlife Research Institute) and hardbottom topography (Eckerd College).

Performance Measure: A map-based database of existing resource inventory data in the preserve.

Objective 3.1.2: Conduct resource inventories, as feasible and as needed, to assess the distribution and condition of submerged habitats.



Map 13 / Seagrass Beds of Terra Ceia Aquatic Preserve

Strategies:

- Use towed video, sonar and direct observation to identify and map submerged habitats and damage to them.
- Map features into a GIS database using differential global positioning system (GPS).
- If program resources allow, map shallow areas to at least the 6ft (2m) contour.

Performance Measure: A resource inventory GIS database.

Goal 3.2: Prevent further damage to submerged habitats. While absolute prevention of all impacts is not practical, certain measures will be taken to minimize these direct impacts.

Objective 3.2.1: Identify areas likely to sustain damage from prop scarring, groundings, etc. Routine damage from these sources is often predictable. Shortcuts at channel mouths and areas of rapid bathymetric change, often are focal points for impacts.

Strategies:

- TCAP will gather information on habitat degradation from sources that include, but are not limited to the seagrass scarring database, compliance/enforcement case information, aerial photography and field observations of TCAP staff and others.
- Once damaged areas are identified, restoration potential will be evaluated according to ecosystem functionality, potential for self-recovery, logistics/cost of restoration and availability of funds and other resources for restoration.

Performance Measure: A GIS database of degradation “hot spots.”

Objective 3.2.2: Take preventive steps to avoid and/or minimize future damage to submerged habitat areas of concern.

Strategies:

- Where appropriate, TCAP and or partners will mark sensitive resources and maintain markers.

Performance Measure: Areas defined as sensitive marked, and, if appropriate, highlighted at preserve access points.

Goal 3.3: Restore existing damage to submerged habitats.

Objective 3.3.1: Where possible, provide technical, logistical, and other assistance to facilitate restoration projects by external partners.

Strategies:

- Define the type and scope of restoration that best matches the habitat(s) and degradation.
- Ensure that restoration areas are identified by signage, and contact information is provided on site.
- Encourage long-term monitoring.

Performance Measure: Habitat restoration activities and acreage will increase in the TCAP and adjacent areas.

Objective 3.3.2: Where necessary, restore degraded habitats with TCAP program resources.

Strategies:

- Define the type and scope of restoration that best matches the habitat(s) and degradation.
- Ensure that restoration areas are identified by signage, and contact information is provided on site.

Performance Measure: Restoration activities by TCAP staff will increase and be more successful.

Goal 3.4: Reduce disturbances to wildlife. As use of the preserve increases, strategies to minimize the disturbance of these activities to wildlife must be in place.

Objective 3.3.1: Create buffer zones for nesting areas. The present system of posting signs on the shore of nesting islands is not adequate to protect nesting colonies from boating and fishing activities. In fact,

boats frequently are observed approaching the signs to read them. Preserve management will seek the authority to post information on signs or nesting buoys offshore of the island perimeters.

Strategies:

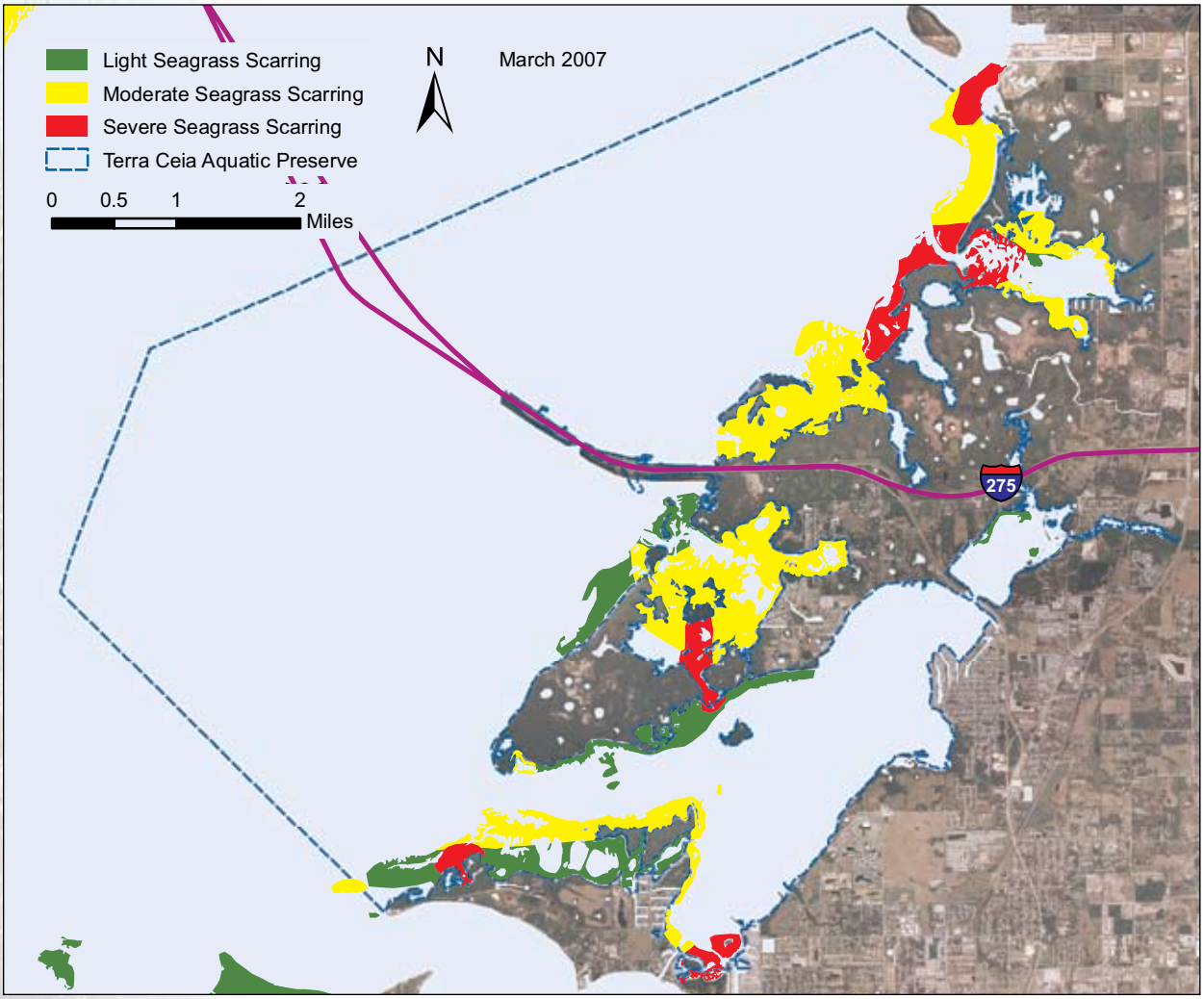
- Analyze existing published and unpublished data on appropriate buffer zones for protecting nesting islands from boat traffic disturbances.
- Seek the authority to post the Washburn, Little Washburn and other nesting islands with buoys to create adequate buffer zones.
- Provide information on nesting islands and their protection at preserve access points.

Performance Measure: Clearly marked buffer zones around sensitive nesting areas.

5.2.4 / Issue Four: Shoreline Alteration

Shoreline alteration poses threats to the ecosystem function, as well as the aesthetics of the TCAP. Maintenance of a vegetated upland margin and a shallow subtidal margin is important to fisheries resources, water quality and minimizing wildlife disturbance. Data from the 2004 Indonesian tsunami support the belief that shoreline vegetation, mangroves in particular, may reduce the loss of property and lives in the event of a storm (Kathiresan & Rajendran, 2005).

Goal 4.1: Prevent illegal shoreline impacts. Illegal shoreline development often takes the form of unauthorized dredge and fill for boat access or upland expansion. Perhaps even more pervasive is the unauthorized cutting of mangroves to improve views of, and access to, the water.



Map 14 / Seagrass Scarring of Terra Ceia Aquatic Preserve

Objective 4.1.1: Produce baseline information on the present state of shorelines. One of the problems in detecting new shoreline degradation and holding violators accountable is the lack of baseline information on the existing condition of shoreline resources.

Strategies:

- Conduct annual video surveys of shorelines with a history and/or likelihood of unauthorized alteration.
- Provide educational literature, workshops and other means of informing the public on the importance of natural shorelines and the prevention of shoreline alteration.

Performance Measure: The development and maintenance of a video database of shoreline alterations used to educate the public on the importance of natural shorelines.

Objective 4.1.2: Provide input for regulatory processes. Timely action to address individual cases of illegal shoreline degradation requires timely detection and notification of illegal activities. Citizens who report illegal activities often express frustration with the rate and/or lack of the enforcement response.

Strategies:

- Continue regular monthly meetings with regulatory staff.

Performance Measure: Ongoing regular meetings with regulatory staff.

Objective 4.1.3: Promote shoreline stewardship among property owners.

Strategies:

- Provide existing information, such as mangrove trimming guideline booklets, to residents through local events and on request.
- Include a shoreline protection message in presentations routinely conducted for local organizations.

Performance Measure: Reversal of trends in shoreline impacts.

Goal 4.2: Restore degraded shorelines. In addition to the aforementioned intentional degradation of shoreline resources, attention also must be given to the chronic degradation of shoreline resources that results from overgrowth by exotic plants, erosion by boat wakes, etc. Whether damaged by illegal intentional activities or through these less direct processes, degraded shoreline resources must be restored. Partnerships and regulatory mechanisms (e.g. public interest projects) can reduce some of the financial burden of restoration.

Objective 4.2.1: Restore dredge and fill areas. Under the assumption that most people would do the right thing if they know what is best for the environment, efforts will be made to provide science-based information on shoreline ecosystem management in a format useful to property owners.

Strategies:

- Develop a literature database to demonstrate the ecological importance of preserving and restoring shallow habitats.
- Coordinate and/or encourage funding and activities to restore dredge and fill sites.

Performance Measure: Restoration of identified impacted sites.

Objective 4.2.2: Restore native shoreline vegetation. Brazilian pepper, Australian pine, and other exotic plants often overgrow and outcompete native shoreline vegetation such as mangroves. This often results in less stable shoreline sediments and reduced food and shelter for fisheries resources. Whether publicly or privately owned, shorelines will be cleared of exotic plants, and, where appropriate, replanted with suitable native vegetation.

Strategies:

- Encourage and assist in the removal of shoreline exotics and revegetation with appropriate native species on public land.
- Encourage homeowners to remove exotic species and to replace them with native shoreline species

Performance Measure: Reduction of exotic plants and increase in native plants along preserve shorelines.

5.2.5 | Issue Five: Unintentional and Illegal Fishing

Because of its relatively remote location, the TCAP has considerable illegal and unintentional fishing activity. Illegal activity includes violations of prohibitions on net fishing and taking of undersized or protected animals. Unintentional fishing activity is in the form of "ghost fishing" by abandoned traps and nets.

Goal 5.1: Reduce ghost fishing by derelict traps and nets. Derelict crab traps are common within the TCAP. These devices often continue to entrap marine life long after they have been abandoned. Additionally, discarded nets occasionally are found in preserve waters. They become fouled with barnacles, oysters and other organisms that anchor them to the bottom where they pose an entanglement hazard.

Objective 5.1.1: Set a protocol and planning framework for derelict trap removal. Specific laws guide the removal of derelict traps and other fishing equipment. Staff shall implement these rules as part of a plan for removal of derelict equipment from the preserve.

Strategies:

- Define legal constraints/permissions related to derelict trap removal.
- Maintain a GIS-based database of suspected ghost trap locations.

Performance Measure: A trap location database, with a mechanism for updates and an established protocol for trap removal

Objective 5.1.2: Remove derelict traps on a regular basis. Using existing volunteer coordination capabilities, TCAP staff shall regularly schedule activities to remove derelict traps and other equipment from the preserve.

Strategies:

- Educate local citizens, law enforcement officers and fishermen on the importance of recognizing and reporting derelict fishing gear.
- Schedule regular trap removal efforts with a frequency determined by the GIS database.

Performance Measure: Removal of known derelict traps on at least an annual basis.

Goal 5.2: Reduce gill netting and other illegal fishing. Law enforcement is key in the reduction of gill netting and other illegal fishing activities. The pervasiveness of these activities at Terra Ceia is related to the ease with which launching and netting can go undetected. Steps will be taken to make these activities more obvious and to enhance the effect of law enforcement activities.

Objective 5.2.1: Facilitate effective law enforcement of gill net regulations.

Strategies:

- Provide information at preserve access points that encourages recognition and reporting of illegal fishing activities.
- Continue to assist law enforcement entities with access and site information.

Performance Measure: Illegal fishing activities will be reduced within the TCAP.

Objective 5.2.2: Educate preserve visitors on fishing regulations. Most people want to do the right thing. Information on fishing regulations will be readily accessible and current.

Strategies:

- Provide current fishing regulation information at preserve access points.
- Provide fishing regulation materials at local events.

Performance Measure: Fishing violations will be reduced within the TCAP.

Goal 5.3: Assess and address bycatch of diamondback terrapins by crab traps. Anecdotal accounts by crabbers and scientists indicate that operational crab traps unintentionally catch and drown diamondback terrapins. This information is not specific to Terra Ceia, but is raises the possibility of the need for local action by TCAP. Diamondback terrapins are known to nest on islands in the preserve, so it is likely that crab traps affect the population to some extent.

Objective 5.3.1: Determine whether crab trap bycatch of diamondback terrapins is a problem at Terra Ceia.

Strategies:

- Seek information from scientific studies of terrapin mortality in crab traps in other areas to determine the likelihood that special traps or other measures are warranted within the TCAP.
- Seek anecdotal information specific to Terra Ceia.

Performance Measure: A definitive decision on whether to pursue strategies for terrapin bycatch at Terra Ceia.

Objective 5.3.2: If warranted, take steps to minimize unintentional bycatch of diamondback terrapins.

Strategies:

- Establish a convenient means of reporting terrapin bycatch within the TCAP.
- If warranted, encourage terrapin-safe crab traps within the preserve.

Performance Measure: If a problem, terrapin bycatach is reduced in the preserve.

5.2.6 / Issue Six: Mooring Fields and Liveaboards

Mooring fields are not extensive in the TCAP, but long-term mooring of vessels within the preserve boundaries has increased in recent years. A sound policy and enforcement mechanism will be developed before the inevitable effects of population growth and increasing boater registration become a serious threat to submerged resources of the preserve. Because most protected areas in which mooring would be desirable do not flush well, it is especially important that liveaboards not discharge into the waters of the preserve.

Goal 6.1: Monitor unauthorized mooring fields.

Objective 6.1.1: Identify illegal mooring activities.

Strategies:

- Educate TCAP staff and local residents to recognize and report illegal long-term mooring within the preserve.
- Work with the Florida Fish and Wildlife Conservation Commission on enforcement actions for illegal mooring.

Performance Measure: Maintenance of only appropriate, legal mooring activities in the preserve.

Goal 6.2: Minimize impacts of liveaboard vessels.

Objective 6.2.1: Ensure that proper sanitation support is available to liveaboards.

Strategies:

- Identify existing pumpout facilities at marinas in and near the preserve.
- Encourage installation of pumpouts where they are lacking.
- Publicize facilities with pumpouts through appropriate media.

Performance Measure: Pumpout facilities readily available and advertised.

5.2.7 / Issue Seven: Public Access Points

Many access issues are addressed elsewhere in this chapter, but access points to the preserve are an important issue. Terra Ceia has benefitted environmentally from its remote location, but increasing demand for access must be addressed proactively and carefully. Access points are developed and managed by a variety of entities which include state and county parks and homeowner associations. It is important that TCAP work with these partners to ensure that resource protection is an important consideration in accommodating access. Additionally, public safety should be a priority of any planned access point. Because the shoreline of the preserve is managed by several agencies other than the TCAP program, much of this issue must be addressed by collaboration with those entities.

Goal 7.1: Upgrade boat access to Bishop Harbor. For decades, boat access at Bishop Harbor has been improvised with a sand ramp. This ramp requires vehicles to back into saltwater. Sediment resuspension and introduction of vehicle fluids into the water are ongoing as a result. For lack of a larger launch facility nearby, some boats launched at this site are too large to negotiate the shallow waters of Bishop Harbor without damaging submerged resources. The deepest route from the launch area to the mouth of the harbor is circuitous and difficult to follow.

Objective 7.1.1: Facilitate the upgrade of the Bishop Harbor Road boat launch. The Division of Recreation and Parks manages the shoreline of this area, so this launch upgrade will be implemented as a partnership.

Strategies:

- Limits will be placed on draft and number of vessels using the facility.
- Encourage the Division of Recreation and Parks to utilize parking surfaces that are permeable with effective stormwater treatment.

Performance Measure: Safe, convenient access for appropriately-sized vessels.

Goal 7.2: Restore paddling access to Bishop Harbor. Nearly 10 years ago, a canoe/kayak launch was developed at Bishop Harbor under the management of the Terra Ceia State Buffer Preserve. In recent years, this launch was removed during habitat restoration activities, and it has not been replaced. At present, kayakers and canoeists must launch with powerboats, and they cannot avoid boat travel lanes.

Objective 7.2.1: Replace the paddling launch removed during habitat restoration.

Strategies:

- TCAP will encourage the use of permeable surfaces and other environmentally friendly features.
- If possible, canoe/kayak traffic should be separated from boat launch traffic.

Performance Measure: Safe, convenient paddling access to Bishop Harbor.

Goal 7.3: Add paddling access to lower Terra Ceia River. The Terra Ceia River is becoming more popular with paddlers, but launching is inconvenient and dangerous. Paddlers must park along Terra Ceia Road, and they must launch their kayaks and canoes over a bluff with a steep slope nearly 6 feet (2m) high.

Objective 7.3.1: Develop a paddling launch at the Haley site.

Strategies:

- A paddling launch will be added to the Haley property near the mouth of the Terra Ceia River.
- The manmade berm will be breached to allow flushing of the pond on the property and to permit coming and going of paddling traffic.
- TCAP will encourage the use of permeable surfaces and other environmentally friendly features.

Performance Measure: Safe, convenient paddling access to the Terra Ceia River.

Goal 7.4: Add paddling access to upper Frog Creek. When the parcel at the intersection of I-275 and U.S. 41 was acquired, it was an obvious answer to requests by paddlers for an upstream pullout to rest, picnic, etc. It is located approximately 3.5 miles (5.6 km) upstream from the proposed launch at the Haley site. While there is no road suitable for the public at this time, the location of the site at the intersection of two major highways lends itself to the development of vehicle access and a paddling launch.

Objective 7.4.1: Add a pullout, and possibly a launch, at the borrow pit site at the intersection of I-275 and U.S. 41.

Strategies:

- This facility will be developed with a restoration plan for the site.

- A temporary pullout site will be developed with a launch site to be developed later.
- Parking and/or roads, if added, will be permeable.

Performance Measure: A place for paddlers to rest upstream.

Objective 7.4.2: Establish a paddling trail along the Terra Ceia River/Frog Creek system. The diversity of this tidally-influenced system makes it especially enjoyable and educational as a paddling route. From saltwater species downstream to freshwater assemblages upstream, the trip gives paddlers a good idea of what many of Tampa Bay's tidal creeks were like before they were altered. Navigable waters for paddling extend from the Tampa Bay Aquatic Preserve office at the Haley site to the borrow pit parcel, at the intersection of I-275 and U.S. 41 3.5 miles (5.6 km) upstream.

Strategies:

- Markers will comply with state and international waterway marker standards.
- A minimum of markers needed for clear guidance will be used.
- The trail markers will be installed and maintained by TCAP.
- For public safety, a horsepower restriction will be considered along the trail.

Performance Measure: Establishment of a clearly-marked trail.

5.2.8 / Issue Eight: Invasive Exotic Species

A University of Florida study has identified approximately 50 species of exotic plants and animals that either have or may invade Tampa Bay (Baker et al., 2004). One of the most prominent of these in the TCAP is the Asian green mussel (*Perna viridis)*. Once established, invasive exotic species are difficult, if not impossible, to eradicate. Therefore, it is important to invest time and resources in prevention and early identification of these species.

Goal 8.1: Assess possible and existing impacts. While there is an apparent threat to native flora and fauna by invasive exotic species, the extent of this threat is not known. However, anecdotal observations indicate that green mussels may not recruit as readily to native hardbottom as they do on artificial substrates. While some exotic infestations may increase exponentially, others may be more aggressive initially, but may diminish as native populations begin to serve as predators and pests. By understanding patterns and limitations of exotic recruitment, TCAP staff may be able to prevent massive infestations of some natural substrates.

Objective 8.1.1: Monitor representative areas for the occurrence of invasive exotics. Long-term monitoring sites will be established for green mussels and any other species for which this approach will provide information. These sites should be established according to a robust experimental design, and they should be checked periodically for known and anticipated invasive species and for increases in apparent environmental controls on these species. Additionally, steps will be taken to help the public recognize and report invasives.

Strategies:

- Gather existing information on likely invasives, recruitment of these species and known methods of control.
- Train staff to recognize anticipated and existing invasive exotic species.
- Provide information at access points for boaters and others to use in recognizing and reporting invasive exotics.

Performance Measure: A growing database of information on exotic recruitment in the preserve.

Goal 8.2: Minimize habitat for exotics. Successful recruitment by exotic species is the result of the availability of propagules, the existence of conditions suitable for survival and, often, susceptibility of native species. Strategies to minimize the recruitment of exotics will focus on one or more of these aspects.

Objective 8.2.1: Prevent and/or minimize habitat disturbances and alterations that facilitate exotic recruitment. The establishment of invasive species may be facilitated by disturbances that create abnormal habitat conditions. For example, water quality changes can cause blooms of undesirable

algal species, and manmade substrates encourage green mussel recruitment. Native species have the best chance of persisting if native habitat conditions are preserved. For most exotic species in the water, physical removal is impractical.

Strategies:

- Investigate the role that manmade structures play in facilitating the establishment of exotics. Encourage research on outstanding recruitment questions.
- Through feedback to regulatory entities, ensure that the likelihood of facilitating exotic recruitment is a consideration in evaluating proposed impacts.
- Educate the public on how to minimize the facilitation of exotic recruitment by artificial substrates, bottom disturbances and other activities.
- Where possible, remove old artificial substrates that are not in use.

Performance Measure: Minimally disturbed habitat for exotics to recruit within.

5.2.9 / Issue Nine: Aquaculture

Aquaculture activities are relatively new to the TCAP. As of 2008, there were eight acres of submerged land leased for aquaculture within preserve boundaries. While aquaculture can yield benefits to the preserve (see Chapter 4 for details), concerns associated with aquaculture activities include direct impacts of activities to the submerged land and water quality, as well as the introduction of non-native species into the area.

Goal 9.1: Minimize physical impacts of aquaculture.

Objective 9.1.1: Ground truth proposed aquaculture areas. Shallow locations are preferred for the growout of filter feeders, because suspended food is more abundant. TCAP staff will ground truth proposed lease sites to ensure that impacts to seagrasses, hardbottom and other submerged resources is avoided. Impacts to shallow open sand bottom communities is unavoidable for many shellfish growout operations.

Strategies:

- Differential GPS and/or markers will be used to delineate proposed aquaculture areas for evaluation.
- Site evaluations will be scheduled for aquatic vegetation growing season.

Performance Measure: Aquaculture activities conducted with minimized impacts on preserves resources.

Objective 9.1.2: Periodically monitor use of aquaculture areas. TCAP staff will inspect aquaculture areas periodically to ensure that uses are appropriate to the conservation goals of the preserve and in accordance with the terms of the lease agreement.

Strategies:

- Occasional inspections of lease sites will look for mechanical damage from anchoring and aquaculture-related operations.
- Staff will inspect sites for encroachment on vegetation, hardbottom or other resources.

Performance Measure: Aquaculture operations conducted as prescribed in lease agreements.

Goal 9.2: Minimize biotic impacts of aquaculture. While non-local species like the northeastern quahog (*Mercenaria mercenaria)*, have been reported in Florida waters for decades, the effects of commercial culture densities of these clams on local southern quahog (*Mercenaria campechiensis)* populations are not thoroughly understood. TCAP management will encourage the use of native species/varieties by aquaculture operations.

Objective 9.2.1: Encourage the cultivation of local species/varieties.

Strategies:

- Continue to gather results of studies of the biotic impacts of non-local species on local species.

- Encourage research on aspects of local clam culture that would make local species more economically viable for culture and harvest.

Performance Measure: A shift to the use of locally-abundant species in aquaculture operations.

5.2.10 / Issue Ten: Historical and Cultural Resources/Sites

The history of Terra Ceia, like that of Tampa Bay, is a rich one, with human habitation spanning thousands of years. As a result, shallow areas, like the entire TCAP, have a high probability for the presence of historical and cultural resources.

Goal 10.1: Identify existing historical and cultural sites. Most known sites are on the shoreline. Given the history of sea level change, sites likely exist below mean high water, but these have not been studied as well. Shoreline site locations may give clues to the probable presence of submerged sites.

Objective 10.1.1: Create a database of known historical and cultural sites.

Strategies:

- Establish a GIS database to include shoreline sites.

Performance Measure: Establishment of historical/cultural site database.

Objective 10.1.2: Encourage development of resource identification measures for submerged sites. Probability models, similar to those used to predict the likelihood of terrestrial sites, will be developed for submerged cultural and historical resources at Terra Ceia. This project is suitable for graduate student research.

Strategies:

- Seek funding sources for archaeological surveys of submerged lands at Terra Ceia.
- Work with archaeology professors to create a research framework for long-term archaeological study of Terra Ceia.
- Solicit graduate student research projects.

Performance Measure: Identification of new sites in submerged areas.

Goal 10.2: Provide protective measures for historical and cultural sites.

Objective 10.2.1: Provide staff training in historical and cultural resource identification and protection. Any available training is useful in equipping TCAP staff to identify and protect submerged cultural and historical resources.

Strategies:

- Work with the Department of State, Division of Historical Resources to train staff in recognizing archaeological sites.

Performance Measure: Staff qualified to identify sites on a cursory level.

Objective 10.2.2: Provide statutory authority information for law enforcement officers. In the past, law enforcement officers have remarked that they have little knowledge of the appropriate statutes and rules that would allow them to enforce protection of cultural and historical resources in the preserve. In addition to training, TCAP will provide laminated reference cards for officers to carry in the field that identify relevant protections.

Strategies:

- Work with the Division of Historical Resources to compile relevant laws and policies into a user-friendly form.
- Make trainings and information available to law enforcement officers operating in the preserve.

Performance Measure: Enhanced capacity for enforcement of laws protecting historical and cultural sites.

Objective 10.2.3: Establish periodic monitoring of known historic sites. Residents who frequently are on the water will be asked to keep an eye on known sites. Training will be provided to equip this "neighborhood watch" to recognize signs of looting and other disturbances to these sites.

Strategies:

- Design forms, protocols, and training for volunteers to assist in monitoring historical resource sites.
- Recruit and train local volunteers to monitor historical sites.

Performance Measure: Reduction in the amount of disturbance to historical resource sites.

5.2.11 / Issue Eleven: Disaster/Contingency Preparation

The location of the preserve near the main Tampa Ship Channel, Port Manatee and intense recreational boating all make it likely that events requiring emergency actions will occur. Contingency planning and robust communications mechanisms will reduce the need for decisions to be made in haste as an event unfolds.

Goal 11.1: Prepare contingencies for oil, fuel and other spills.

Objective 11.1.1: Maintain partnerships and communications channels necessary for effective spill response.

Strategies:

- Maintain communications with DEP's Bureau of Emergency Response (BER) and the U.S. Coast Guard (USCG)

Performance Measure: Agreement with other agencies on spill contingencies.

Objective 11.1.2: Produce a spill contingencies document. A document is needed to serve as a guide for various agencies and groups responding to spills, groundings, etc. This document will be a general guide to aquatic preserve resources, points of protection (e.g. channels to be boomed) and any other information that experience has shown to be valuable to resource protection in an emergency.

Strategies:

- Produce a map of sensitive areas with dimensions of required booms to protect those areas.
- Distribute maps to responders.

Performance Measure: Contingencies document produced and distributed.

Objective 11.1.3: Where prudent, encourage the permanent staging of spill control equipment. Because of the difficulty of launching boats and gear such as spill booms near remote areas of the preserve, it may be prudent to work with other agencies to stage materials in containers in remote areas. If so, provisions must be made for the maintenance and deployment responsibilities.

Strategies:

- Discuss with USCG and DEP's BER whether on-site staging of control booms is practical.
- If practical, identify appropriate entities to stage spill equipment and assist/encourage deployment.

Performance Measure: Definitive decision on staging of booms.

Goal 11.2: Prepare contingencies for vessel groundings. Experience has shown that the most important factor in dealing effectively with vessel groundings is timely, accurate communication of resource information with responders. In the past, poor communications have resulted in damage to submerged resources (hardbottom, seagrass) as a result of towing hulls, dredge floats, etc. over these areas.

Objective 11.2.1: Coordinate policies on avoidance and/or minimization of environmental impacts of groundings and recovery efforts.

Strategies:

- Discuss strategies with USCG and DEP's BER.
- Communicate these strategies when agency personnel change.

Performance Measure: Agreement on groundings protocols.

Goal 11.3: Prepare for tropical weather events. The TCAP program has prepared a detailed hurricane plan, and this plan is updated annually.

Objective 11.3.1: Continue to keep TCAP's hurricane preparedness up to date.

Strategies:

- Revise TCAP's hurricane plan annually.
- Provide information (Clean Marina BMPs) to local facilities whose hurricane preparations may prevent spills and other hurricane-related impacts.

Performance Measure: Annually-revised hurricane plan for TCAP.

Terra Ceia Aquatic Preserve is a popular resource for kayakers of all ages.

Part Three

Additional Plans

Chapter Six

Administrative Plans

The Tampa Bay Aquatic Preserves program has a staff of three full-time equivalent positions (two field and one administrative) and one other personal services position to manage four aquatic preserves, totaling nearly 400,000 acres, in three counties. Two of these preserves (the Pinellas County Aquatic Preserve and Boca Ciega Bay Aquatic Preserve) are located within one of Florida's most densely urbanized counties. The Terra Ceia Aquatic Preserve (TCAP), and the Cockroach Bay Aquatic Preserve require different management approaches from their more urbanized counterparts. The management goals for the TCAP must be balanced with the program's other responsibilities, and it must be done with new issues emerging frequently. To this end, an effective and efficient planning cycle has evolved.

The TCAP program maintains a program-wide strategic plan with a planning horizon of 5 to 10 years. This timeframe accommodates anticipation of vehicle replacements, facilities needs and changing staffing needs. The plan also lists "big picture" goals for the direction of the program. The strategic plan is revisited early each calendar year. By reviewing whether the goals of the strategic plan are still valid, the staff sets the stage for developing individual staff action plans for the next fiscal year. Individual staff action plans include a summary of workload duties, descriptions of projects for the upcoming fiscal year, training and equipment needs and project timelines. The TCAP manager reviews these individual plans and their timelines together to detect likely equipment and staffing bottlenecks for the upcoming fiscal year. This annual planning cycle is timed to generate realistic budgetary needs before the annual budget request is submitted through the Office of Coastal and Aquatic Managed Areas.

To carry out planned activities, limited staff resources are supplemented by active intern and volunteer programs. A computer-based volunteer coordination system is being refined. Colleges, grade schools, nonprofit organizations, corporate groups and other agencies all have been valuable sources of volunteer staffing supplements.

Scientists conducting monitoring studies on Terra Ceia Bay.

Chapter Seven

Facilities Plans

Vehicles and Vessels – All major vehicles and vessels deemed necessary in the strategic plan have been acquired. As part of the program's strategic planning cycle, the suitability and condition of all vehicles and vessels in the program are reevaluated annually.

Vessels and the functional "niches" they fill include the following:

- **Kayaks** – for navigating the many narrow channels, creeks and shallow areas
- **14' jon boat** – for transporting equipment in narrow channels
- **16' vee-hull runabout** – for open water and convenient trailering
- **19' shallow-draft skiff** – for transporting equipment into shallow areas
- **25' Mako** – for transporting more equipment and people and for open, choppy water in the open bay and offshore areas
- **Zodiac** – as a tender for the Mako in shallow areas

Vehicles and their functional "niches" include the following:

- **F-350** for towing the Mako
- **F-250 4x4** for towing the smaller boats and accessing off-road sites
- **Ford Taurus sedan** for economical travel to meetings and errands

Office space

At present, TCAP and the Division of Recreation and Parks staff operate from a shared headquarters facility located in the Haley House. The Office of Coastal and Aquatic Managed Areas (CAMA) has allocated funds to develop a Facilities Master Plan for the site. The master plan will outline the long-range conceptual plans for facilities, public access, education and research designed to help meet CAMA's program needs. The Division of Recreation and Parks and other partners have been involved in the conceptual planning of this document, and will continue to be included. CAMA's future needs for the site include:

- A small indoor and outdoor interpretive facility for analyzing results of the Tampa Bay Study and ongoing research
- A small research lab for microscope work, aquariums, etc.
- A small shop area for assembling, repairing and calibrating field equipment
- An area for visiting scientists to stay overnight and work

List of Appendices

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 insure the perpetual protection, preservation and public enjoyment of certain specific areas of exceptional quality and value by setting aside forever these certain areas as aquatic preserves or sanctuaries; and

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

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

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

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

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

(1) An aquatic preserve is intended to set aside an exceptional area of state-owned land and its associated waters for preservation essentially in their natural or existing condition by reasonable regulation of all human activity which might have an effect on the area.

(2) An aquatic preserve shall include only lands or water bottoms owned by the State of Florida, and such private lands or water bottoms as may be specifically authorized for inclusion by appropriate instrument from the owner. Any included lands or water bottoms to which a private ownership claim might subsequently be proved shall upon adjudication of private ownership be automatically excluded from the preserve, although such exclusion shall not preclude the State from attempting to negotiate an arrangement with the owner by which such lands or water bottoms might be again included within the preserve.

(3) No alteration of physical conditions within an aquatic preserve shall be permitted except: (a) minimum dredging and spoiling for authorized public navigation projects, or (b) other approved activity designed to enhance the quality or utility of the preserve itself. It is inherent in the concept of the aquatic preserve that, other than as contemplated above, there be: no dredging and filling to create land, no drilling of oil wells or excavation for shell or minerals, and no erection of structures on stilts or otherwise unless associated with authorized activity, within the confines of a preserve - to the extent these activities can be lawfully prevented.

(4) Specifically, there shall be no bulkhead lines set within an aquatic preserve. When the boundary of a preserve is intended to be the line of mean high water along a particular shoreline, any bulkhead line subsequently set for that shoreline will also be at the line of mean high water.

(5) All human activity within an aquatic preserve shall be subject to reasonable rules and regulations promulgated and enforced by the State of Florida Board of Trustees of the Internal Improvement Trust Fund and/or any other specifically designated managing agency Such rules and regulations shall not interfere unduly with lawful and traditional public uses of the area, such as fishing (both sport and commercial), hunting, boating, swimming and the like.

(6) Neither the establishment nor the management of an aquatic preserve shall infringe upon the lawful and traditional riparian rights o 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
EARL FAIRCLOTH, Attorney General
BROWARD WILLIAMS, Treasurer
DOYLE CONNER, Commissioner of Agriculture
TOM ADAMS, Secretary of State
FRED O. DICKINSON, JR., Comptroller
FLOYD T. CHRISTIAN, Commissioner of Education

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

A.2 / ***Florida Statutes (F.S.)***

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

- ***Florida Statutes, Chapter 253: State Lands***
- ***Florida Statutes, Chapter 258: State Parks and Preserves***

  Part II (Aquatic Preserves)
- ***Florida Statutes, Chapter 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))

A.3 / ***Florida Administrative Codes (F.A.C.)***

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

- ***Florida Administrative Code, Chapter 18-20: Florida Aquatic Preserves***
  www.dep.state.fl.us/legal/Rules/shared/18-20.pdf
- ***Florida Administrative Code, Chapter 18-21: Sovereignty Submerged Lands Management***
  www.dep.state.fl.us/legal/Rules/shared/18-21.pdf
- ***Florida Administrative Code, Chapter 62-302: Surface Water Quality Standards***
  (Rule designating Outstanding Florida Waters is at 62-302.700)
  www.dep.state.fl.us/legal/Rules/shared/62-302/62-302.pdf

Appendix B

Resource Data

B.1 / Acronym List

Acronym	Description
BER	DEP, Bureau of Emergency Response
BMP	best management practice
BTIITF	Board of Trustees of the International Improvement Trust Fund
CAMA	Office of Coastal and Aquatic Managed Areas
CDMO	Centralized Data Management Office
DEP	Florida Department of Environmental Protection
DRP	DEP, Division of Recreation and Parks
EARL	Eye-safe Atmospheric Research LIDAR
F.A.C.	Florida Administrative Code
F.A.W.	Florida Administrative Weekly
FNAI	Florida Natural Area Inventory
F.S.	Florida Statutes
FTE	Full-Time Equivalent
GIS	Geographic Information Systems

Acronym	Description
GPS	Global Positioning System
LIDAR	Light Detection and Ranging
Mph	miles per hour
NERR	National Estuarine Research Reserve
NGVD	National Geodetic Vertical Datum
NOAA	National Oceanic and Atmospheric Administration
OFW	Outstanding Florida Waters
OPS	Other Personal Services
Ppt	parts per thousand
SAV	submerged aquatic vegetation
SWFWMD	Southwest Florida Water Management District
TBAP	Tampa Bay Aquatic Preserves
TCAP	Terra Ceia Aquatic Preserve
USCG	U.S. Coast Guard
USGS	U.S. Geological Survey

B.2 / Glossary

alternative - a choice between things.

anaerobic - growing or occurring in the absence of molecular oxygen.

aquaculture - the cultivation of aquatic organisms.

aquatic - living in or near water; used of plants adapted for a partially or completely submerged life.

arboreal - living in trees; adapted for life in trees.

benthic - pertaining to the sea bed, river bed or lake floor.

berm - large deposits of dry loose sediment above the high tide line on a beach.

biota - all the organisms living in a particular region, including plants, animals, and microorganisms.

biotic community - a group of interacting species coexisting in a particular habitat.

brood - to incubate eggs.

buffer - to protect a system from change by external factors; anything that reduces an impact.

clastic - sediments that are formed of rock fragments or of clay minerals.

community - a grouping of populations of different organisms found living together in a particular environment.

conjunction - a joining together; combination.

conservation - the planned management of natural resources; the retention of natural balance, diversity and evolutionary change in the environment; preservation.

database - a mass of data in a computer, arranged for rapid expansion, updating, and retrieval.

datasonde - an automated electronic instrument for measuring and recording water quality parameters.

degradation - breakdown into smaller or simpler parts; reduction of complexity.

derelict - deserted by the owner; abandoned.

diurnal - at daily intervals.

diversity - a measure of the number of species and their relative abundance in a community.

dredge - an apparatus for scooping up mud, for deepening channels.

EARL LIDAR - (Eyesafe Atmospheric Research Lidar) a NASA laser mapping system operated from airplanes that can map land elevations, as well as shallow water depths.

easement - a right that one may have in another's land.

ecosystem - a community of organisms and their physical environment interacting as an ecological unit.

ecosystem management - the active and purposeful manipulation of an ecosystem in order to exploit its productivity or to enhance its biodiversity and conservation value.

emergent - used of an aquatic plant having most of the vegetative parts above water; used of a tree which reaches above the level of the surrounding canopy.

empirical - based upon direct observation and experience rather than theory or preconception.

endangered species - an animal or plant species in danger of extinction throughout all or a significant portion of its range.

endemic - native to, and restricted to, a particular geographical region.

environment -the physical, chemical and biological surroundings of an organism at any given time.

ephemeral - short-lived, or of brief duration.

estuary - semi-enclosed coastal water, open to the sea, having a high freshwater drainage and with marked cyclical fluctuations in salinity; usually the mouth of a river.

extinction - the disappearance of a species from a given habitat.

fauna - the animal life of a given region, habitat or geological stratum.

flora - the plant life of a given region, habitat or geological stratum.

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.

geomorphology - the scientific study of the landforms or the Earth's surface and of the processes that have fashioned them.

georeferencing - providing geographic location coordinates for data or images.

habitat - the living place of an organism or community, characterized by its physical or biotic properties.

hydrology - the study of the hydrologic cycle, emphasized the study of bodies of surface water on land and how they change with time.

hyperspectral imaging – digital photography broken into separate color bands for detailed analysis.

incise - cut or carve.

indicator species - a species, the presence or absence of which is indicative of a particular habitat, community or set of environmental conditions.

indigenous - native to a particular area; used of an organism or species occurring naturally in an environment or region.

in situ - in the original location.

knell - the sound of a bell rung slowly.

LIDAR - (Light Detection and Ranging) a laser measuring system that, when used from an airplane, can map land elevations.

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

littoral - the intertidal zone of the seashore; sometimes used to refer to both the intertidal zone of the seashore and the adjacent continental shelf to a depth of about 200 m.

mandate - an order or command; the will of constituents expressed to their representative, legislature, etc.

mesic - pertaining to conditions of moderate moisture or water supply; used of organisms occupying moist habitats.

microtopography – small-scale variation in elevation of the ground or another surface.

mitigation - to make or become less severe, less painful; to work against.

monitor - to watch or check on.

muck - highly decomposed plant material typically darker and with higher mineral content than peat.

native - indigenous; living naturally within a given area.

photo interpretation – interpreting features observed in photographic images.

pneumatophores – vertical extensions of mangrove roots thought to bring oxygen to roots in oxygen-poor sediment.

pollution - the contamination of a natural ecosystem.

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.

psammophyte - a plant growing or moving in unconsolidated sand.

refugium - an isolated habitat that retains the environmental conditions that were once widespread.

respirometry - measurement of an organism's oxygen uptake.

restoration - being returned to a former or normal state, to health.

rugose - wrinkled.

runoff - part of precipitation that is not held in the soil but drains freely away.

salinity - a measure of the total concentration of dissolved salts in seawater.

sediment - material derived from preexisting rock deposited at or near the Earth's surface.

sessile - non-motile; permanently attached at the base.

SHARQ - (Submersible Habitat for Analyzing Reef Quality) an underwater enclosure developed by USGS to measure water chemistry fluctuations over reefs, seagrass beds and other habitats.

shoal - a shallow place in a river, sea etc.; a sand bar forming a shallow place.

sidescan sonar - a high-frequency scanning sonar that produces three-dimensional maps of the seafloor.

silicoclastic - composed of silica (glassy) material.

sloop - a sailing vessel having a single mast with a mainsail and a jib.

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

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.

submergent - pertaining to a plant growing entirely under water.

subsidence – a lowering of land elevation often caused by underground processes like groundwater removal.

subtidal - environment which lies below the mean low water level.

supratidal - the zone on the shore above mean high tide level.

telemetry - measuring and transmitting data about radiation, temperature, etc. from a remote point.

topobathymetric - relating to land elevations (topography) and seafloor depths (bathymetry).

towed video - a video camera system towed behind a boat.

transect - a line or narrow belt used to survey the distributions of organisms across a given area.

trophic - pertaining to nutrition, food or feeding.

upland - land elevated above other land.

vegetation - plant life or cover in an area; also used as a general term for plant life.

viable - having the capacity to live, grow, germinate or develop.

water column - the vertical column of water in a sea or lake extending from the surface to the bottom.

watershed - an elevated boundary area separating tributaries draining in to different river systems; drainage basin.

wetland - an area of low lying land, submerged or inundated periodically by fresh or saline water.

wildlife - any undomesticated organisms; wild animals.

B.3 / ***References***

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*B.4 / **Resource Inventories***

B.4.1 / Native Species Within and Adjacent to the Terra Ceia Aquatic Preserve

Common Name	Species Name	State Status	Federal Status
Legend: T = Threatened / E = Endangered / SSC = Species of Special Concern			
Kingdom Animalia			
Phylum Annelida (segmented worms)			
polychaete worm	*Aglaophamus verrilli*		
polychaete worm	*Ampharetidae*		
polychaete worm	*Ancistrosyllis jonesi*		
polychaete worm	*Aphelochaeta sp.*		
polychaete worm	*Apoprionospio pygmaea*		
polychaete worm	*Arabella multidentata*		
polychaete worm	*Arabella mutans*		
polychaete worm	*Aricidea allisdari*		
polychaete worm	*Aricidea fragilis*		
polychaete worm	*Aricidea lopezi*		
polychaete worm	*Aricidea philbinae*		
polychaete worm	*Aricidea suecica*		
polychaete worm	*Aricidea taylori*		
polychaete worm	*Armandia maculate*		
polychaete worm	*Asychis elongates*		
polychaete worm	*Augeneriella hummelincki*		
polychaete worm	*Axiothella mucosa*		
polychaete worm	*Bhawania heteroseta*		
polychaete worm	*Boguea enigmatica*		
polychaete worm	*Branchiomma sp.*		
polychaete worm	*Brania sp. A*		
polychaete worm	*Brania wellfleetensis*		
polychaete worm	*Capitella capitata complex*		
polychaete worm	*Capitella jonesi*		
polychaete worm	*Carazziella hobsonae*		
polychaete worm	*Caulleriella cf. alata*		

Common Name	Species Name	State Status	Federal Status
Legend: T = Threatened / E = Endangered / SSC = Species of Special Concern			
polychaete worm	*Caulleriella cf. zetlandica*		
polychaete worm	*Caulleriella sp.*		
polychaete worm	*Caulleriella sp. D* of Wolf, 1984		
clam worm	*Ceratonereis irritabilis*		
polychaete worm	*Chaetozone sp.*		
polychaete worm	*Chone cf. Americana*		
polychaete worm	*Chone sp.*		
polychaete worm	*Cirratulidae sp.*		
polychaete worm	*Cirriformia cf. sp. B* of Wolf,1984		
polychaete worm	*Cirriformia sp.*		
polychaete worm	*Cirriformia sp. A* of Wolf, 1984		
polychaete worm	*Cirrophorus americanus*		
polychaete worm	*Cirrophorus sp.*		
tube worm	*Diopatra cuprea*		
polychaete worm	*Dipolydora socialis*		
polychaete worm	*Dorvillea cf. rudolphi*		
oligochaete worm	*Enchytraeidae sp.*		
polychaete worm	*Eteone heteropoda*		
polychaete worm	*Eumida sp. A*		
polychaete worm	*Exogone atlantica*		
polychaete worm	*Exogone breviantennata*		
polychaete worm	*Exogone dispar*		
polychaete worm	*Exogone lourei*		
polychaete worm	*Fabricinuda trilobata*		
polychaete worm	*Galathowenia oculata*		
blood worm	*Glycera Americana*		
blood worm	*Glyceridae sp.*		
polychaete worm	*Glycinde solitaria*		
polychaete worm	*Goniadides carolinae*		
oligochaete worm	*Grania sp.*		
polychaete worm	*Grubeosyllis clavata*		
polychaete worm	*Gyptis crypta*		
polychaete worm	*Hesionidae sp.*		
polychaete worm	*Heteromastus filiformis*		
polychaete worm	*Hobsonia florida*		
polychaete worm	*Isolda pulchella*		
polychaete worm	*Janua (Dexiospira) cf. corrugata*		
polychaete worm	*Janua (Dexiospira) steueri*		
polychaete worm	*Kinbergonuphis simoni*		
clam worm	*Laeonereis culveri*		
polychaete worm	*Laonice cirrata*		
polychaete worm	*Leiochrides sp. A*		
polychaete worm	*Leitoscoloplos fragilis*		
polychaete worm	*Leitoscoloplos robustus*		
polychaete worm	*Leitoscoloplos sp.*		
polychaete worm	*Loimia medusa*		

Common Name	Species Name	State Status	Federal Status
Legend: T = Threatened / E = Endangered / SSC = Species of Special Concern			
clam worm	*Lumbrineris latreilli*		
clam worm	*Lumbrineris sp. D* of Uebelacker, 1984		
clam worm	*Lumbrineris verrilli*		
polychaete worm	*Magelona pettiboneae*		
polychaete worm	*Maldanidae*		
polychaete worm	*Malmgreniella maccraryae*		
polychaete worm	*Malmgreniella taylori*		
polychaete worm	*Mediomastus ambiseta*		
polychaete worm	*Mediomastus californiensis*		
polychaete worm	*Mediomastus sp.*		
polychaete worm	*Megalomma pigmentum*		
polychaete worm	*Megalomma sp.*		
polychaete worm	*Melinna cristata*		
polychaete worm	*Melinna maculate*		
polychaete worm	*Monticellina dorsobranchialis*		
polychaete worm	*Mooreonuphis cf. nebulosa*		
polychaete worm	*Mooreonuphis sp.*		
polychaete worm	*Nephtys cryptomma*		
clam worm	*Nereididae sp.*		
polychaete worm	*Nereiphylla castanea*		
polychaete worm	*Nereiphylla fragilis*		
clam worm	*Nereis acuminate*		
clam worm	*Nereis falsa*		
clam worm	*Nereis lamellose*		
clam worm	*Nereis sp.*		
clam worm	*Nereis succinea*		
polychaete worm	*Notomastus americanus*		
polychaete worm	*Notomastus hemipodus*		
polychaete worm	*Notomastus n. sp.*		
polychaete worm	*Onuphidae sp.*		
polychaete worm	*Ophelina cf. acuminate*		
polychaete worm	*Ophiodromus obscura*		
polychaete worm	*Owenia fusiformis*		
polychaete worm	*Paradoneis cf. lyra*		
polychaete worm	*Parahesione luteola*		
polychaete worm	*Paranaitis gardineri*		
polychaete worm	*Paraonella sp.*		
polychaete worm	*Paraonis fulgens*		
polychaete worm	*Paraprionospio pinnata*		
ice cream cone worm	*Pectinaria gouldii*		
polychaete worm	*Pettiboneia sp.*		
polychaete worm	*Phyllodoce arenae*		
polychaete worm	*Phyllodoce groenlandica*		
polychaete worm	*Phyllodocidae sp.*		
polychaete worm	*Pionosyllis nr. ehlersiaeformis*		
polychaete worm	*Pionosyllis sp. D* of Uebelacker, 1984		

Common Name	Species Name	State Status	Federal Status
Legend: T = Threatened / E = Endangered / SSC = Species of Special Concern			
clam worm	*Platynereis dumerilii*		
polychaete worm	*Podarkeopsis levifuscina*		
polychaete worm	*Polycirrus cf. denticulatus*		
polychaete worm	*Polydora cornuta*		
polychaete worm	*Polynoidae*		
polychaete worm	*Polynoidae genus D*		
polychaete worm	*Pomatoceros americanus*		
polychaete worm	*Prionospio cristata*		
polychaete worm	*Prionospio heterobranchia*		
polychaete worm	*Prionospio multibranchiata*		
polychaete worm	*Prionospio perkinsi*		
polychaete worm	*Prionospio sp.*		
polychaete worm	*Prionospio steenstrupi*		
polychaete worm	*Procerae sp. A*		
polychaete worm	*Pseudopotamilla cf. reniformis*		
polychaete worm	*Sabaco americanus*		
polychaete worm	*Sabellaria sp. A* of Uebelacker, 1984		
polychaete worm	*Sabellaria sp. C of*		
polychaete worm	*Scolelepis texana*		
polychaete worm	*Scoloplos rubra*		
featherduster worm	*Serpulidae sp.*		
polychaete worm	*Sigambra tentaculata*		
polychaete worm	*Sphaerosyllis aciculate*		
polychaete worm	*Sphaerosyllis labyrinthophila*		
polychaete worm	*Sphaerosyllis longicauda*		
polychaete worm	*Sphaerosyllis taylori*		
polychaete worm	*Spio pettiboneae*		
polychaete worm	*Spiochaetopterus costarum*		
polychaete worm	*Spiophanes bombyx*		
polychaete worm	*Spirorbidae sp.*		
polychaete worm	*Spirorbis spirillum*		
polychaete worm	*Sthenelais sp. A* of Wolf,1984		
polychaete worm	*Streblosoma hartmanae*		
polychaete worm	*Streblospio sp.*		
polychaete worm	*Streptosyllis pettiboneae*		
polychaete worm	*Syllides floridanus*		
polychaete worm	*Syllis cornuta*		
polychaete worm	*Synelmis ewingi*		
oligochaete worm	*Tectidrilus squalidus*		
oligochaete worm	*Thalassodrilides ineri*		
oligochaete worm	*Thalassodrilides sp.*		
polychaete worm	*Tharyx acutus*		
polychaete worm	*Tharyx sp.*		
polychaete worm	*Travisia hobsonae*		
oligochaete worm	*Tubificidae sp.*		
oligochaete worm	*Tubificoides brownie*		

Common Name	Species Name	State Status	Federal Status
Legend: T = Threatened / E = Endangered / SSC = Species of Special Concern			
oligochaete worm	*Tubificoides motei*		
oligochaete worm	*Tubificoides wasselli*		
Phylum Arthropoda (crabs, spiders, insects)			
Subphylum Chelicerata (horseshoe crabs, arachnids)			
Class Arachnida (spiders, scorpions)			
orb weaver	*Argiope sp.*		
crab spider	*Gastrocanthus cancriformis*		
Class Merostomata (horseshoe crabs, mantis shrimps)			
horseshoe crab	*Limulus polyphemus*		
Subphylum Crustacea (crabs, shrimps)			
amphipod	*Acanthohaustorius uncinus*		
cumacean	*Almyracuma proximoculi*		
snapping shrimp	*Alpheus angulatus*		
green snapping shrimp	*Alpheus normanni*		
isopod	*Amakusanthura magnifica*		
myside shrimp	*Americamysis bigelowi*		
myside shrimp	*Americamysis stucki*		
amphipod	*Ampelisca abdita*		
amphipod	*Ampelisca agassizi*		
amphipod	*Ampelisca holmesi*		
amphipod	*Ampelisca sp.*		
amphipod	*Ampelisca sp. C* of LeCroy, 2002		
amphipod	*Ampelisca vadorum*		
amphipod	*Amphilochus sp. B*		
amphipod	*Ampithoe cf. longimana*		
amphipod	*Ampithoe sp.*		
amphipod	*Aoridae sp.*		
barnacle	*Balanus improvisus*		
barnacle	*Balanus sp.*		
amphipod	*Batea catharinensis*		
amphipod	*Bemlos cf. longicornis*		
amphipod	*Bemlos rectangulatus*		
amphipod	*Bemlos spinicarpus*		
myside shrimp	*Bowmaniella brasiliensis*		
myside shrimp	*Bowmaniella floridana*		
myside shrimp	*Bowmaniella sp.*		
crab	*Brachyura sp.*		
blue crab	*Callinectes sapidus*		
skeleton shrimp	*Caprellidae-unid.*		
amphipod	*Cerapus sp.*		
amphipod	*Cerapus sp. C (="tubularis")*		
barnacle	*Cirripedia sp.*		
cumacean	*Cumella cf. garrityi*		
cumacean	*Cyclaspis cf. varians*		
cumacean	*Cyclaspis spp.*		
amphipod	*Cymadusa compta*		

Common Name	Species Name	State Status	Federal Status
Legend: T = Threatened / E = Endangered / SSC = Species of Special Concern			
skeleton shrimp	*Deutella incerta*		
sand dollar crab	*Dissodactylus mellitae*		
amphipod	*Dulichiella appendiculata*		
gulf grassflat crab	*Dyspanopeus texanus*		
isopod	*Edotia triloba*		
amphipod	*Elasmopus levis*		
isopod	*Erichsonella attenuate*		
amphipod	*Erichthonius brasiliensis*		
lobster	*Euceramus praelongus*		
amphipod	*Eudevenopus honduranus*		
amphipod	*Eusiridae sp.*		
pink shrimp	*Farfantepenaeus duorarum*		
amphipod	*Gammaridea sp.*		
amphipod	*Grandidierella bonnieroides*		
amphipod	*Hartmanodes nyei*		
crab	*Heterocrypta granulate*		
crab	*Hexapanopeus angustifrons*		
false zostera shrimp	*Hippolyte pleuracantha*		
shrimp	*Hippolyte zostericola*		
amphipod	*Hourstonius laguna*		
tanaid	*Kalliapseudes macsweenyi*		
amphipod	*Laticorophium cf. baconi*		
shrimp	*Latreutes parvulus*		
amphipod	*Lembos unifasciatus*		
tanaid	*Leptochelia sp.*		
cumacean	*Leucon americanus*		
decorator crab	*Libinia dubia*		
amphipod	*Listriella barnardi*		
crab	*Majidae sp.*		
amphipod	*Metatiron tropakis*		
amphipod	*Metharpinia floridana*		
amphipod	*Microprotopus raneyi*		
amphipod	*Monocorophium acherusicum*		
myside shrimp	*Mysidopsis furca*		
myside shrimp	*Mysidopsis spp.*		
sea flea	*Nebalia sp.*		
cumacean	*Oxyurostylis lecroyae*		
cumacean	*Oxyurostylis smithi*		
cumacean	*Oxyurostylis spp.*		
hermit crab	*Paguristes hummi*		
hermit crab	*Paguristes nr. Tortugae*		
hermit crab	*Paguroidea sp.*		
hermit crab	*Pagurus gymnodactylus*		
hermit crab	*Pagurus longicarpus*		
hermit crab	*Pagurus maclaughlinae*		
hermit crab	*Pagurus sp.*		

Common Name	Species Name	State Status	Federal Status
Legend: T = Threatened / E = Endangered / SSC = Species of Special Concern			
hermit crab	*Pagurus stimpsoni*		
grass shrimp*	*Palaemonetes spp.**		
grass shrimp	*Palaemonidae sp.*		
crab	*Panopeidae sp.*		
mud crab	*Panopeus sp.*		
skeleton shrimp	*Paracaprella sp.*		
isopod	*Paracerceis caudate*		
amphipod	*Paramicrodeutopus cf. myersi*		
teardrop crab	*Pelia mutica*		
caridean shrimp	*Periclimenes americanus*		
caridean shrimp	*Periclimenes longicaudatus*		
crab	*Pinnixa cf. floridana*		
crab	*Pinnixa cf. pearsii*		
gaper pea crabs	*Pinnixa sp.*		
crab	*Pinnixa sp. A (of LeCroy)*		
crab	*Pinnotheridae sp.*		
eggshell urn crab	*Pitho laevigata*		
shrimp	*Rimapenaeus constrictus*		
amphipod	*Rudilemboides naglei*		
amphipod	*Shoemakerella cubensis*		
amphipod	*Stenothoe cf. Georgiana*		
amphipod	*Stenothoe gallensis*		
arrow shrimp	*Tozeuma carolinense*		
isopod	*Tropedotea lyonsi*		
shrimp	*Upogebia affinis*		
shrimp	*Upogebia sp.*		
isopod	*Xenanthura brevitelson*		
Phylum Bryozoa (moss animals)			
moss animal	*Bugula neritina*		
moss animal	*Glottidia pyramidata*		
Phylum Chaetognatha (arrow worms)			
arrow worm	*Chaetognatha sp.*		
Phylum Chordata (sea squirts, vertebrates)			
Class Amphibia (frogs, salamanders)			
southeastern five-lined skink	*Eumeces inexpectatus*		
cuban tree frog	*Osteopilus septentrionalis*		
leopard frog	*Rana pipiens*		
Class Aves (birds)			
sharp-shinned hawk	*Accipiter striatus*		
spotted sandpiper	*Actitis macularaia*		
roseate spoonbill	*Ajaia ajaja*		SSC
green-winged teal	*Anas carolinensis*		
northern shoveler	*Anas clypeata*		
blue-winged teal	*Anas discors*		
mottled duck	*Anas fulvigula*		
mallard	*Anas platyrhynchos*		

Common Name	Species Name	State Status	Federal Status
Legend: T = Threatened / E = Endangered / SSC = Species of Special Concern			
anhinga	*Anhinga anhinga*		
limpkin	*Aramus guarauna*		
great blue heron	*Ardea Herodias*		
ruddy turnstone	*Arenaria interpres*		
burrowing owl	*Athene cunicularia*		
lesser scaup	*Aythya affinis*		
American bittern	*Botaurus lentiginosus*		
great horned owl	*Bubo virginianus*		
cattle egret	*Bubulcus ibis*		
red tail hawk	*Buteo jamaicensis*		
red-shouldered hawk	*Buteo lineatus*		
green heron	*Butorides virescens*		
sanderling	*Calidris alba*		
dunlin	*Calidris alpine*		
western sandpiper	*Calidris mauri*		
least sandpiper	*Calidris minutilla*		
great egret	*Casmerodius albus*		
turkey vulture	*Cathartes aura*		
willet	*Catoptrophorus semipalmatus*		
piping plover	*Charadrius melodus*	T	T
semipalmated plover	*Charadrius semipalmatus*		
killdeer	*Charadrius vociferous*		
Wilson's plover	*Charadrius wilsonia*		
mangrove cuckoo	*Coccyzus minor*		
little blue heron	*Egretta caerulea*		SSC
reddish egret	*Egretta rufescens*		SSC
snowy egret	*Egretta thula*		SSC
tricolored heron	*Egretta tricolor*		SSC
swallow-tailed kite	*Elanoides forficatus*		
white ibis	*Eudocimus albus*		SSC
peregrine falcon	*Falco peregrinus*		
American kestrel	*Falco sparverius*		
magnificent fridatebird	*Fregata magnificens*		
common snipe	*Gallinago gallinago*		
sandhill crane	*Grus Canadensis*		T
American oystercatcher	*Haematopus palliates*		SSC
bald eagle	*Haliaeetus leucocephalus*		
worm-eating warbler	*Helmitheros vermivorus*		
black-necked stilt	*Himantopus mexicanus*		
wood thrush	*Hylocichla mustelina*		
herring gull	*Larus argentatus*		
laughing gull	*Larus atricilla*		
ring-billed gull	*Larus delawarensis*		
marbled godwit	*Limosa fedoa*		
red-breasted merganser	*Mergus serrator*		
wood stork	*Mycteria Americana*		E

Common Name	Species Name	State Status	Federal Status
Legend: T = Threatened / E = Endangered / SSC = Species of Special Concern			
long-billed curlew	*Numenius americanus*		
yellow-crowned night-heron	*Nyctanassa violacea*		
black-crowned night-heron	*Nycticorax nycticorax*		
eastern screech-owl	*Otus asio*		
osprey	*Pandion haliaetus*		
white pelican	*Pelecanus erythrorhynchos*		
brown pelican	*Pelecanus occidentails*		SSC
double-crested cormorant	*Phalacrocorax auritus*		
black-bellied plover	*Pluvialis squatarola*		
prothonotary warbler	*Protonotaria citrea*		
American avocet	*Recurvirostra Americana*		
black skimmer	*Rynchops niger*		
least tern	*Sterna antillarum*	T	T
royal tern	*Sterna maxima*		
sandwich tern	*Sterna sandvicensis*		
lesser yellowlegs	*Tringa flavipes*		
greater yellowlegs	*Tringa melanoleuca*		
American robin	*Turdus migratorius*		
Class Cephalochordata (lancelets)			
lancelet	*Branchiostoma floridae*		
Class Chondrichthyes (cartilaginous fishes)			
atlantic stingray	*Dasyatis Sabina*		
cownose stingray	*Rhinoptera bonasus*		
Class Mammalia (mammals)			
nine-banded armadillo	*Dasypus novemcinctus*		
opossum	*Didelphis marsupialus*		
big brown bat	*Eptesicus fuscus*		
humans	*Homo sapiens*		
yellow bat	*Lasiurus intermedius*		
Seminole bat	*Lasiurus seminolus*		
river otter	*Lutra Canadensis*		
evening bat	*Nycticeius humeralis*		
raccoon	*Procyon lotor*		
black rat	*Rattus rattus*		
cotton rat	*Signodon hispidus*		
Atlantic bottlenose dolphin	*Tursiops truncatus*		
marsh rabbit	*Sylvilagus palustris*		
freetail bat	*Tadarida brasiliensis*		
West Indian manatee	*Trichechus manatus*		
Class Osteichthyes (bony fishes)			
lined sole	*Achirus lineatus*		
diamond killifish	*Adinia xenica*		
striped anchovy	*Anchoa hepsetus*		
bay anchovy	*Anchoa mitchilli*		
anchovy	*Anchoa spp.*		
sheepshead	*Archosargus probatocephalus*		

Common Name	Species Name	State Status	Federal Status
Legend: T = Threatened / E = Endangered / SSC = Species of Special Concern			
hardhead catfish	*Arius felis*		
silver perch	*Bairdiella chrysoura*		
frillfin goby	*Bathygobius soporator*		
menhaden	*Brevoortia spp.*		
snook	*Centropomus undecimalis*		
florida blenny	*Chasmodes saburrae*		
cichlid	*Cichlidae sp.*		
herring	*Clupeidae sp.*		
sand seatrout	*Cynoscion arenarius*		
spotted seatrout	*Cynoscion nebulosus*		
sheepshead minnow	*Cyprinodon variegates*		
striped mojarra	*Diapterus plumieri*		
threadfin shad	*Dorosoma petenense*		
ladyfish	*Elops saurus*		
silver jenny	*Eucinostomus gula*		
tidewater mojarra	*Eucinostomus harengulus*		
mojarra	*Eucinostomus spp.*		
goldspotted killifish	*Floridichthys carpio*		
marsh killifish	*Fundulus confluentus*		
gulf killifish	*Fundulus grandis*		
striped killifish	*Fundulus majalis*		
killifish	*Fundulus spp.*		
eastern mosquito fish	*Gambusia holbrooki*		
highfin goby	*Gobionellus oceanicus*		
emerald goby	*Gobionellus smaragdus*		
naked goby	*Gobiosoma bosc*		
code goby	*Gobiosoma robustum*		
goby	*Gobiosoma spp.*		
scaled sardine	*Harengula jaguana*		
least killifish	*Heterandria Formosa*		
dwarf seahorse	*Hippocampus zosterae*		
brown hoplo	*Hoplosternum littorale*		
halfbeak	*Hyporhamphus meeki*		
brook silverside	*Labidesthes sicculus*		
pinfish	*Lagodon rhomboids*		
spot	*Leiostomus xanthurus*		
bluegill	*Lepomis macrochirus*		
spotted sunfish	*Lepomis punctatus*		
sunfish	*Lepomis spp.*		
bluefin killifish	*Lucania goodei*		
rainwater killifish	*Lucania parva*		
highfin blenny	*Lupinoblennius nicholsi*		
gray snapper	*Lutjanus griseus*		
tarpon	*Megalops atlanticus*		
rough silverside	*Membras martinica*		
silverside	*Menidia spp.*		

Common Name	Species Name	State Status	Federal Status
Legend: T = Threatened / E = Endangered / SSC = Species of Special Concern			
southern kingfish	*Menticirrhus americanus*		
clown goby	*Microgobius gulosus*		
atlantic croaker	*Micropogonias undulatus*		
largemouth bass	*Micropterus salmoides*		
striped mullet	*Mugil cephalus*		
white mullet	*Mugil curema*		
fantail mullet	*Mugil gyrans*		
mullet	*Mugil spp.*		
leatherjacket	*Oligoplites saurus*		
gulf toadfish	*Opsanus beta*		
blue tilapia	*Oreochromis aureus*		
pigfish	*Orthopristis chrysoptera*		
gulf flounder	*Paralichthys albigutta*		
sailfin molly	*Poecilia latipinna*		
black drum	*Pogonias cromis*		
drum	*Sciaenidae sp.*		
red drum	*Sciaenops ocellatus*		
sole	*Soleidae sp.*		
southern puffer	*Sphoeroides nephelus*		
redfin needlefish	*Strongylura notata*		
timucu	*Strongylura timucu*		
blackcheek tonguefish	*Symphurus plagiusa*		
chain pipefish	*Syngnathus louisianae*		
gulf pipefish	*Syngnathus scovelli*		
inshore lizardfish	*Synodus foetens*		
tilapia	*Tilapia spp.*		
hogchoker	*Trinectes maculates*		
Class Reptilia (reptiles)			
cottonmouth	*Agkistrodon piscivorus*		
american alligator	*Alligator mississippiensis*		
green sea turtle	*Chelonia mydas*		
eastern diamondback rattlesnake	*Crotalus adamanteus*		
leatherback sea turtle	*Dermochelys coriacea*		
Eastern indigo snake	*Drymarchon corais couperi*		
red rat snake	*Elaphe obsoleta*		
yellow rat snake	*Elaphe obsoleta quadrivittata*		
diamondback terrapin	*Malaclemys terrapin*		
water snake	*Nerodia sp.*		
Phylum Cnidaria (jellyfishes, corals)			
Class Anthozoa (anemones, corals)			
anemone	*Actinaria sp.*		
anemone	*Actinaria sp.b*		
anemone	*Athenaria sp.*		
Burrowing anemone	*Haloclava Cf. Producta*		
Anemone	*Thenaria sp.*		
Anemone	*Thenaria Sp. A Of EPC*		

Common Name	Species Name	State Status	Federal Status
Legend: T = Threatened / E = Endangered / SSC = Species of Special Concern			
Class Hyrdrozoa (hydroids)			
Hydrozoan	*Hydrozoa sp.*		
Phylum Echinodmermata (starfishes, urchins)			
Class Echinoidea (urchins, sand dollars)			
sea biscuit	*Echinoidea sp.*		
sand dollar	*Mellita tenuis*		
Class Holothuroidea (sea cucumbers)			
sea cucumber	*Holothuroidea sp.*		
burrowing sea cucumber	*Synaptidae sp. A*		
Class Ophiuroidea (brittle stars)			
brittle star	*Micropholis sp.*		
Phylum Hemichordata (acorn worms)			
acorn worm	*Enteropneusta sp.*		
acorn worm	*Stereobalanus canadensis*		
Phylum Mollusca (snails, clams, squids)			
Class Bivalvia (clams)			
common Atlantic abra	*Abra aequalis*		
paper mussel	*Amygdalum papyrium*		
transverse ark	*Anadara transversa*		
pointed venus	*Anomalocardia auberiana*		
common jingle shell	*Anomia simplex*		
hemphill's thracia	*Asthenothaerus hemphilli*		
scorched mussel	*Brachidontes exustus*		
broad-ribbed carditid	*Carditamera floridana*		
venus	*Chione elevate*		
contracted corbula	*Corbula contracta*		
corbula	*Corbula sp.*		
swift's corbula	*Corbula swiftiana*		
American oyster	*Crassostrea virginica*		
telling-like cumingia	*Cumingia tellinoides*		
thin cyclinella	*Cyclinella tenuis*		
pimpled diplodon	*Diplodonta semiaspera*		
disk dosinia	*Dosinia discus*		
minor jackknife clam	*Ensis minor*		
erycina	*Erycina floridana*		
lucina	*Lucinidae sp.*		
woven lucina	*Lucinisca nassula*		
lyonsia	*Lyonsia floridana*		
constricted macoma	*Macoma constricta*		
tenta macoma	*Macoma tenta*		
dwarf surf clam	*Mulinia lateralis*		
lateral musculs	*Musculus lateralis*		
atlantic flat lepton	*Mysella planulata*		
Conrad's false mussel	*Mytilopsis leucophaeta*		
Atlantic nut clam	*Nucula proxima*		
nut clam	*Nuculana acuta*		

Common Name	Species Name	State Status	Federal Status
Legend: T = Threatened / E = Endangered / SSC = Species of Special Concern			
giant montacutid	*Orobitella floridana*		
brown gem clam	*Parastarte triquetra*		
costate lucina	*Parvilucina costata*		
many-lined lucina	*Parvilucina multilineata*		
sphenia	*Sphenia antillensis*		
purplish razor clam	*Tagelus divisus*		
stout razor clam	*Tagelus plebeius*		
razor clam	*Tagelus sp.*		
alternate tellin	*Tellina alternata*		
DeKay's dwarf tellin	*Tellina cf. versicolor*		
iris telling	*Tellina iris*		
telling	*Tellina sp.*		
telling	*Tellinidae sp.*		
thracia	*Thraciidae sp.*		
Florida pricklycockle	*Trachycardium egmontianum*		
stimpson transennella	*Transenella stimpsoni*		
conrad transennella	*Transennella conradina*		
tansennella	*Transennella sp.*		
veneridae	*Veneridae sp.*		
Class Gastropoda (snails)			
Orbigny's barrel bubble	*Acteocina bidentata*		
barrel bubble	*Acteocina canaliculata*		
barrel bubble	*Acteocina sp.*		
sooty sea hare	*Aplysia brasiliana*		
lunar dovesnail	*Astyris lunata*		
grass cerith	*Bittiolum varium*		
impressed odostome	*Boonea impressa*		
common Atlantic bubble	*Bulla striata*		
ragged sea hare	*Bursatella leachii pleii*		
caecum	*Caecum cf. bipartitum*		
beautiful little caecum	*Caecum pulchellum*		
caecum	*Caecum sp.*		
caecum	*Caecum strigosum*		
caecum	*Caecum ustulatulina*		
circular cup-and-saucer	*Calyptraea centralis*		
cerith	*Cerithium muscarum*		
obscure corambe	*Corambe obscura*		
dovesnail	*Costoanachis semiplicata*		
common Atlantic slipper shell	*Crepidula fornicata*		
spotte slipper shell	*Crepidula maculosa*		
flat slipper shell	*Crepidula plana*		
slipper shell	*Crepidula sp.*		
trilix vitrinella	*Cyclostremiscus pentagonus*		
gold-line marginella	*Dentimargo aureocinctus*		
odostome	*Eulimastoma sp.*		
odostome	*Eulimastoma teres*		

Common Name	Species Name	State Status	Federal Status
Legend: T = Threatened / E = Endangered / SSC = Species of Special Concern			
odostome	*Eulimastoma weberi*		
eastern banded tulip	*Fasciolaria lilium hunteria*		
pitted murex	*Favartia cellulose*		
snowflake marginella	*Gibberula lavalleenana*		
marginella	*Granulina hadria*		
paper bubble	*Haminoea antillarum*		
paper bubble	*Haminoea elegans*		
paper bubble	*Haminoea sp.*		
paper bubble	*Haminoea succinea*		
snail	*Houbricka cf. incise*		
dward olive	*Jaspidella blanesi*		
brown-tipped mangelia	*Kurtziella atrostyla*		
morton eggcockle	*Laevicardium mortoni*		
snail	*Lephalapsidea sp.*		
little horn caecum	*Meioceras nitidum*		
eulima	*Melanella jamaicensis*		
eulima	*Melanella sp.*		
eulima	*Microeulima hemphilli*		
common eastern nassa	*Nassarius vibex*		
odostome	*Odostomia producta*		
odostome	*Odostomia sp. C (of EPC)*		
odostome	*Odostomia virginica*		
odostome	*Odostominae sp.*		
very small dwarf olive	*Olivella pusilla*		
dwarf olive	*Olivella sp.*		
dove-shell	*Parvanachis obesa*		
common atlantic marginella	*Prunum apicinum*		
plicate mangelia	*Pyrgocythara plicosa*		
Adams' baby-bubble	*Rictaxis punctostriatus*		
odostome	*Sayella laevigata*		
catesby's risso	*Schwartziella catesbyana*		
turrid	*Stellatoma stellata*		
natica	*Tectonatica pusilla*		
teinostome	*Teinostoma biscaynense*		
teinostome	*Teinostoma sp.*		
turbonilla	*Turbonilla (Pyrigiscus) sp.*		
turbonilla	*Turbonilla cf conradi*		
Dall's turbonilla	*Turbonilla cf. dalli*		
turbonilla	*Turbonilla interrupta*		
turbonilla	*Turbonilla sp.*		
turbonilla	*Turbonilla textilis*		
vitrinellidae	*Vitrinellidae sp.*		
Class Polyplacophora (chitons)			
fuzzy chiton	*Acanthopleura granulata*		
Class Scaphopoda (tusk shells)			
tusk shell	*Antalis pilsbryi*		

Common Name	Species Name	State Status	Federal Status
Legend: T = Threatened / E = Endangered / SSC = Species of Special Concern			
Phylum Nemertea (ribbon worms)			
ribbon worm	*Amphiporus bioculatus*		
ribbon worm	*Amphiporus sp. A of EPC*		
ribbon worm	*Archinemertea Sp. A Of Epc*		
ribbon worm	*Micrura leidyi*		
ribbon worm	*Nemertea sp.*		
ribbon worm	*Tubulanus pellucidus*		
ribbon worm	*Tubulanus sp. A of EPC*		
ribbon worm	*Tubulanus sp. B of EPC*		
ribbon worm	*Zygonemertes virescens*		
Phylum Phoronida (horseshoe worms)			
horseshoe worm	*Phoronis architecta*		
horseshoe worm	*Phoronis sp.*		
Phylum Platyhelminthes (flatworms)			
flat worm	*Eustylochus meridianalis*		
flat worm	*Turbellaria sp.*		
Phylum Sipunculida (peanut worms)			
peanut worm	*Phascolion cf. caupo*		
peanut worm	*Phascolion cryptum*		
peanut worm	*Phascolion sp.*		
Kingdom Plantae			
Phylum Magnoliophyta (flowering plants)			
Class Liliopsida (grass-like flowering plants)			
swamp lilly	*Crinum americanum*		
butterfly orchid	*Encyclia tampensis*		
shoal grass	*Halodule wrightii*		
star grass	*Halophila englemannii*		
black needlerush	*Juncus romerianus*		
widgeon grass	*Ruppia maritima*		
smooth cordgrass	*Spartina* alterniflora		
manatee grass	*Syringodium filiforme*		
turtle grass	*Thalassia testudinum*		
Class Magnoliopsida (woody flowering plants)			
black mangrove	*Avicennia germinans*		
buttonwood	*Conocarpus erectus*		
white mangrove	*Laguncularia racemosa*		
live oak	*Quercus virginiana*		
red mangrove	*Rhizophora mangle*		
Phylum Pinophyta (cone-bearing plants)			
red cedar	*Juniperus virginiana*		
Phylum Polypodiophyta (ferns)			
leather furn	*Acrosticum sp.*		
Kingdom Protista			
Phylum Chlorophyta (green algae)			
sea down	*Bryopsis plumosa*		
algae	*Caulerpa mexicana*		

Common Name	Species Name	State Status	Federal Status
Legend: T = Threatened / E = Endangered / SSC = Species of Special Concern			
algae	*Caulerpa racemosa*		
algae	*Caulerpa sertularioides*		
algae	*Cladophora sp.*		
algae	*Cladophoropsis sp.*		
deadman's fingers	*Codium spp.*		
algae	*Enteromorpha flexuosa*		
gut weed	*Enteromorpha intestinalis*		
algae	*Halimeda sp.*		
sea lettuce	*Ulva fasciata*		
sea lettuce	*Ulva lactuca*		
Phylum Dinophyta (dinoflagellates)			
dinoflagellates	*Exuvialla sp.*		
dinoflagellates	*Goniaulax sp.*		
Phylum Ochrophyta (golden-brown algae)			
diatoms	*Amphiprora sp.*		
diatoms	*Amphora sp.*		
bluegreen algae	*Anacystis sp.*		
diatoms	*Biddulphia sp.*		
diatoms	*Coscinodiscus sp.*		
diatoms	*Grammatophora marina*		
diatoms	*Gyrosigma sp.*		
bluegreen algae	*Lyngbya sp.*		
bluegreen algae	*Microcystis sp.*		
diatoms	*Navicula clavata*		
diatoms	*Navicula ssp.*		
diatoms	*Nitzschia closterium*		
bluegreen algae	*Oscillatoria sp.*		
algae	*Padina sp.*		
diatoms	*Pleurosigma sp.*		
sargassum	*Sargassum filipendula*		
sargassum	*Sargassum vulgare*		
diatoms	*Striatella unipunctata*		
diatoms	*Thalassiothrix sp.*		
Phylum Rhodophyta (red algae)			
algae	*Acanthophora spicifera*		
algae	*Agardhiella subulata*		
algae	*Centroceras clavulatum*		
algae	*Ceramium avalone*		
algae	*Dasya baillouviana*		
algae	*Dictyota sp.*		
algae	*Gracilaria armata*		
algae	*Gracilaria blodgeettii*		
algae	*Gracilaria cervicornis*		
algae	*Gracilaria damaecornis*		
algae	*Gracilaria mammilaris*		
algae	*Gracilaria verrucosa*		

Common Name	Species Name	State Status	Federal Status
Legend: T = Threatened / E = Endangered / SSC = Species of Special Concern			
algae	*Halymenia sp.*		
algae	*Heterosiphonia gibbesii*		
algae	*Hypnea cervicornis*		
algae	*Hypnea cornuta*		
algae	*Hypnea musciformis*		
hooked redweed	*Hypnea spinella*		
algae	*Hypnea valentiae*		
algae	*Laurencia sp.*		
algae	*Meristiella acanthocladum*		
algae	*Solieria tenera*		
algae	*Spyridia sp.*		

B.4.2 / Invasive Non-native Species List

Common Name	Species Name	State Status	Federal Status
Legend: T = Threatened / E = Endangered / SSC = Species of Special Concern			
Kingdom Plantae			
Phylum Magnoliophyta (flowering plants)			
Class Liliopsida (grass-like flowering plants)			
taro	*Colocasia esculenta*		
water hyacinth	*Eichhornia crassipes*		
torpedo grass	*Panicum repens*		
Class Magnoliopsida (woody flowering plants)			
alligator weed	*Alternanthera philoxeroides*		
Australian pine	*Cassurina equisitifolia*		
melaleuca	*Melaleuca quinquenervia*		
Brazilian pepper	*Schinus terebinthifolius*		
Kingdom Animalia			
Phylum Mollusca (snails, clams, squids)			
Class Bivalvia (clams)			
Asian green mussel	*Perna viridis*		

B.4.3 / Problem Species List

Common Name	Species Name	State Status	Federal Status
Legend: T = Threatened / E = Endangered / SSC = Species of Special Concern			
Kingdom Plantae			
Phylum Magnoliophyta (flowering plants)			
Class Liliopsida (grass-like flowering plants)			
southern cattail	*Typha domingensis*		
Kingdom Animailia			
Phylum Chordata (sea squirts, vertebrates)			
Class Mammalia (mammals)			
raccoon	*Procyon lotor*		

*B.5 / **Florida Natural Areas Inventory Descriptions***

Eighty-one Natural Communities are classified by the Florida Natural Areas Inventory (FNAI). A Natural Community is defined as a distinct and reoccurring assemblage of populations of plants, animals, fungi and microorganisms naturally associated with each other and their physical environment. The levels of this classification become increasingly more complex and finely subdivided. At all levels, however, there are overlaps between types because of overlapping species distributions and intergrading physical conditions.

At the broadest level, the Natural Communities are grouped into seven Natural Community Categories based on hydrology and vegetation. A second level of the hierarchy splits the Natural Community Categories into Natural Community Groups. The third level of the classification, Natural Community Types, is the level at which Natural Communities are named and described. Natural Communities are characterized and defined by a combination of physiognomy, vegetation structure and composition, topography, land form, substrate, soil moisture condition, climate, and fire. They are named for their most characteristic biological or physical feature.

Levels of Natural Communities

CATEGORIES – based on hydrology and vegetation

Groups – defined by landform, substrate, and vegitation

Types – characterized and defined by a combination of physiognomy, vegetation structure and composition, topography, land form, substrate, soil moisture condition, climate, and fire

Seven Natural Community Categories

Terrestrial Natural Communities - upland habitats dominated by plants which are not adapted to anaerobic soil conditions imposed by saturation or inundation for more than 10% of the growing season.

Palustrine Natural Communities - freshwater wetlands dominated by plants adapted to anaerobic substrate conditions imposed by substrate saturation or inundation during 10% or more of the growing season.

Lacustrine Natural Communities - nonflowing wetlands of natural depressions lacking persistent emergent vegetation except around the perimeter.

Riverine Natural Communities - natural, flowing waters from their source to the downstream limits of tidal influence, and bounded by channel banks.

Subterranean Natural Communities occur below ground surface.

Estuarine Natural Communities - subtidal, intertidal, and supratidal zones of coastal water bodies, usually partially enclosed by land but with a connection to the open sea, within which seawater is significantly diluted with freshwater inflow from the land.

Marine Natural Communities – occur in subtidal, intertidal, and supratidal zones of the sea, landward to the point at which seawater becomes significantly diluted with freshwater inflow from the land.

Descriptions of the Natural Community Types found in Terra Ceia Aquatic Preserve

MARINE AND ESTUARINE

Mineral Based - communities which occur in subtidal, intertidal and supratidal zones.

Consolidated Substrate – characterized as expansive, relatively open areas of subtidal, intertidal, and supratidal zones which lack dense populations of sessile plant and animal species. Are solidified rock or shell conglomerates and include coquina, limerock or relic reef materials.

Unconsolidated Substrate – 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 unsolidified 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.

Faunal Based

Mollusk Reef – 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 American oyster.

Octocoral Bed – characterized as large populations of sessile invertebrates of the Class Anthozoa, Subclass Octocorallia, Orders Gorgonacea and Pennatulacea. This community is confined to the subtidal zone since the sessile organisms are highly susceptible to desiccation.

Sponge Bed – characterized as dense populations of sessile invertebrates of the Phylum Porifera, Class Demospongiae. Although concentrations of living sponges can occur in marine and estuarine intertidal zones, sponge beds are confined primarily to subtidal zones.

Floral Based - communities which occur in intertidal and supratidal zones.

Algal Bed – characterized as large populations of nondrift macro or micro algae.

Seagrass Bed – 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.

Tidal Marsh – characterized as expanses of grasses, rushes and sedges along coastlines of low wave energy and river mouths. They are most abundant and most extensive in Florida north of the normal freeze line, being largely displaced by and interspersed among tidal swamps below this line.

Tidal Swamp – characterized as dense, low forests occurring along relatively flat, intertidal and supratidal shorelines of low wave energy along Southern Florida.

Composite Substrate

Composite Substrate – consist of a combination of Natural Communities such as "beds" of algae and seagrasses or areas with small patches of consolidated and unconsolidated bottom with or without sessile floral and faunal populations. Composite substrates may be dominated by any combination of marine and estuarine sessile flora or fauna, or mineral substrate type. Typical combinations of plants, animals and substrates representing composite substrates include soft and stony corals with sponges on a hard bottom such as a limerock outcrop; psammophytic algae and seagrasses scattered over a sand bottom; and patch reefs throughout a coralgal bottom.

FNAI Natural Communities Rankings

Below are the relative ranks of the Natural Communities. FNAI uses several criteria to determine the relative rarity and threat to each community type; these are translated or summarized into a global and a state rank, the G and S ranks, respectively. Most G ranks for Natural Communities are temporary pending comparison and coordination with other states using this methodology to classify and rank vegetation types (contact FNAI for the most recent Natural Community ranks). A few Natural Communities and several Plant Communities occur only or mostly in Florida and can be considered endemic to Florida (Muller, Hardin, Jackson, Gatewood & Caire, 1989). The only opportunity for protection of these communities is in Florida and they should be given special consideration in Florida's protection efforts.

MARINE AND ESTUARINE

Mineral Based
G3 S3 Consolidated Substrate
G5 S5 Unconsolidated Substrate

Faunal Based
G3 S3 Mollusk Reef
G2 S1 Octocoral Bed
G2 S2 Sponge Bed

Floral Based
G3 S2 Algal Bed
G2 S2 Seagrass Bed
G4 S4 Tidal Marsh
G3 S3 Tidal Swamp

Composite Substrate
G3 S3 Composite Substrate

Definition of Global (G) element ranks:

G1 - Critically imperiled globally because of extreme rarity (5 or fewer occurrences or very little remaining area, e.g., less than2,000 acres) or because of some factor(s) making it especially vulnerable to extinction;

G2 - Imperiled globally because of rarity (6-20 occurrences or very little remaining area, e.g., less than 10,000 acres) or because of some factor(s) making it very vulnerable to extinction throughout its range;

G3 - Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range or because of other factor(s) making it vulnerable to extinction throughout its range, 21-100 occurrences;

G4 - Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery;

G5 - secure globally, though it may be quite rare in parts of its range, especially at the periphery;

G? - uncertain Global rank.

Definition of State (S) element ranks:

S1 - Critically imperiled in state because of extreme rarity (five or fewer occurrences or very little remaining area) or because of some factor(s) making it especially vulnerable to extinction;

S2 - Imperiled in state because of rarity (6 - 20 occurrences or little remaining area) or because of some factor(s) making it very vulnerable to extinction throughout it range;

S3 - Rare or uncommon in state (21 - 100 occurrences);

S4 - Apparently secure in state, although it may be rare in some parts of its state range;

S5 - Demonstrably secure in state and essentially ineradicable under present conditions;

S? - uncertain State rank.

Appendix C

Public Involvement

*C.1 / **Advisory Committee***

The following Appendixes contain information about who serves on the Advisory Committee, when meetings were held, copies of the public advertisements for those meetings, and summary of each meeting (as required by Ch. 259.032(10), F.S.)

C.1.1 / Terra Ceia Aquatic Reserve Advisory Committee (AC) Members

Name	Affiliate	County
Bergeron, Donald	DEP-Department of Recreation and Parks	Manatee
Brown, Rob	Manatee County Environmental Management	Manatee
Burger, Bill	local land owner	Manatee
Eckenrod, Dick	Tampa Bay Estuary Program	Pinellas
Henningsen, Brandt	SWFWMD-SWIM	Hillsborough
Hodgson, Ann	National Audubon Coastal Islands Sanctuaries / Washburn Sanctuary	Hillsborough
Isiminger, George	Port Manatee	Manatee
McDonald, John	local land owner	Manatee
McIvor, Carole	USGS - Large Research Program	Pinellas
Nobbe, Rachel	local fishing guide	Manatee
Paul, Ann	National Audubon Coastal Islands Sanctuaries / Washburn Sanctuary	Hillsborough
Styron, Ed	Tampa Bay Sea Kayakers	Pinellas

C.1.2 / Florida Administrative Weekly Posting

Meeting: **Monday, October 30, 2006, 7:00 p.m.**

Florida Administrative Weekly Section VI, Volume 32, Number 41, October 13, 2006

The Department of Environmental Protection, Office of Coastal and Aquatic Managed Areas announces a public meeting to which all persons are invited.

Date and Time: Monday, October 30, 2006, 7:00 p.m.

Place: Terra Ceia VIA Hall, 1505 Center Road, Terra Ceia, FL 34250

General Subject Matter to be Considered: Terra Ceia Aquatic Preserve Advisory Committee Meeting - purpose is to brief members of the Advisory Committee on their role in assisting in the management plan development process. A copy of the agenda may be obtained by contacting: Aquatic Preserve Manager, Randy Runnels at (941)721-2068.

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 Aquatic Preserve Manager, Randy Runnels at (941)721-2068. 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).

Meeting: **Tuesday, November 28, 2006, 7:00 p.m.**

Florida Administrative Weekly Section VI, Volume 32, Number 46, November 17, 2006

The Department of Environmental Protection, Office of Coastal and Aquatic Managed Areas announces a public meeting to which all persons are invited.

Date and Time: Tuesday, November 28, 2006, 7:00 p.m.

Place: Terra Ceia VIA Hall, 1505 Center Road, Terra Ceia, FL 34250

General Subject Matter to be Considered: Terra Ceia Aquatic Preserve Advisory Committee Meeting – purpose is to discuss the revision of the Terra Ceia Aquatic Preserve Management Plan. A copy of the agenda may be obtained by contacting: Aquatic Preserve Manager, Randy Runnels at (941)721-2068.

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 Aquatic Preserve Manager, Dr. Randy Runnels at (941)721-2068. 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).

Meeting: **Monday, February 5, 2007, 7:00 p.m.**

Florida Administrative Weekly Section VI, Volume 32, Number 52, December 29, 2006

The Department of Environmental Protection, Office of Coastal and Aquatic Managed Areas announces a public meeting to which all persons are invited.

Date and Time: Monday, February 5, 2007, 7:00 p.m.

Place: Terra Ceia VIA Hall, 1505 Center Road, Terra Ceia, FL 34250

General Subject Matter to be Considered: Terra Ceia Aquatic Preserve Advisory Committee meeting. The purpose is for members of the Advisory Committee to review and discuss the draft Terra Ceia Aquatic Preserve management plan. A copy of the agenda may be obtained by contacting Aquatic Preserve Manager, Randy Runnels, (941)721-2068.

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 Aquatic Preserve Manager, Randy Runnels, (941)721-2068. 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).

Meeting: **Monday, March 12, 2007, 7:15 p.m.**

Florida Administrative Weekly Section VI, Volume 33, Number 7, February 16, 2007

The Department of Environmental Protection, Office of Coastal and Aquatic Managed Areas announces a public meeting to which all persons are invited.

Date and Time: Monday, March 12, 2007, 7:15 p.m.

Place: Terra Ceia VIA Hall, 1505 Center Road, Terra Ceia, FL 34250

General Subject Matter to be Considered: Terra Ceia Aquatic Preserve Advisory Committee meeting. The purpose is for members of the Advisory Committee to discuss the Terra Ceia Aquatic Preserve management plan. A copy of the agenda may be obtained by contacting Aquatic Preserve Manager, Randy Runnels, (941)721-2068.

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 Aquatic Preserve Manager, Randy Runnels, (941)721-2068. 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.1.3 / Meeting Summaries

Meeting: **Monday, October 30, 2006, 7:00 P.M.**

Terra Ceia VIA Hall, 1505 Center Road, Terra Ceia, FL 34250

Name	Affiliate	County	AC Member
Bareford, Karen	DEP-Central Office	Leon	
Bergeron, Donald	DEP-Department of Recreation and Parks	Manatee	X
Brown, Rob	Manatee County Environmental Management	Manatee	X
Burger, Bill	Local Land Owner/Archeologist	Manatee	X
Carnahan, Libby	DEP-Tampa Bay Aquatic Preserves	Manatee	
Eckenrod, Dick	Tampa Bay Estuary Program	Pinellas	X
Hemmel, Kurt	Aquaculture Business Owner	Manatee	
Henningsen, Brandt	SWFWMD-SWIM	Hillsborough	X
Krzystan, Andrea	DEP-Tampa Bay Aquatic Preserves	Manatee	
Lytton, Gary	DEP-RBNERR	Collier	
Mathis, Christine	DEP-Tampa Bay Aquatic Preserves	Manatee	
McDonald, John	Local Land Owner	Manatee	X
McIvor, Carol	USGS-Large Research Program	Pinellas	X
Nobbe, Rachel	Local Fishing Guide	Manatee	X
Runnels, Randy	DEP-Tampa Bay Aquatic Preserves	Manatee	
Samek, Kelly	DEP-Office of General Counsel	Leon	
Styron, Ed	Tampa Bay Sea Kayakers	Pinellas	X

This is a summary of Libby Carnahan's personal notes that she took at the advisory committee meeting.

Terra Ceia Management Plans

Advisory Committee Briefing Meeting

October 30, 2006

Attendees: *TBAP Staff:* Randy Runnels, Libby Carnahan, Andrea Krzystan, & Christine Mathis

Advisory Committee: Brandt Henningsen, Don Bergeron, Ed Styron, John McDonald, Bill Burger, Rob Brown, Rachel Nobbe, Carol McIvor & Dick Eckinrod

Others: Kurt Hemmel, Kelly Samek, Karen Bareford, & Gary Lytton

Randy Runnels, Tampa Bay Aquatic Preserves Manager

Planning Cycles

- Statewide (1 and 3 year)
- Local Program Strategic & Tactical Plans
- Site Specific Management Plants

CAMA's Resource Management is:

- Big Picture (not managing in a vacuum)
- Place Based
- Science Based
- Adaptive

Common Pitfalls

- Inaccurate characterization of the program (Not a park)
- The program is conservation based
- Unsustainable initiatives (must consider the long term)
- Committing resources asymmetrically

Karen Bareford, Program Planning Support Officer, CAMA

- More opportunities for public & advisory committees to be involved
- Handout – Dates for management plan deadlines
- Final Draft has to go through governor and cabinet

Comments:

1) Brandt Henningsen – Will Agency on Bay Management (ABM) get to give comments on Management Plan? Yes, Jan. 19, 2007, ABM will be able review document.
2) Randy will look into getting onto Tampa Bay ABM Agenda for the January meeting to advise them of the TCAP Management Plans.

Kelly Samek- Senior Assistant General Council, FDEP

Summary of legal constraints

- Statute 286 keeps government public & open to people.
- We have to give notice of these meetings in a reasonable amount of time
- Guidelines as to how we conduct these meetings
- We cannot discuss the business of this meeting between 2 or more advisory council members outside of this meeting (email, phone, conversation).
- Kelly is open for questions
- Board members can talk to TBAP staff, Karen Bareford and/or the public, but they can not talk with each other outside of these meetings.
- Any emails, written comments, etc are public record-- think before you write.
- Handout – "Overview of the Sunshine Law"

Gary Lytton, Environmental Administrator, Southwest Region, CAMA

- Anticipated outcome, well designed, well though out management plan that will be an effective document for 10-20 years from now.
- Question: Will your (advisory council members) time be well spent? Answer: We will try.
- Good Management Plans informs communities, governments & public about aquatic preserve programs, an informational tool we can share with leadership.

Comments:

ABM meeting next week, make announcement about our public scoping meeting.

Brandt: He likes what Dick Eckinrod wrote – a 100 year plan for Tampa Bay (Charting the Course, The Comprehensive Conservation and Management Plan for Tampa Bay). Normative forecasting. There are several plans that include all of Tampa Bay and address Terra Ceia specifically—make sure we look at them through the process.

Karen: Management plans are tools for the managers. It should be able to be pulled off the shelf to manage the site now and over the next several years.

Several people commented that the management plan should be done for a period longer than 5 years; they suggested a 20 year plan. They stated it is easier to write the plan for 20 years and revisit the plan every 5 years. Karen restated that a lot will change in the next 5 years, so we will stick with a 5 year plan and rewrite the plan then. Dick Eckinrod pointed out that if we are going to think in terms of sea level rise, that will require looking 50-100 years out.

Brandt: Will the aquatic preserve plan take upland Terra Ceia Preserve State Park management plan into account? Will that be linked?

Karen stopped discussion, stating we have gone outside our scope of this meeting, and are getting too far into discussion.

Libby: Could we have a meeting with the advisory board that is announced to the public so we could continue this discussion?

Advisory Committee Meeting set for November 28, 2006 at the Terra Ceia VIA Hall at 7:00 pm.

Kurt: Expressed concern that recreational aspects, commercial groups such as marinas, commercial fisherman & port authority are not represented on this committee.

Randy: There are no marina's located in Terra Ceia AP. Randy stated he left a message with the port authority, but has not heard anything. Rachael represents the fishing industry. The Public Advisory Committee is not meant to be an overall representation but a cross section.

Meeting Adjourned.

Meeting: **Tuesday, November 28, 2006, 7:00 P.M.**

Terra Ceia VIA Hall, 1505 Center Road, Terra Ceia, FL 34250

Name	Affiliate	County	AC Member
Bareford, Karen	DEP-Central Office	Leon	
Bergeron, Donald	DEP-Department of Recreation and Parks	Manatee	X
Brown, Rob	Manatee County Environmental Management	Manatee	X
Burger, Bill	Local Land Owner/Archeologist	Manatee	X
Carnahan, Libby	DEP-Tampa Bay Aquatic Preserves	Manatee	
Eckenrod, Dick	Tampa Bay Estuary Program	Pinellas	X
Foster, Mary	Florida Native Plant Society	Manatee	
Henningsen, Brandt	SWFWMD-SWIM	Hillsborough	X
Isiminger, George	Port Manatee	Manatee	X
Krzystan, Andrea	DEP-Tampa Bay Aquatic Preserves	Manatee	
Mathis, Christine	DEP-Tampa Bay Aquatic Preserves	Manatee	
McDonald, John	Local Land Owner	Manatee	X
Nobbe, Rachel	Local Fishing Guide	Manatee	X
Runnels, Randy	DEP-Tampa Bay Aquatic Preserves	Manatee	
Samek, Kelly	DEP-Office of General Counsel	Leon	

This is a summary of Libby Carnahan's personal notes that she took at the advisory committee meeting.

Terra Ceia Aquatic Preserve Management Plan

Advisory Committee Meeting

November 28, 2006 @ 7:00 pm

Attendees: *TBAP Staff:* Randy Runnels, Libby Carnahan, Andrea Krzystan, & Christine Mathis

Advisory Committee: Bill Burger, John McDonald, Brandt Henningsen, Dick Eckinrod, Don Bergeron, Rob Brown, George Isiminger and Rachel Nobbe

Others: Mary Foster, Karen Bareford & Kelly Samek

Libby Carnahan, Tampa Bay Aquatic Preserves Environmental Specialist, summarized public comments from November 13, 2006 Public Scoping Meeting. The group responded to those comments.

- Discussion of the desire for Resource Inventories in Aquatic Preserves
  - Randy – Resource inventories to a realistic end would be nice, but we can not drain our inventories
  - Rob Brown (Manatee County) – There is a benthic mapping program out there, which we could barrow from (TBEP or SWFWMD?)
  - George Isiminger – Aerial interpretation and groundtruthing has been cost effective and useful.
  - Randy – Skeptical of aerial interpretation
- Discussion of seagrass protection, etc.
  - Randy – we are seeing a change in Bishop Harbor (potential increase in seagrass abundance in Eastern end of Bishop Harbor) due to…
    - SWFWMD Restoration Project
    - Upcoming Channel Marking
    - Upcoming improved Boat Ramp
      - Don is working with the previous plan to try and accommodate existing use
      - Randy – We should not be trying to accommodate everybody on a holiday weekend
    - Discontinuation of Piney Point discharge into Bishop Harbor
  - Randy-signage requires continued maintenance
  - Open Discussion-
    - For exclusion zones – try and start as a volunteering thing with educational signs, etc. Then move onto regulatory measures if you have to
    - Intensive Patrolling is very expensive
    - It is hard when the biggest "rule breakers" are the folks with local knowledge
  - Randy – Restricting Horsepower on Frog Creek?
  - Dick Eckinrod – One of the directives of CCMP is increased law enforcement presence, put this in as a need in Management Plan
  - Bill Burger – Signs should be bilingual. Would like to see a tide gauge at Bishop Harbor.
- Dick Eckinrod – There will a change analysis documenting changes from 1990 to 2005. This will be helpful in telling us how Tampa Bay Estuary Program is doing in its efforts.
- Open discussion of Terra Ceia Preserve State Park Boundary Modification
- Very important for the Terra Ceia aquatic preserve that the watershed be protected
- We need to include other conservation land in the Management Plan
  - Emerson point
  - Washburn Sanctuary
- Additional Discussion
  - Brandt- wants Management Plan to Recognize/Identify sea level rise
  - Brandt-Wants to see seamless molding of Terra Ceia Aquatic Preserve management plan and Terra Ceia Preserve State Park
  - Brandt-timeline – Wants to see long term (100 year)plan
  - Karen – CAMA will rewrite every 5 years, action plan for 5-10 years, foresight for 10-20 years
  - Randy – We will get together in 5 years with management plan advisory committee to revisit the plan; but not rewrite it for more years.
  - Brandt – Would like to see as much of the management plan science based as possible
  - Dick – Lay out a plan for our relationship with Port Manatee in the management plan
  - Randy-Oil Spills – Maybe stage a boom at Bishop Harbor Boat Ramp. Whoever is responsible for the spill is responsible for the cleanup. The Coast Guard will only intervene if the cleanup is not going properly.
  - Rob (Manatee County) – How much do we want to get involved with development issues?
  - Randy – In theory he wants to be involved, in reality, no time.
  - Rob (Manatee County) - If we include this in the management plan, it can be a guideline for the county to use
    - Increased setbacks
    - Septic systems

- County can put it into COMP plan & development code

• Karen – If we are going to set a goal for septic systems, etc,

- We need to have a plan for how we measure success

• Will we educate the public, work with the county, etc.?

• Partnership with other agencies– Should be identified and should be emphasized in the management

Meeting adjourned.

Meeting: **Monday, February 5, 2007, 7:15 P.M.**

Terra Ceia VIA Hall, 1505 Center Road, Terra Ceia, FL 34250

Name	Affiliate	County	AC Member
Bergeron, Donald	DEP-Dept of Recs & Parks	Manatee	X
Brown, Rob	Manatee County Environmental Management	Manatee	X
Burger, Bill	Local Land Owner/Archeologist	Manatee	X
Carnahan, Libby	DEP-Tampa Bay Aquatic Preserves	Manatee	
Eckenrod, Dick	Tampa Bay Estuary Program	Pinellas	X
Henningsen, Brandt	SWFWMD-SWIM	Hillsborough	X
Krzystan, Andrea	DEP-Tampa Bay Aquatic Preserves	Manatee	
Mathis, Christine	DEP-Tampa Bay Aquatic Preserves	Manatee	
McDonald, John	Local Land Owner	Manatee	X
Runnels, Randy	DEP-Tampa Bay Aquatic Preserves	Manatee	
McIvor, Carol	USGS-Large Research Program	Pinellas	X
Lytton, Gary	DEP-RBNERR	Collier	
Styron, Ed	Tampa Bay Sea Kayakers	Pinellas	X

This is a summary of Libby Carnahan's personal notes that she took at the advisory committee meeting.

Terra Ceia Aquatic Preserve Management Plan

Advisory Committee Meeting

February 5, 2007 @ 7:00pm

Attendees: *TBAP Staff:* Randy Runnels, Libby Carnahan, Andrea Krzystan, & Christine Mathis

Advisory Committee: Brandt Henningsen, Don Bergeron, Ed Styron, John McDonald, Bill Burger, Rob Brown, Carol McIvor & Dick Eckinrod

Others: Gary Lytton

Gary Lytton, Environmental Administrator, Southwest Region, CAMA

In December, Tallahassee folks & field folks got together to make sure that a meaningful plan was created

• You have to prioritize issues and they must drive the plan

• In the plan, we need to recognize the capabilities of our partners

Plan Structure=

Issues

- Goals
  - Objectives
    - Strategies

Randy Runnels, Tampa Bay Aquatic Preserves Manager

Summary of "Issues" in draft Management Plan

1) Marine Debris

2) Indirect Degradation of Water Quality & Submerged Habitats

3) Direct Impacts to Natural Resources

- SAV damage
- Restore damaged areas
- Encourage avoidance & minimization of linear (pipelines – power lines) feature impacts
- Reduce disturbances to wildlife

4) Shoreline development

5) Unintentional & illegal fishing

6) Mooring Fields & Liveaboards (looming on horizon)

7) Invasive exotic species (marine)

8) Ecological Integrity of Restoration Projects

9) Aquaculture (should it be folded into other category?)

10) Historical & Cultural Resources/Sites

11) Integration with other conservation efforts

12) Disaster/Contingency Planning

Other Issues Advisory Committee members would like to see addressed

1) Signage & maintenance

- Bilingual signs

2) Resource Inventory

3) Boater/User Access

- How do we interact to get that balance

4) Global Climate change

Meeting Adjourned.

Meeting: **Monday, March 12, 200, 7:15 P.M.**
Terra Ceia VIA Hall, 1505 Center Road, Terra Ceia, FL 34250

Name	Affiliate	County	AC Member
Donald Bergeron	DEP-Department of Recreation and Parks	Manatee	Yes
Rob Brown	Manatee County Environmental Management	Manatee	Yes
Bill Burger	Local Land Owner / Archaeologist	Manatee	Yes
Holly Greening (for Dick Eckenrod)	Tampa Bay Estuary Program	Pinellas	Yes
Brandt Henningsen	SWFWMD-SWIM	Hillsborough	Yes
John McDonald	Local Land Owner	Manatee	Yes
Carol McIvor	USGS-Large Research Program	Pinellas	Yes
Karen Bareford	DEP-Central Office	Leon	No
Libby Carnahan	DEP-Tampa Bay Aquatic Preserves	Manatee	No
Andrea Krzystan	DEP-Tampa Bay Aquatic Preserves	Manatee	No
Christine Mathis	DEP-Tampa Bay Aquatic Preserves	Manatee	No
Eric Porterfield	DEP-Central Office	Leon	No
Randy Runnels	DEP-Tampa Bay Aquatic Preserves	Manatee	No

This is a summary of Libby Carnahan's personal notes that she took at the advisory committee meeting.

Terra Ceia Aquatic Preserve Management Plan

Advisory Committee Meeting

March 12, 2007 @ 7:15 pm

Attendees: *TBAP Staff:* Randy Runnels, Libby Carnahan, Andrea Krzystan, & Christine Mathis

Advisory Committee: Bill Burger, John McDonald, Brandt Henningsen, Holly Green (for Dick Eckinrod), Carol McIvor & Don Bergeron.

Others: Karen Bareford, Eric Porterfield

Karen Bareford, Planning Manager, CAMA

- Final copy of management plan to Tallahassee next Friday (March 23, 2007)
- The plan will be posted on the web March 30, 2007
- The advisory committee is encouraged to attend the Public Meeting scheduled for April 30, 2007 @ 6 PM @ The Manatee Convention Center

- Comments from the advisory committee are due to Randy by Friday, March 16, 2007

Comments from advisory committee about their review of draft Management Plan:

- Brandt Henningsen: No major issues, mostly punctuation and grammar
- John McDonald: Education & Outreach – Maybe have volunteers that provide information to the public that work on the water. Randy – Team Ocean maybe? We do not have a lot of people on the water in Terra Ceia. Maybe big holiday weekends. Maybe have neighborhood watch or partner with Dept. Rec & Parks.
- Bill Burger – Would be cautious about giving more information to people about archaeological sites. First Saturday in November – Outreach – Terra Ceia Mullet Smoke off. He would like to see the AP have a table there.
- Bill Burger: Historical section is primarily wrong. He rewrote 3 paragraphs for Randy to use. DHR offers a training for preserve managers for cultural resources. Bill suggested ordering bilingual signs for fishing regulations on Terra Ceia Road Bridge.
- Don Bergeron: Just grammatical changes.
- Carol McIvor: Just grammatical changes.
- Holly Green (For Dick Eckenrod): Dick would like to see some of the statutory authority, etc in the appendices (rather than up front in the document). Water quality (p.33) – Dick doesn't feel objections are clearly stated. Objective Two – Define objectives of the water quality program. Objective Three – Follow objectives.
- Bill Burger- what about the Bishop Harbor Piney Point outfall as a site for a water quality station?
- Randy Runnels-There is not enough depth of water at that location for a water quality station.
- John McDonald: Wastewater treatment – Manatee County. He thinks the City of Palmetto has outflow into Terra Ceia AP down Hagen Blvd. – they are under EPA directive to clean it up. Palmetto only has one discharge.
- Randy to Holly – Is there a place for the AP in this situation?
- Holly to Randy-It is grandfather in and EPA is handing it.
- Bill (p.30) – "Investigate stage info"…..- Bill did not understand wording.
- Brant Henningsen: Wants to see more mention of collaborating with DEP Parks on management of ecosystem.
- Randy – Will acquisition be an "issue" or discussed sooner?
- Karen – it can be mentioned throughout document
- Holly Greening: Do we discuss sea level rise? We need to emphasize resilience of anything we place/do on the shoreline. There is probably enough science to incorporate it (sea level rise) into our management plans.
- Bill – second's Holly statement. Don (DEP parks) will loose land to Randy.
- Brandt-- (p.41) references sea level change.
- Randy – Sea level change has a place in land acquisition discussion.
- Brandt-- He would like to see a change in font, indentation, etc., to distinguish between issues, goals & objectives.
- Holly--Do we talk about land based exotics?
- Randy – Yes we do in "Shorelines development" section.
- Karen – There is a native species, non-native species section that Randy has now, but has not seen it before.
- Randy – We only need to control exotics at shoreline.
- Carole – Who is the management plan written for?
- Karen – The management plan is written for the manager but also as a tool for the community.
- John feels like Randy has done a heck of a job and thinks everyone does a great job.

Meeting adjoured.

Meeting: **Monday, April 30, 2007 at 6:00 p.m.**

Manatee Convention Center, One Haben Blvd, Palmetto, FL 34221

An Advisory Committee Meeting was held in conjunction with the Formal Public Meeting

Name	Affiliate	County	AC Member
Donald Bergeron	DEP-Department of Recreation and Parks	Manatee	Yes
Bill Burger	Local Land Owner	Manatee	Yes
Holly Greening (for Dick Eckenrod)	Tampa Bay Estuary Program	Pinellas	Yes
Brandt Henningsen	South Florida Water Management District	Hillsborough	Yes
Keith Singleton	DEP - State Lands	Leon	No
Karen Bareford	DEP-Central Office	Leon	No

Name	Affiliate	County	AC Member
Libby Carnahan	DEP-Tampa Bay Aquatic Preserves	Manatee	No
Andrea Krzystan	DEP-Tampa Bay Aquatic Preserves	Manatee	No
Christine Mathis	DEP-Tampa Bay Aquatic Preserves	Manatee	No
Eric Porterfield	DEP-Central Office	Leon	No
Randy Runnels	DEP-Tampa Bay Aquatic Preserves	Manatee	No
Kelly Samek	DEP-Office of General Counsel	Leon	No
Carol McIvor	USGS	Pinellas	Yes
John McDonald	Local Land Owner	Manatee	Yes

This is a summary of Libby Carnahan's personal notes that she took at the advisory committee meeting.

Terra Ceia Aquatic Preserve Management Plan

Advisory Committee Meeting

April 30, 2007 @ 7:15 pm

Attendees: *TBAP Staff:* Randy Runnels, Libby Carnahan, Andrea Krzystan, & Christine Mathis

Advisory Committee: Bill Burger, John McDonald, Brandt Henningsen, Holly Green (for Dick Eckinrod), Carol McIvor & Don Bergeron.

Others: Karen Bareford, Eric Porterfield

Comments from advisory committee about their review of draft Management Plan:

- Brandt Henningsen: Would like to be sure that most of the issues from the first draft are present in same way in revised plan
- Karen Bareford: Issues cannot be "wish list". Strategies have to have measurable deliverables. Part of the changes from draft #1 and draft #2 are framing changes.
- Randy Runnels: Feels like some very key stuff is in chapter before issues.
- Brandt Henningsen: Can we send comments?
- Karen Bareford: Yes, send comments and if you feel that a "non-issue" can have identifiable and deliverable goals and can be moved up to an issue, please let Randy know.
- Randy Runnels: Feels like he has realized a lot more than he was able to put in the management plan. He is wondering how he will relay that to a future manager.

*C.2 / **Public Scoping Meeting***

The following Appendixes contain information about the Public Scoping Meeting(s) which was held in order to obtain input from the public as what they thought the issues in Terra Ceia Aquatic Preserve were. There are copies of the public advertisements for those meetings, a list of attendees, a summary of the meeting(s) (as required by Ch. 259.032(10), F.S.), and a copy of the written comments received.

C.2.1 / Florida Administrative Weekly Posting

Meeting: **Monday, November 13, 2006, 6:00 p.m.**

Florida Administrative Weekly Section VI, Volume 32, Number 41, October 13, 2006

The Department of Environmental Protection, Office of Coastal and Aquatic Managed Areas announces a public meeting to which all persons are invited.

Date and Time: Monday, November 13, 2006, 6:00 p.m.

Place: Manatee Civic Center, Terra Ceia Room, One Haben Blvd., Palmetto, FL 34221

General Subject Matter to be Considered: Terra Ceia Aquatic Preserve Management Plan Public Scoping Meeting – purpose is to inform the public on the management plan development process and to solicit input on issues they are interested in seeing addressed in the plan. A copy of the agenda may be obtained by contacting Aquatic Preserve Manager, Randy Runnels at (941)721-2068.

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 Aquatic Preserve Manager, Randy Runnels at (941)721-2068. 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).

2006 Statewide Flyer

Florida Department of Environmental Protection
Coastal and Aquatic Managed Areas

Public Meetings

The Florida Department of Environmental Protection's Office of Coastal and Aquatic Managed Areas (CAMA) is responsible for the management of Florida's 41 Aquatic Preserves, 3 National Estuarine Research Reserves (NERR), 1 National Marine Sanctuary, and the Coral Reef Conservation Program. These protected areas comprise more than 4 million acres of the most valuable submerged lands and select coastal uplands in Florida. With public input, CAMA successfully developed a Program Overview that provides the statewide perspective and is now updating site specific management plans. This year three site management plans will be under review. These sites will hold individual public scoping meetings designed to receive public input on site issues.

Meeting Locations

October 25, 2006 at 7:00 p.m.

St. Joseph Bay Aquatic Preserve

St. Joseph Bay Buffer Preserve Center
3915 Highway C-30
Port St. Joe, FL 32456

November 1, 2006 at 6:00 p.m.

Guana Tolomato Matanzas NERR, Guana River Marsh Aquatic Preserve, Pellicer Creek Aquatic Preserve

University of Florida
Whitney Laboratory for Marine Bioscience
Whitney Hall
9505 Ocean Shore Boulevard
St. Augustine, FL 32080

November 2, 2006 at 6:00 p.m.

Guana Tolomato Matanzas NERR, Guana River Marsh Aquatic Preserve, Pellicer Creek Aquatic Preserve

Guana Tolomato Matanzas National Estuarine Research Reserve Environmental Education Center
505 Guana River Road
Ponte Vedra Beach, FL 32082

November 13, 2006 at 6:00 p.m.

Terra Ceia Aquatic Preserve

Manatee Civic Center
Terra Ceia Room
1 Haben Boulevard
Palmetto, FL 34221

These scoping meetings will assist in crafting the content for individual site management plans. The information from each meeting will be recorded, compiled, and presented to CAMA by facilitators. The objectives of the public scoping meetings are to:

- Inform the public about the history, purpose, and scope of management plan development
- Solicit public input regarding issues and opportunities that should be addressed in the management plan

Written comments are welcome and can be submitted to:

Gigi Coulson
Tetra Tech EC, Inc.
759 South Federal Highway, Suite 100
Stuart, FL 34994
or by fax: 772.781.3411

For more information, please contact:
Ellen Stere 850.245.2094 ELLEN.STERE@DEP.STATE.FL.US or visit our website at www.aquaticpreserves.org

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this hearing is asked to advise the agency at least 48 hours before the hearing by contacting Ellen Stere at 850/245-2094. If you are hearing or speech impaired, please contact the Florida Relay Service by calling (800) 955-8771 (TDD).

Terra Ceia Aquatic Preserve Flyer

Florida Department of Environmental Protection
Coastal and Aquatic Managed Areas

Terra Ceia Aquatic Preserve

Public Meeting

The Florida Department of Environmental Protection's Office of Coastal and Aquatic Managed Areas (CAMA) is responsible for the management of Florida's 41 Aquatic Preserves, 3 National Estuarine Research Reserves (NERR), 1 National Marine Sanctuary, and the Coral Reef Conservation Program. These protected areas comprise more than 4 million acres of the most valuable submerged lands and select coastal uplands in Florida. With public input, CAMA successfully developed a Program Overview that provides the statewide perspective and is now updating site specific management plans. This year three site management plans will be under review. These sites will hold individual public scoping meetings designed to receive public input on site issues.

Meeting Location

November 13, 2006 at 6:00 p.m.

Terra Ceia Aquatic Preserve

Manatee Civic Center, Terra Ceia Room
1 Haben Boulevard
Palmetto, FL 34221

These scoping meetings will assist in crafting the content for individual site management plans. The information from each meeting will be recorded, compiled, and presented to CAMA by facilitators. The objectives of the public scoping meetings are to:

- Inform the public about the history, purpose, and scope of management plan development
- Solicit public input regarding issues and opportunities that should be addressed in the management plan

Written comments are welcome and can be submitted to:

Gigi Coulson
Tetra Tech EC, Inc.
759 South Federal Highway, Suite 100
Stuart, FL 34994
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Name	Affiliate	County	AC Member
Donald Bergeron	DEP-Department of Recreation and Parks	Manatee	Yes
Rob Brown	Manatee County Environmental Management	Manatee	Yes
Dick Eckenrod	Tampa Bay Estuary Program	Pinellas	Yes
John McDonald	Local Land Owner	Manatee	Yes
Carol McIvor	USGS-Large Research Program	Pinellas	Yes
Adam Brame		Pinellas	No
Scott Browning		Hillsborough	No
Kristen Collins		Manatee	No
Laura Geselbracht	The Nature Conservancy	Pinellas	No
Rob Harold		Manatee	No
John Jones		Manatee	No
Justin Krebs		Manatee	No
Heath Marston		Manatee	No
Ron Martino	Manatee County	Manatee	No
Jake Paris		Manatee	No
Stephen Raymond	DEP-Department of Recreation and Parks	Manatee	No
Douglas Shaw		Manatee	No
Joanna Williams	Coastal Conservation Association	Manatee	No
Roger Williams		Manatee	No
Karen Bareford	DEP-Central Office	Leon	No
Kelly Samek	DEP-Office of General Counsel	Leon	No
Libby Carnahan	DEP-Tampa Bay Aquatic Preserves	Manatee	No
Andrea Krzystan	DEP-Tampa Bay Aquatic Preserves	Manatee	No
Christine Mathis	DEP-Tampa Bay Aquatic Preserves	Manatee	No
Randy Runnels	DEP-Tampa Bay Aquatic Preserves	Manatee	No

Meeting Summary

Terra Ceia Aquatic Preserve / November 13, 2006
Public Scoping Meeting Issues Paper / Prepared by Tetra Tech

Introduction

Purpose of the Scoping Meeting

The purpose of public involvement is to meaningfully engage all interested individuals, groups, and agencies in the Office of Coastal and Aquatic Managed Areas (CAMA). Aquatic Preserve (AP) management plan development process. The following goals have been set for this round of meetings:

- To meaningfully and efficiently solicit public opinion to be used in developing management plans that are useful, implementable, and widely supported;
- To inform and involve stakeholders in the management plan development process; and
- To gain insight on community and management level issues of concern.

Benefits of an Independent Facilitator (Tetra Tech)

Meetings of large groups of people can be very hard to organize as well as to control when they are in progress. The independent facilitator's job is to lead the group process without bias and help them improve the way they communicate, examine and solve problems, and make decisions. Facilitators, like Tetra Tech (TtEC) can help groups stay on task; and therefore be more creative, efficient, and productive than they would be without facilitation help.

There are a number of additional common benefits to using a facilitator to run public meetings. First, members of the public are often more motivated to support the subsequent decisions made because of their investment in the process. Second, using Tetra Tech makes it more possible for managers and leaders to draw more on their staffs as resources, which contributes to overall organizational success. Participants are encouraged to think and act for the overall benefit of the group, resulting in higherquality decisions. Finally, negative attitudes, low morale, low involvement, and withholding of information are less likely because everyone is involved in a joint process.

CAMA's Planning Program

The Florida Department of Environmental Protection's Office of CAMA is responsible for the management of Florida's 41 Aquatic Preserves, 3 National Estuarine Research Reserves (NERR), 1 National Marine Sanctuary, and the Coral Reef Conservation Program. The state-owned protected areas comprise more than 4 million acres of the most valuable submerged lands and select coastal uplands in Florida. With public input, CAMA successfully developed a Program Overview that provides a statewide perspective of the program and is now updating site specific management plans for the Aquatic Preserves and NERRs. In 2006, three site management plans will be under review. These sites will hold individual public scoping meetings designed to receive public input on site issues.

These scoping meetings will assist in crafting the content for individual site management plans. The information from each meeting will be recorded, compiled, and

presented to CAMA by facilitators. The objectives of the public scoping meetings are to:

- Inform the public about the history, purpose, and scope of site specific Aquatic Preserve Management Plan development; and
- Solicit public input regarding issues and opportunities that should be addressed in the site specific Management Plan.

Advisory Committees

One key step that is taken during management plan development is organization of an advisory committee (s. 253.034[5]) comprised of key stakeholders of the Preserve. The advisory committees will be chosen by the Preserve Managers and will work closely with them to review notices for public meetings, collect and review data on community issues and concerns, and review the plan as it develops into a final draft management plan.

After the initial round of CAMA's Program Overview public workshops in 2005, the preserves that were scheduled to be first to revise their site specific Aquatic Preserve Management Plans began to organize their advisory committees. These committees will be engaged in the beginning steps of the review and development of the draft aquatic Preserve Management Plan. Following the work conducted by the Preserve Managers and their advisory committees, the Preserve will advertise and conduct formal public meetings to introduce the draft plan and to engage a broader group of stakeholders in the development of the draft and final aquatic Preserve Management Plan.

Values, Issues and Opportunities – Workshop Participants

General Summary of the Meeting

The general public and Preserve users and stakeholders were invited to the Terra Ceia public scoping meeting located at the Manatee Civic Center, in Palmetto, Florida. The meeting took place on November 13, 2006, at seven o'clock in the evening. According to the sign-in sheet, 24 people attended the approximately two hour meeting. Following the PowerPoint presentation on the site specific Aquatic Preserve Management Plan planning process, the meeting was opened up to public for their comments. The public input portion of the meeting was recorded and is available for review.

The values, issues, and opportunities for improvement in aquatic preserve management as expressed by public meeting

participants are described under the categories listed below. The categories are five operational Management Program Areas under which preserve management will be

organized. The management goals, objectives, and strategies identified in the site management plans will be arranged according to these Management Programs. A brief explanation of the Management Program Area is provided preceding the comments.

Resource Management

This Management Program Area oversees all Natural and Cultural Resource Management projects within the state to ensure scientific robustness and consistency in techniques. The Program Area includes listed species, critical habitat management, nuisance species, habitat management, fire management, cultural resources, traditional uses of natural resources, incident response, etc. all pertaining to resource management and protection.

One member of the meeting suggested that the Terra Ceia State Park Buffer Preserve Plan should be completed and incorporated into the Aquatic Preserve plan. They felt the Aquatic Preserve Management Plan should include an objective of acquiring additional lands such as Rattlesnake Key to make it part of the Terra Ceia Preserve.

Once the additional areas outlined in the Buffer Preserve Plan are acquired, CAMA will succeed in preserving 16-miles of coastline from the Little Manatee River to the Manatee River in its natural state. This attendee commented that managing the coastline and keeping it undeveloped should be a high priority for the Terra Ciea Aquatic Preserve.

Another attendee, who works for the United State Geographical Survey (USGS), has observed ghost fishing in the northern preserve and would like the Preserve Management Team to devise a plan to remove these crab traps. The same commenter mentioned the areas surrounding the boat ramp in Bishop Harbor it are quite shallow and that the Managers should consider ramp improvements to mitigate for negative use impacts such as prop dredging and seagrass scarring.

A member of the Tampa Bay Estuary Program (Program) spoke about their estuary management plan, entitled Charting the Course, which has been included in this Issues Notebook. The Program have recently updated their comprehensive management plan for Tampa Bay and would like to offer the information contained therein as

examples of goals, objectives, and strategies for the Terra Ceia Management Plan. Their estuary management plan emphasizes providing restoration of seagrass and other estuarine habitats, and establishing goals such as reducing pollution from boaters, increasing onwater enforcement, establishing and protecting enforcement zones, preserving the diversity and abundance of Bay wildlife, and promoting public involvement in Bay management.

One commenter asked if the plan would give direction on understanding, quantifying and developing strategies to address threats to the Preserve. The public also commented on the threat of water pollution from tributaries, and suggested that CAMA manage and/or mitigate for water quality from outside of the Preserve boundaries.

Ecosystem Science

This Management Program Area oversees all Resource Assessment, Research and Monitoring projects within the state to ensure scientific robustness and consistency in techniques. The Program Area includes mapping, modeling, monitoring, research and support within preserves.

The public commented more than once on addressing water quality in the Preserve and the importance of including research and monitoring for water quality impacts into

Preserve Management Plan.

One member of the audience informed on a study that USGS has been conducting a four-year study within Tampa Bay and will publish their findings soon. The results will include information on Terra Ceia tidal creeks and estuarine ponds. This information will be beneficial in the creation of the Preserve Management Plan.

The public felt that the Terra Ceia Aquatic Preserve, as well as other Florida Aquatic Preserves, should be treated as jewels that are important to the state. They agreed that new plans are needed and that CAMA is doing a great job addressing that need. The public understands that each preserve and reserve represents a unique resource and commented that the Plan should explain how each Aquatic Preserve is unique, special, and important to Florida. They also want to be sure that the plans characterize the resource's, their locations and condition, and provide trend data that is quantitative and qualitative. Once this information is included in the Plan it will be easier to identify threats and develop strategies to address the threats.

Monitoring was another topic commented on at this meeting. The public stressed the importance of monitoring the strategies in the plan to assess their effectiveness and adjusting as necessary.

Education and Outreach

This Management Program Area develops and conducts programs in education, outreach, community engagement, marketing, and volunteers within the preserves, as well as facilitates opportunities for participation in management plan development and implementation.

More than one member of the public commented on the importance of the Preserve promoting public involvement. They would like to see better use of the website as a public information tool by including links to studies or reports on preserve work projects, information on key issues, and updates on Management Plan activities.

Public Use

This Management Program Area would cover the responsibilities for delivery of recreational and tourism opportunities including: user research, public access, boating rules and impacts, consumptive use, non-consumptive use, aquaculture leases, interpretive displays, eco-tourism, volunteer management, enforcement, and private concessions.

One commenter asked that the preserve take steps to reduce pollution for recreational boaters and provide more on-water enforcement. Another comment suggested that a master public use plan should be incorporated to ensure that recreational use doesn't interfere with the more important goal of preserving habitat and wildlife diversity.

Additional public comments were sent in via e-mail and facsimile. These comments were placed into a summary sheet and included in the Issues Notebook.

Values, issues and opportunities – Preserve Managers and Staff

An interview with Preserve staff was conducted on October 26, 2006, beginning at eleven o'clock in the morning and lasting approximately an hour and a half. The values, issues, and opportunities for improvement in aquatic preserve management as expressed by Preserve Managers and staff are described under the categories listed below.

Ecosystem Science

The staff suggests that monitoring data management for water quality should be summarized and put into report form on a monthly or quarterly basis.

The waters within Bishop Harbor are very shallow and there have been significant damages to the resources in the area from boating activities. Channel marking was suggested as a solution to boating impacts in the area. In addition, staff feels that they need to quantify the seagrass scars in the area by conducting a baseline survey and then perform subsequent yearly mapping efforts to see if the channel marking had worked or if another proactive approach should be used to decrease these impacts.

Another project was suggested for the Preserve related to the hardbottom areas within the Terra Ceia Aquatic Preserve. These special resources should be mapped, perhaps in partnership with ESRI or Trimble to assure accuracy, good methodology, and frequent updates. Another idea submitted was for a collaboration effort was for

sediment quality surveys for heavy metals and other toxins. This information and data could be used to support the claims that Terra Ceia is a pristine waterbody and should be maintained in that state. The data could also be used as justification for additional land acquisitions.

Resource Management

The staff discussed how channel marking in Bishop Harbor needs to be a priority for protection of the hardbottom and shallow seagrass areas from prop scarring.

They also spoke about the fact that FDEP enforcement officers are stretched thin, and so the CAMA staff is approached by the public on a regular basis to respond to illegal activity enforcement and permit violation issues. The staff expressed the desire to be able to focus on practicing science based resource management and not be held accountable for enforcement or regulating duties. A possible solution to this issue would be for Preserve staff to give out information on the local regulatory FDEP and Water Management District offices so that the local stakeholders and users could report dredge and fill violations to the appropriate agencies. This information could be posted on the Terra Ceia website. There is some confusion by the public as to what violations the Florida Marine Patrol, the FFWCC, and the FDEP/WMD have jurisdiction over, and perhaps that detailed information could also be posted on the Aquatic Preserve website.

Managers also want the boundaries of Terra Ceia, as stated in Chapter 258, F.S, to be revised so that they are specific and understandable to the public and the staff. This would also be especially helpful in protecting the area from development. In this new Plan, a map and a description of where the boundaries lie would be very helpful for management.

Education and Outreach

It is important that permitted County, local, and Audubon Society Island waterway signage be uniform, created to state standards, and maintained (also a public safety and access issue).

Staff has agreed that they will communicate goals, projects, and management milestones to the public via a monthly or quarterly newsletter.

Public Use

Staff members feel that Bishop Harbor does not need more access points, or improved access points that would allow for larger vessels. In fact, they believe that current boat access areas should be hardened to lessen the impact to the submerged land. Seagrass scarring is a big issue for these managers, and one suggestion to lessen this impact is channel marking so the public can tell which areas are too shallow for boating.

Other

Dock permits have been given to several homeowners in direct violation of the Aquatic Preserve rules and guidelines. The staff would like to work with the regulators to develop a better relationship with them, and perhaps give some training on how to use Chapter 18-20, F.A.C. when reviewing permit applications for those lands adjacent to the Aquatic Preserve.

Staff members want to improve interagency communication so they know when another agency or university is conducting research in the Preserve. This communication will foster collaboration, interest in partnering and data sharing, and will allow staff to assist the visiting researchers in their endeavors.

The Preserve is working towards being part of the Global Coastal Oceanic Observation System, where they will collaborate with coastal management agencies around the world through the use of data stations. These data stations will provide Terra Ceia with informative data, and assist in establishing worldwide trend data for coastal areas. The collaboration will also provide Terra Ceia the opportunity to refine their data collection standards and methods, which will in turn provide education for the other Aquatic Preserves around the state.

Conclusion and Findings

Public comments centered around protecting the pristine nature of the Terra Ceia Aquatic Preserve and that managing it so that the resources persist for future generations. Public involvement was stated to be a necessary and appreciated facet of management plan development. The resource issues that were commented on ranged from water quality, illegal crab traps, and enforcement to interagency cooperation and seagrass restoration.

Aquatic Preserve staff also wants to keep Terra Ceia pristine despite development pressures. Their comments were similar to public comments on the subjects of interagency cooperation and addressing impact threats to the Preserve. This staff of four also spoke about the daunting task of managing 400,000 preserve acres. While more staff may not be the answer due to funding restraints, they would like to see that the goals, objectives, and strategies outlined in the plan must take into account the limited staff resources.

There were several common comment themes from both the public and the Preserve staff such as: keep the public involved; preserve undeveloped coastline by acquiring more parcels for the Aquatic Preserve; maintain use levels; keep uses to low impact activities, and establish trend data by conducting baseline surveys and subsequent monitoring.

Solutions that address these issues start with acquiring Florida Forever parcels when they become available, working with regulators to keep development low-impact, using the Aquatic Preserve rule appropriately when permitting. The Florida Department of Environmental Protection (FDEP) regulators may need training to educate them on stormwater, septic system, dock, and marina impacts to aquatic preserves.

Name: John McDonald

Date: 11/13/06

Address: 4118 Pompano Lane, Palmetto, FL

Email Address:

Telephone: (941) 722-9695

1. What do you think are the biggest issues of the Terra Ceia Aquatic Preserve?
Completion of purchase of proposed Terra Ceia Buffer Preserve properties should be highest priority in the Terra Ceia Aquatic Preserve Management Plan

2. How could we best address these issues?
Make combined SWFWMD/DEP via ARC committee acquisitions a high priority. Rattlesnake Key and islands south of Skyway Bridge and properties on Snead Island

3. What opportunities should be considered in the new management plans for this aquatic preserve?
Need to keep these adjacent islands pristine and undeveloped

4. Do you have comments that deal with the way the natural or cultural resources are being managed? (RM)
Excellent

5. Do you have comments that deal with the way the resources are being researched, assessed and monitored? (ES)
I have with the ARC acquisition list and why funding has not been more available to purchase additional Terra Ceia Buffer Preserve properties.

10. Other comments
Collaboration with the county needs to be done regarding land use and density near or on the aquatic preserve. More density means more pollution into the water, thus damaging the ecosystem.

Name: Roger Williams

Date: 11/13/06

Address: 219 4th Ave East, Bladenton, FL 34208 (Manatee)

Email Address: Rogerinke@aol.com

4. Do you have comments that deal with the way the natural or cultural resources are being managed? (RM)
If established, “no motor zone” should be “no combustion engines” i.e. electric trolling motors be allowed. Not everyone is able to pole and use from polling platforms.

Name: Greg Blanchard

Date: November 17, 2006

Address: Manatee County, EMD, PO Box 1000, Bradenton, FL 34206-1000

Email Address: greg.blanchard@co.manatee.fl.us

Telephone: 941 742 5980 ext 1702

1. What do you think are the biggest issues of the Terra Ceia Aquatic Preserve?
Surrounding land uses and how they are developed or managed.

2. How could we best address these issues?
Make sure TCB AP management plan compatible with management plans of adjacent managed areas.

3. What opportunities should be considered in the new management plans for this aquatic preserve?
Continue to support conservation land acquisitions in TCB watershed.

4. Do you have comments that deal with the way the natural or cultural resources are being managed? (RM)
n/a

5. Do you have comments that deal with the way the resources are being researched, assessed and monitored? (ES)
An annual environmental status and trends report should be produced.

6. Do you have comments that deal with the way the community is educated and engaged? (EO)
Public communication would be facilitated if there were a TCBAP office or facility located adjacent to the preserve.

7. Do you have comments that deal with the recreation, tourism, and public use or access? (PU)
Accurate assessments of TCBAP visitor numbers are very important to establish the value of the TCBAP to the public. They should be collected monthly at a minimum.

8. Do you have comments that deal with legal, regulatory, or authority issues? (LR)
Try to create a planning district or overlay in the TCBAP watershed to influence local planning practices.

Name: Laura Geselbracht, The Nature Conservancy

Date: November 20, 2006

Address: 2455 E. Sunrise Blvd., #1101, Ft. Lauderdale, FL 33304

Email Address: lgeselbracht@tnc.org

Telephone: 954-564-6144

1. What do you think are the biggest issues of the Terra Ceia Aquatic Preserve?

I think that some of the biggest issues for the above aquatic preserve are having:

* A detailed inventory (preferably geospatial) of the resources present and quantititave information on their current status (size, condition and connectivity to the larger system). This detailed inventory is essential if the aquatic preserve staff is to be capable of assessing whether the status of the resources at the site have changed over time. The inventory will also give CAMA managers and other interested parties the ability to assess the importance and uniqueness of the site regionally, at the state and at the national level.

* An assessment of threats to site resources (both originating at the site and coming from surrounding areas) that identifies, prioritizes, and quantifies these threats, as well as provides an indication of threat trends;

* An inventory of actions that will be taken to abate the highest rated threats and an action plan/timeline to implement these actions; and

* A monitoring program in place to determine how successful the threat abatement actions have been regarding resource protection/restoration. Without a monitoring program it will be impossible to determine if actions should be adjusted to improve threat abatement success.

Without the above information it would be very difficult to ensure the continued health of natural resources at the site and to justify certain management activities that may be required to enable site resources to persist in a healthy state.

Public use activities occurring at the site should be managed to ensure the long-term health and integrity of site resources.

2. How could we best address these issues?

The sites appear to require more funding to accomplish the basics noted above. Also, an annual update made available to the public should be completed each year that highlights the progress made to reduce current threats to an acceptable level and to abate current anticipated threats to site resources. This annual update should also include a astatus report on the site resources, new research done to better assess site resource distribution and condition, and an overview of public outreach activities/programs.

3. What opportunities should be considered in the new management plans for this aquatic preserve?

The hardbottom community in particular should be quantitatively and qualitatively assessed. Coral communities occurring at these higher latitudes in Florida are becoming increasingly important in light of the current condition of coral reef communities in the Florida Keys. See also my comments under question #1 above.

4. Do you have comments that deal with the way the natural or cultural resources are being managed? (RM)

See my answer to question #1 above.

5. Do you have comments that deal with the way the resources are being researched, assessed and monitored? (ES)

See my answer to question #1 above.

6. Do you have comments that deal with the way the community is educated and engaged? (EO)

Yes, I noticed that the portion of CAMA's website that deals with the aquatic preserves have little current information on activities going on at the sites and links to reports produced on site resources, management activities, and public outreach. Such readily available information would greatly increase community education and engagement opportunities.

7. Do you have comments that deal with the recreation, tourism, and public use or access? (PU)

See my comments to question #6 above.

8. Do you have comments that deal with legal, regulatory, or authority issues? (LR)

Yes, site managers and other appropriate officials must have the authority to manage the sites as provided in site management plans, state laws and regulations. If for any reason, there are deficiencies in the ability to protect site resources as identified in site management plans, adjustments should be made to ensure adequate protection of these resources for the use and enjoyment of current and future generations.

9. Do you have comments that deal with funding or purchasing (Capital Investments)?

Yes, CAMA must have the resources (staff and programmatic) available to adequately manage AP resources. Without adequate funding, we will likely observe a steady erosion of resource integrity.

10. Other comments

No additional comments.

Thank you for the opportunity to comment.

Name: W. Heath Marston

Manatee County Citizen / Coastal Conservation Association President – Manatee County Chapter.

8784 E. State Road 70 Ste. 101, Bradenton, FL 34202

941-758-1200 / heath@heathmarston.com

Thanks for hosting the Terra Ciea meeting at the Manatee Civic Center. Here are my recommendation for management plans.

1. The biggest issue for the preserve is abuse of the resource and pollution
2. My recommendation for management of the preserve are as follows:

Keep current recreational fishing regulations, laws, and rules.

Keep current no wake and manatee zones, do not add more.

Do additional research studies and monitoring of red tide and take any preventive measures.

Take necessary measure to control run off and pollution

Protect sea grass beds

Support additional measures to control and police illegal netting

Thank you for your efforts.

*C.3 / **Formal Public Meetings***

The following appendices contain information about the Formal Public Meeting which was held in order to obtain input from the public about the Terra Ceia Aquatic Preserve Draft Management Plan. There are copies of the public advertisements for this meeting, a list of attendees, a summary of the meeting, and a copy of the written comments received.

C.3.1 / Florida Administrative Weekly Posting

Meeting: **Monday, April 30, 2007, 6:00 p.m.**

Florida Administrative Weekly Section VI, Volume 33, Number 11, March 16, 2007

The Department of Environmental Protection/Office of Coastal and Aquatic Managed Areas announces a public meeting to which all persons are invited.

Date and Time: Monday, April 30, 2007, 6:00 p.m.

Place: Manatee Convention Center, Terra Ceia Room, One Haben Blvd., Palmetto, FL 34221

General Subject Matter to be Considered: The purpose of this public meeting is to receive public comment on the draft Terra Ceia Aquatic Preserve Management Plan. A copy of the draft plan will be available for viewing starting March 30, 2007, at www.aquaticpreserves.org. A copy of the agenda may be obtained by contacting Aquatic Preserve Manager, Randy Runnels, (941)721-2068.

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 Aquatic Preserve Manager, Randy Runnels, (941)721-2068. 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).

Meeting: **Monday, April 30, 2007, 6:00 p.m.**

Florida Administrative Weekly Section VI, Volume 33, Number 14, April 6, 2007

The Department of Environmental Protection/Office of Coastal and Aquatic Managed Areas, acting as staff to the Board of Trustees of the Internal Improvement Trust Fund announces a public meeting to which all persons are invited.

Date and Time: Monday, April 30, 2007, 6:00 p.m.

Place: Manatee Convention Center, Terra Ceia Room, One Haben Blvd., Palmetto, FL 34221

General Subject Matter to be Considered: The Terra Ceia Aquatic Preserve Advisory Committee meeting will be held in conjunction with the public meeting advertised in the March 16, 2007, F.A.W. To receive public input regarding the draft Terra Ceia Aquatic Preserve Management Plan.

A copy of the draft plan will be available for viewing starting March 30, 2007 at www.aquaticpreserves.org.

A copy of the agenda may be obtained by contacting Aquatic Preserve Manager, Randy Runnels, (941)721-2068.

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 Aquatic Preserve Manager, Randy Runnels, (941)721-2068. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

Florida Department of Environmental Protection • Office of Coastal & Aquatic Managed Areas

Terra Ceia Aquatic Preserve

Public Meeting

Monday, April 30, 2007, 6:00 pm

Terra Ceia Aquatic Preserve
Manatee Convention Center
Terra Ceia Room
One Haben Boulevard
Palmetto, FL 34221

The Florida Department of Environmental Protection's Office of Coastal and Aquatic Managed Areas (CAMA) is responsible for the management of Florida's 41 Aquatic Preserves, 3 National Estuarine Research Reserves (NERR), 1National Marine Sanctuary, and the Coral Reef Conservation Program. These protected areas comprise more than 4 million acres of the most valuable submerged lands and select coastal uplands in Florida. CAMA is updating the site specific management plans, and currently has three plans under review. These sites will be holding formal public meetings to receive input on the new draft plans.

These meetings will assist in editing the content for the individual site management plans. The information from each meeting will be compiled, and presented to CAMA by facilitators. The objective of the public meetings is to solicit public input regarding the draft management plans.

For more information, please contact Christine Mathis (941) 721-2068, ext. 202 / christine.mathis@dep.state.fl.us or visit our website at www.aquaticpreserves.org.

Written comments are welcome and can be submitted via by fax: 1 (850) 245-2110 Attn: Terra Ceia; or email TerraCeia@dep.state.fl.us.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the a agency at least 5 days before the workshop/meeting by contacting Christine Mathis (941) 721-2068, ext. 202. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, (800) 955-8771 (TDD) or (800) 955-8770 (Voice).

This publication funded in part through a grant agreement from the Florida Department of Environmental Protection, Florida Coastal Management Program by a grant provided by the Office of Ocean and Coastal Resource Management under the Coastal Zone Management Act of 1972, as amended, National Oceanic and Atmospheric Administration (NOAA) Award No. NA06NOS4190129-CZ709. The views, statements, finding, conclusions, and recommendations expressed herein are those of the author(s) and do not necessarily reflect the views of the State of Florida, NOAA, or any of its subagencies. April 2007.

Meeting: **Monday, April 30, 2007 at 6:00 p.m.**
Manatee Convention Center, Terra Ceia Room, One Haben Blvd., Palmetto, FL 34221

Name	Affiliate	AC Member
Donald Bergeron	DEP-Department of Recreation and Parks	Yes
Bill Burger	Local Land Owner	Yes
Dick Eckenrod	Tampa Bay Estuary Program	Yes
Brandt Henningsen	South Florida Water Management District	Yes
Frank Alfonso		No
Yvonne Alfonso		No
Eddie Anderson		No
Laura Geselbracht	The Nature Conservancy	No
Dawn Griffin	Florida Fish & Wildlife Conservation Commission	No
Carol Grynewicz	Pinellas County	No
Curt Hemmel	Bay Shellfish Co.	No
Ray E. Markham		No
Scott Moody	Local Homeowner	No
Jim Nanney		No
Bill O'Shea	Manatee County	No
Russell Owens		No
Keith Singleton	DEP - State Lands	No
Doug Strott		No
Guy Thibaut		No
Jamie Thibaut		No
Karen Bareford	DEP-Central Office	No
Libby Carnahan	DEP-Tampa Bay Aquatic Preserves	No
Andrea Krzystan	DEP-Tampa Bay Aquatic Preserves	No
Christine Mathis	DEP-Tampa Bay Aquatic Preserves	No
Eric Porterfield	DEP-Central Office	No
Randy Runnels	DEP-Tampa Bay Aquatic Preserves	No
Kelly Samek	DEP-Office of General Counsel	No

Coastal and Aquatic Managed Areas

Terra Ceia Aquatic Preserve Draft Management Plan

Summary of public comments

April 30th 2007

15 May 2007

Introduction

On April 30th, 2007 the Terra Ceia Aquatic Preserve conducted a public meeting to meet the following objectives:

1. Review purpose of and process for reviewing the site management plan
2. Present the Draft Terra Ceia Aquatic Preserve Management Plan, with a focus on the identified issues, goals, objectives and strategies.
3. Receive feedback from stakeholders on the draft management plans

This was the second public meeting related to the review of the site's management plan. The first meeting was held in November 2006 and worked with participants to identify issues that should be included in the management plan.

The April 30th meeting followed the following agenda:

- Official Welcome and introduction to the meeting.
- Overview Presentation: A short presentation was given by the site manger to provide an overview of the planning process, the identified issues and proposed strategies.

- Public Comment and Stakeholder Feedback: An opportunity for the public to provide written and verbal feedback directly to the site staff by visiting "kiosks."
- Kiosk Reports: Staff provided a verbal summary of the comments they received at their kiosk.
- Public Comment: Participants who wanted to make a verbal public statement were asked to sign a posted "speakers list". At the end of the meeting an opportunity was provided for those participants that signed the "speakers list" to make a public statement to the full assembly. Only written comments were included in this summary.

The workshop was designed to encourage deep dialogue between the public and the Terra Ceia Aquatic Preserve staff on specific issues as well as providing a forum for general comments and observations.

Coastal and Aquatic Managed Areas Background

The Florida Department of Environmental Protection's Office of Coastal and Aquatic Managed Areas (CAMA) is responsible for the management of Florida's 41 Aquatic Preserves, 3 National Estuarine Research Reserves (NERR), 1 National Marine Sanctuary, and the Coral Reef Conservation Program. These protected areas comprise more than 4 million acres of the most valuable submerged lands and select coastal uplands in Florida. CAMA is currently in the process of revising its site management plans, including the plan for the Terra Ceia Aquatic Preserve. These plans will provide a critical management framework for the sites, setting priorities and guiding implementation for the next ten years.

This document

This document includes both written comments received at the workshops and by email/postal mail during the comment period. It also includes a summary of the reports made by the staff at the end of the kiosk period. This summary is not meant to be a detailed description of the proceedings, but a record of the major themes and comments received. Only written comments are included in this summary.

Summary of the reports made by the staff from the Kiosks

Below is an overall summary of the comments received by Terra Ceia Aquatic Preserve during the public meeting process:

- Overall, there was a positive response to the current draft of the site plan. Several participants commented on the improvement between the current draft and the first draft. There was additional conversation about what should be included in the issue section of the plan versus the background and context section.
- Participants expressed concern about upland development and how it will affect the Aquatic Preserve especially as it relates to water quality and runoff.
- Participants generally agreed with the priority management issues and the proposed management strategies as presented in the current draft.

Written comments received on comment cards at meeting

Trash cans- frog creek road. *Comment provided by Anonymous*

Manatee sign- broke free. *Comment provided by Anonymous*

Tampa Bay Watch- Crab Trap Removal. *Comment provided by Anonymous*

Ocean Conservancy- database in debris in region- Tampa Bay. *Comment provided by Anonymous*

Biggest Issue? *Comment provided by Anonymous*

Have invasive, non- native aquatic species impacts been considered? Randy mentioned near a shipping area? What is the current status of the invasions? *Comment provided by Laura Geselbraeht- Nature Conservancy*

We are concerned with how the plan will address the negative impact of development within the preserve on water quality. It is recommended that this be addressed specifically with regard to "runoff", etc. from developing lands adjacent to waterways. *Comment provided by Frank & Yvonne Alfonso*

Not clear in the plan what water quality data is being collected in TCAP. Summarize for all agencies, organizations etc., and collecting data in the AP. What contaminants info. Is being collected? What is status of benthic communities? Are there plans to collaborate so that data will be able to indicate when change has taken place? *Comment provided by Laura Geselbracht- Nature Conservancy*

Marine debris- undoubtedly an important issue, but one of the key issues? What about contaminants, sea level rise, development. *Comment provided by Laura Geselbracht- Nature Conservancy*

Written comments submitted during comment period.

These are written comments received within the comment period, which ended on May 7th.

May 6, 2007

Dr. Randy Runnels
Aquatic Preserve Manager
Terra Ceia Aquatic Preserve

130 Terra Ceia Road
Terra Ceia, FL 34250

Re: Comments on Terra Ceia Aquatic Preserve Management Plan, 2nd Draft

Dear Dr. Runnels:

Thank you for the continued opportunity to participate in development of the Terra Ceia Aquatic Preserve management plan. I found the public meeting on April 30th very informative. The meeting was well-organized and incorporated just the right amount of information. In general, the second draft of the management plan is a substantial improvement over the first draft as the management programs and issues are described in greater detail. I offer a few additional comments below that I believe will further improve the management plan and its implementation into the future. Please do not hesitate to contact me if you have any questions.

Sincerely,

Laura Geselbracht

Marine Conservation Planner

Florida Chapter Science Department

Attachment: Comments on Terra Ceia Aquatic Preserve Management Plan, 2nd Draft

Comments on the Terra Ceia Management Plan, 2nd Draft (from Laura Geselbracht)

Executive Summary – This one page summary is very helpful and has a nice layout that is easy to read and follow. The list of natural communities doesn't fully correspond with those described in the body of the text. It may also be helpful to list the issues for which actions are developed in the plan.

Page 12, bottom of page – A number of features in the preserve are noted such as bays, harbors and keys. Inclusion of a detailed map of the preserve and surrounding area that identifies these features would serve to orient readers as these features are described throughout the document.

Page 15, top of page – It would be helpful to include information such as the size of the TCAP watershed and data/information on the historic, current and anticipated future land uses within the watershed. For example, how much of the watershed was/is devoted to agriculture and what type of agriculture? Also, it is noted that the TCAP was designated as Outstanding Florida Waters in 1986. Since designation as an OFW, has there been any degradation of the water quality and what evidence is available to support this? Shellfish Harvesting classifications are noted. Have there been any changes in Shellfish Harvesting Classifications since designation as an OFW?

Page 15, Natural Communities Table – There is information available regarding the number of acres of some of the natural communities that is based on interpreted satellite imagery. While this information has a margin of error associated with it, it is still very useful. If this information has not been listed due to concerns with its accuracy at the TCAP, these concerns should be noted. Where acreage for natural communities has not been directly measured, it may be helpful to include an estimate of range of likely acreage based on existing knowledge of the site, e.g., between 1,000 and 5,000 acres.

Page 21 – Just prior to the section on listed species, it would be helpful to have a section on native species typically found at the site and describe any known aggregations. Cover each of the major taxonomic categories and reference existing literature and studies.

Page 28, bottom of page – USGS Tampa Bay website is noted. It would be helpful to list the weblink in the text.

Page 29 – The need for resource inventories is noted in the section on this page. Completion of some key resource inventories where gaps in knowledge persist should become an action item for this management plan. Perhaps focus on filling information gaps first for those natural communities where changes in community size and/or condition have been noted, suspected or anticipated.

Page 30, paragraph 2 – It is noted that there has been a trend toward a decrease in nutrient and phosphate process water pollution into Terra Ceia Bay. While closing of the Piney Point facility undoubtedly decreased the phosphate process water pollution, what has decreased the pollution from sewage and septic tank discharges? Also, were sediments at TCAP contaminated by the past phosphate operations?

Page 31, 2nd paragraph – Fixed water quality monitoring stations are discussed on this page. It would be helpful to include a description of how monitoring site locations were selected.

Page 31, 3rd paragraph – What are the results of the benthos sampling that has taken place in TCAP and surrounding areas?

Page 33, Invasive Exotic Species – Provide the citation for the University of Florida study described.

Page 38, Public Use section – Current harvest levels should be discussed in the context of whether they are appropriate in terms of long-term health of the TCAP ecosystem. It is noted here that scallop populations have declined. Was overharvesting the reason or were there other factors? Why haven't these populations recovered? Has a scallop restoration program been considered as an action item for the TCAP? If not feasible, note the reasons why. What is an appropriate harvest level for all species groups in the TCAP? Has this level been reached or exceeded? As human population in the area grows, this issue will become increasingly important. Addressing it in this plan is essential for long-term protection of the natural communities of the TCAP. Partner with Fish and Wildlife Research Institute.

Chapter 4, general – Somewhere in this chapter, a section on anticipated changes to natural communities and native species resulting from climate change and sea level rise needs to be included.

Page 41, Issues Introduction – Add a discussion of how the issues were selected and prioritized.

Page 43, Issue Two, Water Quality – Agriculture as a potential issue is noted on page 13. What are the past and present impacts of agriculture on the water quality and sediments in the TCAP? Also, the phosphate plant and shipments of phosphate are mentioned on page 11. What are the past and current impacts of these operations? Are the natural communities of TCAP in the recovery mode? Are any reports or data available? If so, reference these in this section.

Page 44 – Add goal, objectives and strategies that address preventing the degradation of turbidity that could result from increasing development in the watershed.

Appendix D

Goals, Objectives, and Strategies Table

*D.1 / **Current Goals, Objectives and Strategies Table***

The following table is a summary of the issues, goals, objectives and strategies identified in Chapter 5. The "Management Program" column identifies which Management Program each strategy falls within. The "Implementation Date" column identifies the fiscal year when the strategy was, or will be, initiated. The "Project Initiation" column indicates if this is an activity that is already underway, currently under initial development, or will occur in the future. The "Length of Initiative" column indicates how long it is expected to complete the strategy, and the "Estimated Yearly Cost" column identifies the anticipated expenses associated with the strategy.

Goals, Objectives & Integrated Strategies	Management Program	Implementation Date (Planned)	Project Initiation	Length of Initiative	Estimated Yearly Cost
Legend: C = Currently Underway / D = Under Initial Development / F = Future Implementation					
Issue 1: Marine Debris					
Goal 1.1: Develop a better understanding of debris at the TCAP.					
Objective 1.1.1: Study the environmental hazards of debris in the preserve.					
Strategy: Recruit a student researcher.	Ecosystem Science	2010-2011	F	1	$200
Strategy: Categorize debris from shoreline cleanup activities in the preserve with regard to material, amount, nature, etc.	Ecosystem Science	2010-2011	F	1	$500
Strategy: Use published information to assess the environmental hazards for the categories of debris found.	Ecosystem Science	2010-2011	F	1	$100
Strategy: Partner with the adjacent preserve state park in defining informational needs and in organizing cleanup activities.	Ecosystem Science	2010-2011	C	ongoing	$200
Objective 1.1.2: Investigate the sources of debris in the preserve.					
Strategy: Recruit a student researcher (may be the same student as in the previous objective).	Ecosystem Science	2011-2012	F	1	$200
Strategy: Categorize debris from shoreline cleanup efforts in terms of likely source.	Ecosystem Science	2011-2012	F	1	$100
Strategy: Identify sources of debris in the Tampa Bay watershed.	Ecosystem Science	2011-2012	F	1	$200
Strategy: Partner with the adjacent preserve state park in defining informational needs and in organizing debris collection activities.	Ecosystem Science	2011-2012	C	ongoing	$100
Goal 1.2: Reduce the amount of debris in the preserve.					
Objective 1.2.1: Control debris at the sources.					
Strategy: Guarantee that access points to the preserve (boat launches, fishing piers, etc.) have monofilament line depositories.	Resource Management	2010-2011	C	1	$200
Strategy: Encourage local parks, marinas and other facilities to equip trash receptacles with lids.	Resource Management	2010-2011	C	1	$200
Strategy: Ensure that, whenever possible, public access points to the preserve include signage on the threats and prevention of debris.	Education & Outreach	2011-2012	C	1	$500
Objective 1.2.2: Remove debris that has made it into the preserve.					
Strategy: Recruit volunteers to help with cleanup events.	Resource Management	2009-2010	C	ongoing	$1,000
Strategy: Work with park staff and volunteers to achieve initial cleanups of all accessible shorelines and to establish a maintenance schedule.	Resource Management	2009-2010	C	ongoing	$1,000
Objective 1.2.3: Coordinate derelict vessel removal as needed.					
Strategy: Post contact information for reporting derelict vessels at preserve access points.	Education & Outreach	2012-2013	F	1	$500

Goals, Objectives & Integrated Strategies	Management Program	Implementation Date (Planned)	Project Initiation	Length of Initiative	Estimated Yearly Cost
Legend: C = Currently Underway / D = Under Initial Development / F = Future Implementation					
Strategy: Once inspected for leaks and other hazards, vessels either will be boomed and stabilized or towed to the nearest access point for removal.	Resource Management	2009-2010	C	ongoing	$1,000
Issue 2: Water Quality					
Goal 2.1: Improve understanding of water quality status and trends in the preserve.					
Objective 2.1.1: Determine the status and trends in preserve water quality.					
Strategy: Appropriate agencies will be contacted, and, where possible, their water quality data will be obtained to be archived in digital form.	Ecosystem Science	2013-2014	C	ongoing	$500
Goal 2.2: Further develop long-term, continual, synoptic water quality monitoring at key locations.					
Objective 2.2.1: Improve, integrate and maintain Frog Creek datasonde station.					
Strategy: Datasonde station hardware will be upgraded as needed and new equipment becomes available.	Resource Management	2010-2011	C	ongoing	$2,000
Strategy: Protocols for operation and maintenance of the datasonde station will be updated to standards acceptable to the National Oceanic and Atmospheric Administration Centralized Data Management Office Manual or Department of Environmental Protection standards, whichever are more appropriate.	Resource Management	2009-2010	C	ongoing	$0
Strategy: Investigate the possible utility of stage information to paddling trail users if linked to internet-based information.	Education & Outreach	2011-2012	F	1	$100
Objective 2.2.2: Establish a permanent datasonde station at the mouth of Bishop Harbor.					
Strategy: A datasonde-based permanent water quality station will be located at the site of previous temporary stations on a piling at the mouth of Bishop Harbor.	Ecosystem Science	2009-2010	C	1	$8,000
Strategy: This station will be equipped with wireless data telemetry.	Resource Management	2009-2010	C	1	$1,500
Strategy: Protocols for operation and maintenance of the datasonde station will be updated to standards acceptable to the National Oceanic and Atmospheric Administration Centralized Data Management Office Manual or Department of Environmental Protection standards, whichever are more appropriate.	Resource Management	2009-2010	C	ongoing	$0
Strategy: If appropriate and useful, make this data available to fishermen on the Internet.	Education & Outreach	2010-2011	F	ongoing	$100
Objective 2.2.3: Establish a permanent datasonde station at mouth of the Terra Ceia River.					
Strategy: A datasonde-based permanent water quality station will be installed with a platform near the mouth of the Terra Ceia River.	Ecosystem Science	2013-2014	F	1	$12,000
Strategy: Protocols for operation and maintenance of the datasonde station will be updated to standards acceptable to the National Oceanic and Atmospheric Administration Centralized Data Management Office Manual or Department of Environmental Protection standards, whichever are more appropriate.	Resource Management	2013-2014	F	ongoing	$0
Strategy: If appropriate and useful, make this data available to fishermen and paddlers on the Internet.	Education & Outreach	2013-2014	F	ongoing	$100

Goals, Objectives & Integrated Strategies	Management Program	Implementation Date (Planned)	Project Initiation	Length of Initiative	Estimated Yearly Cost
Legend: C = Currently Underway / D = Under Initial Development / F = Future Implementation					
Objective 2.2.4: Integrate monitoring stations with the Gulf Coast Ocean Observing System program.					
Strategy: Integrate the experimental design of TCAP monitoring efforts to be compatible with other monitoring programs in the area.	Ecosystem Science	2010-2011	F	ongoing	$200
Strategy: Encourage the public to take an interest in the water quality of their preserve, and enhance public involvement through web access of the data.	Education & Outreach	2010-2011	C	ongoing	$500
Objective 2.2.5: Develop a buoy-based water quality station with turbidity sensor for temporary deployment.					
Strategy: Develop an adequate mooring system for anticipated site conditions.	Resource Management	2014-2015	F	1	$15,000
Strategy: Add wireless telemetry for prompt notification of changes in water quality.	Resource Management	2014-2015	F	1	$1,500
Objective 2.2.6: Investigate, and if feasible, employ benthic data as a tool in preserve management decisions.					
Strategy: Investigate the availability, suitability and adequacy of existing data and their usefulness in assessing benthic habitat health.	Ecosystem Science	2012-2013	F	1	$200
Strategy: Collaborate with Hillsborough County Environmental Protection Commission to evaluate the applicability of their benthic habitat quality index in monitoring preserve conditions.	Ecosystem Science	2012-2013	F	1	$400
Strategy: Acquire additional data sets from agencies and universities and evaluate its suitability for determining habitat change and health.	Ecosystem Science	2012-2013	F	1	$200
Goal 2.3: Reduce the amount of untreated human and animal waste that goes into the preserve.					
Objective 2.3.1: Encourage effective wastewater treatment systems in the preserve watershed.					
Strategy: Seek out information on state-of-the-art wastewater treatment approaches for homes without available sewer connections.	Ecosystem Science	2011-2012	F	1	$500
Strategy: Seek information (preferably GIS-based maps) on the abundance and distribution of septic systems in the TCAP watershed.	Ecosystem Science	2011-2012	F	1	$200
Strategy: Encourage local health agencies to consider new state-of-the-art wastewater treatment ideas.	Education & Outreach	2011-2012	F	ongoing	$500
Objective 2.3.2: Encourage proper pet sanitation on waterfront areas.					
Strategy: Add literature addressing pet sanitation in coastal areas to TCAP literature database.	Ecosystem Science	2014-2015	F	1	$1,000
Strategy: TCAP staff will encourage management entities to monitor pet cleanup stations.	Resource Management	2014-2015	F	ongoing	$100
Strategy: Include informational signs on the hazards of pet waste at access points.	Education & Outreach	2014-2015	F	1	$500
Goal 2.4: Reduce sediment influx into the preserve.					
Objective 2.4.1: Strengthen regulatory partnerships that deal effectively with sediment sources.					
Strategy: Baseline turbidity ranges will be established through mining existing data and through long-term monitoring.	Ecosystem Science	2012-2013	F	1	$300
Strategy: Enforcement entities will be made aware of the availability of nearly real-time turbidity data through datasonde telemetry.	Education & Outreach	2012-2013	C	ongoing	$500

Goals, Objectives & Integrated Strategies	Management Program	Implementation Date (Planned)	Project Initiation	Length of Initiative	Estimated Yearly Cost
Legend: C = Currently Underway / D = Under Initial Development / F = Future Implementation					
Strategy: Training on best management practices for contractors and regulators will be encouraged.	Education & Outreach	2012-2013	F	ongoing	$500
Strategy: TCAP will seek opportunities to educate local residents on the threats of sediments to the preserve.	Education & Outreach	2009-2010	F	ongoing	$500
Strategy: Boat launches, trails and other access points will be designed, built and operated to minimize erosion.	Resource Management	2009-2010	C	ongoing	$300
Issue 3: Direct Impacts to Preserve Habitats					
Goal 3.1: Assess the distribution and biotic composition of shallow submerged areas of the preserve.					
Objective 3.1.1: Organize existing resource survey information into a readily-available database.					
Strategy: When possible, habitat and distribution data will be georeferenced.	Ecosystem Science	2010-2011	C	ongoing	$500
Strategy: TCAP will mine existing databases to include seagrass scarring (Fish and Wildlife Research Institute) and hardbottom topography (Eckerd College).	Ecosystem Science	2010-2011	C	ongoing	$500
Objective 3.1.2: Conduct resource inventories, as feasible and as needed, to assess the distribution and condition of submerged habitats.					
Strategy: Use towed video, sonar and direct observation to identify and map submerged habitats and damage to them.	Ecosystem Science	2009-2010	F	ongoing	$1,500
Strategy: Map features into a GIS database using differential GPS.	Ecosystem Science	2009-2010	C	ongoing	$1,000
Strategy: If program resources allow, map shallow areas to at least the 6ft (2m) contour.	Ecosystem Science	2009-2010	C	ongoing	$1,000
Goal 3.2: Prevent further damage to submerged habitats.					
Objective 3.2.1: Identify areas likely to sustain damage from prop scarring, groundings, etc.					
Strategy: TCAP will gather information on habitat degradation from sources that include, but are not limited to the seagrass scarring database, compliance/enforcement case information, aerial photography and field observations of TCAP staff and others.	Ecosystem Science	2010-2011	C	ongoing	$500
Strategy: Once damaged areas are identified, restoration potential will be evaluated according to ecosystem functionality, potential for self-recovery, logistics/cost of restoration and availability of funds and other resources for restoration.	Ecosystem Science	2009-2010	C	ongoing	$500
Objective 3.2.2: Take preventive steps to avoid and/or minimize future damage to submerged habitat areas of concern.					
Strategy: Where appropriate, TCAP and or partners will mark sensitive resources and maintain markers.	Resource Management	2009-2010	F	ongoing	$500
Goal 3.3: Restore existing damage to submerged habitats.					
Objective 3.3.1: Where possible, provide technical, logistical, and other assistance to facilitate restoration projects by external partners.					
Strategy: Define the type and scope of restoration that best matches the habitat(s) and degradation.	Ecosystem Science	2010-2011	C	ongoing	$100
Strategy: Ensure that restoration areas are identified by signage, and contact information is provided on site.	Education & Outreach	2009-2010	C	ongoing	$200
Strategy: Encourage long-term monitoring.	Ecosystem Science	2009-2010	C	ongoing	$0

Goals, Objectives & Integrated Strategies	Management Program	Implementation Date (Planned)	Project Initiation	Length of Initiative	Estimated Yearly Cost
Legend: C = Currently Underway / D = Under Initial Development / F = Future Implementation					
Objective 3.3.2: Where necessary, restore degraded habitats with TCAP program resources.					
Strategy: Define the type and scope of restoration that best matches the habitat(s) and degradation.	Ecosystem Science	2010-2011	C	ongoing	$200
Strategy: Ensure that restoration areas are identified by signage, and contact information is provided on site.	Education & Outreach	2009-2010	C	ongoing	$500
Goal 3.4: Reduce disturbances to wildlife.					
Objective 3.4.1: Create buffer zones for nesting areas.					
Strategy: Analyze existing published and unpublished data on appropriate buffer zones for protecting nesting islands from boat traffic disturbances.	Ecosystem Science	2009-2010	C	1	$200
Strategy: Seek the authority to post the Washburn, Little Washburn and other nesting islands with buoys to create adequate buffer zones.	Resource Management	2009-2010	C	2	$500
Strategy: Provide information on nesting islands and their protection at preserve access points.	Education & Outreach	2010-2011	F	1	$300
Issue 4: Shoreline Alteration					
Goal 4.1: Prevent illegal shoreline impacts.					
Objective 4.1.1: Produce baseline information on the present state of shorelines.					
Strategy: Conduct annual video surveys of shorelines with a history and/or likelihood of unauthorized alteration.	Resource Management	2010-2011	F	ongoing	$1,500
Strategy: Provide educational literature, workshops and other means of informing the public on the importance of natural shorelines and the prevention of shoreline alteration.	Education & Outreach	2009-2010	C	ongoing	$500
Objective 4.1.2: Provide input for regulatory processes.					
Strategy: Continue regular monthly meetings with regulatory staff.	Education & Outreach	2009-2010	C	ongoing	$1,000
Objective 4.1.3: Promote shoreline stewardship among property owners.					
Strategy: Provide existing information, such as mangrove trimming guideline booklets, to residents through local events and on request.	Education & Outreach	2009-2010	C	ongoing	$500
Strategy: Include a shoreline protection message in presentations routinely conducted for local organizations.	Education & Outreach	2009-2010	C	ongoing	$500
Goal 4.2: Restore degraded shorelines.					
Objective 4.2.1: Restore dredge and fill areas.					
Strategy: Develop a literature database to demonstrate the ecological importance of preserving and restoring shallow habitats.	Ecosystem Science	2010-2011	C	ongoing	$500
Strategy: Coordinate and/or encourage funding and activities to restore dredge and fill sites.	Resource Management	2009-2010	C	ongoing	$300
Objective 4.2.2: Restore native shoreline vegetation.					
Strategy: Encourage and assist in the removal of shoreline exotics and revegetation with appropriate native species on public land.	Resource Management	2009-2010	C	ongoing	$500
Strategy: Encourage homeowners to remove exotic species and to replace them with native shoreline species.	Education & Outreach	2009-2010	C	ongoing	$200

Goals, Objectives & Integrated Strategies	Management Program	Implementation Date (Planned)	Project Initiation	Length of Initiative	Estimated Yearly Cost
Legend: C = Currently Underway / D = Under Initial Development / F = Future Implementation					
Issue 5: Unintentional and Illegal Fishing					
Goal 5.1: Reduce ghost fishing by derelict traps and nets.					
Objective 5.1.1: Set a protocol and planning framework for derelict trap removal.					
Strategy: Define legal constraints/permissions related to derelict trap removal.	Resource Management	2009-2010	C	1	$100
Strategy: Maintain a GIS-based database of suspected ghost trap locations.	Ecosystem Science	2010-2011	F	ongoing	$500
Objective 5.1.2: Remove derelict traps on a regular basis.					
Strategy: Educate local citizens, law enforcement officers and fishermen on the importance of recognizing and reporting derelict fishing gear.	Education & Outreach	2010-2011	F	ongoing	$200
Strategy: Schedule regular trap removal efforts with a frequency determined by the GIS database.	Resource Management	2010-2011	F	ongoing	$1,000
Goal 5.2: Reduce gill netting and other illegal fishing.					
Objective 5.2.1: Facilitate effective law enforcement of gill net regulations.					
Strategy: Provide information at preserve access points that encourages recognition and reporting of illegal fishing activities.	Education & Outreach	2010-2011	F	1	$1,000
Strategy: Continue to assist law enforcement entities with access and site information.	Education & Outreach	2009-2010	C	ongoing	variable
Objective 5.2.2: Educate preserve visitors on fishing regulations.					
Strategy: Provide current fishing regulation information at preserve access points.	Education & Outreach	2009-2010	C	ongoing	$500
Strategy: Provide fishing regulation materials at local events.	Education & Outreach	2009-2010	C	ongoing	$1,000
Goal 5.3: Assess and address bycatch of diamondback terrapins by crab traps.					
Objective 5.3.1: Determine whether crab trap bycatch of diamondback terrapins is a problem at Terra Ceia.					
Strategy: Seek information from scientific studies of terrapin mortality in crab traps in other areas to determine the likelihood that special traps or other measures are warranted within the TCAP.	Ecosystem Science	2012-2013	F	1	$500
Strategy: Seek anecdotal information specific to Terra Ceia.	Ecosystem Science	2010-2011	F	ongoing	$200
Objective 5.3.2: If warranted, take steps to minimize unintentional bycatch of diamondback terrapins					
Strategy: Establish a convenient means of reporting terrapin bycatch within the TCAP.	Ecosystem Science	2012-2013	F	1	$500
Strategy: If warranted, encourage terrapin-safe crab traps within the preserve.	Education & Outreach	2012-2013	F	ongoing	$200
Issue 6: Mooring Fields and Liveaboards					
Goal 6.1: Monitor unauthorized mooring fields.					
Objective 6.1.1: Identify illegal mooring activities.					
Strategy: Educate TCAP staff and local residents to recognize and report illegal long-term mooring within the preserve.	Education & Outreach	2014	F	ongoing	$100
Strategy: Work with the Florida Fish and Wildlife Conservation Commission on enforcement actions for illegal mooring.	Resource Management	2014	C	ongoing	$200
Goal 6.2: Minimize impacts of liveaboard vessels.					
Objective 6.2.1: Ensure that proper sanitation support is available to liveaboards.					
Strategy: Identify existing pumpout facilities at marinas in and near the preserve.	Ecosystem Science	2011-2012	F	1	$200

Goals, Objectives & Integrated Strategies	Management Program	Implementation Date (Planned)	Project Initiation	Length of Initiative	Estimated Yearly Cost
Legend: C = Currently Underway / D = Under Initial Development / F = Future Implementation					
Strategy: Encourage installation of pumpouts where they are lacking.	Education & Outreach	2011-2012	F	1	$300
Strategy: Publicize facilities with pumpouts through appropriate media.	Education & Outreach	2011-2012	F	ongoing	$200
Issue 7: Public Access Points					
Goal 7.1: Upgrade boat access to Bishop Harbor.					
Objective 7.1.1: Facilitate the upgrade of the Bishop Harbor Road boat launch.					
Strategy: Limits will be placed on draft and number of vessels using the facility.	Resource Management	2009-2010	F	ongoing	$0
Strategy: Encourage Division of Recreation and Parks to utilize parking surfaces that are permeable with effective stormwater treatment.	Education & Outreach	2009-2010	F	1	$300
Goal 7.2: Restore paddling access to Bishop Harbor.					
Objective 7.2.1: Replace the paddling launch removed during habitat restoration.					
Strategy: TCAP will encourage the use of permeable surfaces and other environmentally friendly features.	Education & Outreach	2010-2011	C	1	$200
Strategy: If possible, canoe/kayak traffic should be separated from boat launch traffic.	Public Use	2010-2011	F	1	$0
Goal 7.3: Add paddling access to lower Terra Ceia River.					
Objective 7.3.1: Develop a paddling launch at the Haley site.					
Strategy: A paddling launch will be added to the Haley property near the mouth of the Terra Ceia River.	Public Use	2012-2013	F	1	$3,000
Strategy: The manmade berm will be breached to allow flushing of the pond on the property and to permit coming and going of paddling traffic.	Resource Management	2012-2013	F	1	$1,500
Strategy: TCAP will encourage the use of permeable surfaces and other environmentally friendly features.	Resource Management	2012-2013	F	1	$200
Goal 7.4: Add paddling access to upper Frog Creek.					
Objective 7.4.1: Add a pullout, and possibly a launch, at the borrow pit site at the intersection of I-275 and U.S. 41.					
Strategy: This facility will be developed with a restoration plan for the site.	Public Use	2015-2016	F	1	$500
Strategy: A temporary pullout site will be developed with a launch site to be developed later.	Public Use	2016-2017	F	1	$2,000
Strategy: Parking and/or roads, if added, will be permeable.	Resource Management	2016-2017	F	1	$50,000
Objective 7.4.2: Establish a paddling trail along the Terra Ceia River/Frog Creek system.					
Strategy: Markers will comply with state and international waterway marker standards.	Education & Outreach	2009-2010	F	1	$900
Strategy: A minimum of markers needed for clear guidance will be used.	Public Use	2009-2010	F	1	$2,000
Strategy: The trail markers will be installed and maintained by TCAP.	Public Use	2009-2010	F	1	$1,500
Strategy: For public safety, a horsepower restriction will be considered along the trail.	Public Use	2010-2011	F	ongoing	$0
Issue 8: Invasive Exotic Species					
Goal 8.1: Assess possible and existing impacts.					
Objective 8.1.1: Monitor representative areas for the occurrence of invasive exotics.					
Strategy: Gather existing information on likely invasives, recruitment of these species and known methods of control.	Ecosystem Science	2009-2010	C	ongoing	$200

Goals, Objectives & Integrated Strategies	Management Program	Implementation Date (Planned)	Project Initiation	Length of Initiative	Estimated Yearly Cost
Legend: C = Currently Underway / D = Under Initial Development / F = Future Implementation					
Strategy: Train staff to recognize anticipated and existing invasive exotic species.	Education & Outreach	2009-2010	C	ongoing	$500
Strategy: Provide information at access points for boaters and others to use in recognizing and reporting invasive exotics.	Education & Outreach	2011-2012	F	1	$700
Goal 8.2: Minimize habitat for exotics.					
Objective 8.2.1: Prevent and/or minimize habitat disturbances and alterations that facilitate exotic recruitment.					
Strategy: Investigate the role that manmade structures play in facilitating the establishment of exotics.	Ecosystem Science	2012-2013	F	1	$1,000
Strategy: Through feedback to regulatory entities, ensure that the likelihood of facilitating exotic recruitment is a consideration in evaluating proposed impacts.	Education & Outreach	2009-2010	F	ongoing	$100
Strategy: Educate the public on how to minimize the facilitation of exotic recruitment by artificial substrates, bottom disturbances and other activities.	Education & Outreach	2010-2011	F	ongoing	$200
Strategy: Where possible, remove old artificial substrates that are not in use.	Resource Management	2010-2011	F	ongoing	$500
Issue 9: Aquaculture					
Goal 9.1: Minimize physical impacts of aquaculture.					
Objective 9.1.1: Ground truth proposed aquaculture areas.					
Strategy: Differential GPS and/or markers will be used to delineate proposed aquaculture areas for evaluation.	Ecosystem Science	2009-2010	C	ongoing	$500
Strategy: Site evaluations will be scheduled for aquatic vegetation growing season.	Resource Management	2009-2010	C	ongoing	$500
Objective 9.1.2: Periodically monitor use of aquaculture areas.					
Strategy: Occasional inspections of lease sites will look for mechanical damage from anchoring and aquaculture-related operations.	Resource Management	2009-2010	C	ongoing	$200
Strategy: Staff will inspect sites for encroachment on vegetation, hardbottom or other resources.	Resource Management	2009-2010	C	ongoing	$500
Goal 9.2: Minimize biotic impacts of aquaculture.					
Objective 9.2.1: Encourage the cultivation of local species/varieties.					
Strategy: Continue to gather results of studies of the biotic impacts of non-local species on local species.	Ecosystem Science	2009-2010	C	ongoing	$200
Strategy: Encourage research on aspects of local clam culture that would make local species more economically viable for culture and harvest.	Ecosystem Science	2009-2010	C	ongoing	$0
Issue 10: Historical and Cultural Resources/Sites					
Goal 10.1: Identify existing historical and cultural sites.					
Objective 10.1.1: Create a database of known historical and cultural sites.					
Strategy: Establish a GIS database to include shoreline sites.	Ecosystem Science	2013-2014	F	ongoing	$500
Objective 10.1.2: Encourage development of resource identification measures for submerged sites.					
Strategy: Seek funding sources for archaeological surveys of submerged lands at Terra Ceia.	Ecosystem Science	2013-2014	F	ongoing	$300
Strategy: Work with archaeology professors to create a research framework for long-term archaeological study of Terra Ceia.	Ecosystem Science	2012-2013	F	ongoing	$300

Goals, Objectives & Integrated Strategies	Management Program	Implementation Date (Planned)	Project Initiation	Length of Initiative	Estimated Yearly Cost
Legend: C = Currently Underway / D = Under Initial Development / F = Future Implementation					
Strategy: Solicit graduate student research projects.	Ecosystem Science	2012-2013	F	ongoing	$200
Goal 10.2: Provide protective measures for historical and cultural sites.					
Objective 10.2.1: Provide staff training in historical and cultural resource identification and protection.					
Strategy: Work with the Department of State, Division of Historical Resources to train staff in recognizing archaeological sites.	Education & Outreach	2012-2013	F	ongoing	$200
Objective 10.2.2: Provide statutory authority information for law enforcement officers.					
Strategy: Work with the Division of Historical Resources to compile relevant laws and policies into a user-friendly form.	Education & Outreach	2012-2013	F	1	$500
Strategy: Make trainings and information available to law enforcement officers operating in the preserve.	Education & Outreach	2013-2014	F	ongoing	$1,000
Objective 10.2.3: Establish periodic monitoring of known historic sites.					
Strategy: Design forms, protocols, and training for volunteers to assist in monitoring historical resource sites.	Resource Management	2013-2014	F	1	$200
Strategy: Recruit and train local volunteers to monitor historical sites.	Education & Outreach	2013-2014	F	1	$500
Issue 11: Disaster/Contingency Preparation					
Goal 11.1: Prepare contingencies for oil, fuel and other spills.					
Objective 11.1.1: Maintain partnerships and communications channels necessary for effective spill response.					
Strategy: Maintain communications with DEP's Bureau of Emergency Response and the U.S. Coast Guard.	Education & Outreach	2009-2010	C	ongoing	$500
Objective 11.1.2: Produce a spill contingencies document.					
Strategy: Produce a map of sensitive areas with dimensions of required booms to protect those areas.	Resource Management	2010-2011	F	1	$200
Strategy: Distribute maps to responders.	Education & Outreach	2010-2011	F	ongoing	$400
Objective 11.1.3: Where prudent, encourage the permanent staging of spill control equipment.					
Strategy: Discuss with U.S. Coast Guard and DEP's Bureau of Emergency Response whether on-site staging of control booms is practical.	Resource Management	2010-2011	F	1	$200
Strategy: If practical, identify appropriate entities to stage spill equipment and assist/ encourage deployment.	Resource Management	2010-2011	F	1	$200
Goal 11.2: Prepare contingencies for vessel groundings.					
Objective 11.2.1: Coordinate policies on avoidance and/or minimization of environmental impacts of groundings and recovery efforts.					
Strategy: Discuss strategies with U.S. Coast Guard and DEP's Bureau of Emergency Response.	Resource Management	2009-2010	F	ongoing	$100
Strategy: Communicate these strategies when agency personnel change.	Education & Outreach	2009-2010	F	ongoing	$100
Goal 11.3: Prepare for tropical weather events.					
Objective 11.3.1: Continue to keep TCAP's hurricane preparedness up to date.					
Strategy: Revise TCAP's hurricane plan annually.	Resource Management	2009-2010	C	ongoing	$200
Strategy: Provide information (Clean Marina Best Management Practices) to local facilities whose hurricane preparations may prevent spills and other hurricane-related impacts.	Education & Outreach	2009-2010	F	ongoing	$200

*D.2 / **Budget Table***

The following table provides a cost estimate for conducting the priority management activities identified in this plan. The data is organized by year and Management Program with subtotals for each program and year. The following represents the actual budgetary needs for managing the resources of the aquatic preserve. This budget was developed using data from CAMA and other cooperating entities, and is based on actual costs for management activities, equipment purchases and maintenance, and for development of fixed capital facilities. The budget below exceeds the funds CAMA has been receiving through the state appropriations process, but is consistent with the direction necessary to achieve the goals and objectives identified in the Goals, Objectives and Strategies Table in Appendix D.1. Budget categories identified correlate with the CAMA Management Program Areas.

Issue	Strategy	Project Initiation	Estimated Yearly Cost
2009-2010 Cost Estimate			
Ecosystem Science			
Water Quality	A datasonde-based permanent water quality station will be located at the site of previous temporary stations on a piling at the mouth of Bishop Harbor.	2009-2010	$8,000
Direct Impacts to Preserve Habitats	Use towed video, sonar and direct observation to identify and map submerged habitats and damage to them.	2009-2010	$1,500
Direct Impacts to Preserve Habitats	Map features into a GIS database using differential GPS.	2009-2010	$1,000
Direct Impacts to Preserve Habitats	If program resources allow, map shallow areas to at least the 6ft (2m) contour.	2009-2010	$1,000
Direct Impacts to Preserve Habitats	Once damaged areas are identified, restoration potential will be evaluated according to ecosystem functionality, potential for self-recovery, logistics/cost of restoration and availability of funds and other resources for restoration.	2009-2010	$500
Direct Impacts to Preserve Habitats	Encourage long-term monitoring.	2009-2010	$0
Direct Impacts to Preserve Habitats	Analyze existing published and unpublished data on appropriate buffer zones for protecting nesting islands from boat traffic disturbances.	2009-2010	$200
Invasive Exotic Species	Gather existing information on likely invasives, recruitment of these species and known methods of control.	2009-2010	$200
Aquaculture	Differential GPS and/or markers will be used to delineate proposed aquaculture areas for evaluation.	2009-2010	$500
Aquaculture	Continue to gather results of studies of the biotic impacts of non-local species on local species.	2009-2010	$200
Aquaculture	Encourage research on aspects of local clam culture that would make local species more economically viable for culture and harvest.	2009-2010	$0
	Ecosystem Science Subtotal		**$13,100**
Resource Management			
Marine Debris	Recruit volunteers to help with cleanup events.	2009-2010	$1,000
Marine Debris	Work with park staff and volunteers to achieve initial cleanups of all accessible shorelines and to establish a maintenance schedule.	2009-2010	$1,000
Marine Debris	Once inspected for leaks and other hazards, vessels either will be boomed and stabilized or towed to the nearest access point for removal.	2009-2010	$1,000
Water Quality	Protocols for operation and maintenance of the datasonde station will be updated to standards acceptable to the National Oceanic and Atmospheric Administration Centralized Data Management Office Manual or Department of Environmental Protection standards, whichever are more appropriate. (For Objectives 2.2.1 & 2.2.2.)	2009-2010	$0
Water Quality	This station will be equipped with wireless data telemetry.	2009-2010	$1,500
Water Quality	Boat launches, trails and other access points will be designed, built and operated to minimize erosion.	2009-2010	$300
Direct Impacts to Preserve Habitats	Where appropriate, TCAP and or partners will mark sensitive resources and maintain markers.	2009-2010	$500

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Direct Impacts to Preserve Habitats	Seek the authority to post the Washburn, Little Washburn and other nesting islands with buoys to create adequate buffer zones.	2009-2010	$500
Shoreline Alteration	Coordinate and/or encourage funding and activities to restore dredge and fill sites.	2009-2010	$300
Shoreline Alteration	Encourage and assist in the removal of shoreline exotics and revegetation with appropriate native species on public land.	2009-2010	$500
Unintentional and Illegal Fishing	Define legal constraints/permissions related to derelict trap removal.	2009-2010	$100
Public Access Points	Limits will be placed on draft and number of vessels using the facility.	2009-2010	$0
Aquaculture	Site evaluations will be scheduled for aquatic vegetation growing season.	2009-2010	$500
Aquaculture	Occasional inspections of lease sites will look for mechanical damage from anchoring and aquaculture-related operations.	2009-2010	$200
Aquaculture	Staff will inspect sites for encroachment on vegetation, hardbottom or other resources.	2009-2010	$500
Disaster/ Contingency Preparation	Discuss strategies with U.S. Coast Guard and DEP's Bureau of Emergency Response.	2009-2010	$100
Disaster/ Contingency Preparation	Revise TCAP's hurricane plan annually.	2009-2010	$200
	Resource Management Subtotal		**$8,200**
Education & Outreach			
Water Quality	TCAP will seek opportunities to educate local residents on the threats of sediments to the preserve.	2009-2010	$500
Direct Impacts to Preserve Habitats	Ensure that restoration areas are identified by signage, and contact information is provided on site.	2009-2010	$200
Direct Impacts to Preserve Habitats	Ensure that restoration areas are identified by signage, and contact information is provided on site.	2009-2010	$500
Shoreline Alteration	Provide educational literature, workshops and other means of informing the public on the importance of natural shorelines and the prevention of shoreline alteration.	2009-2010	$500
Shoreline Alteration	Continue regular monthly meetings with regulatory staff.	2009-2010	$1,000
Shoreline Alteration	Provide existing information, such as mangrove trimming guideline booklets, to residents through local events and on request.	2009-2010	$500
Shoreline Alteration	Include a shoreline protection message in presentations routinely conducted for local organizations.	2009-2010	$500
Shoreline Alteration	Encourage homeowners to remove exotic species and to replace them with native shoreline species.	2009-2010	$200
Unintentional and Illegal Fishing	Continue to assist law enforcement entities with access and site information.	2009-2010	variable
Unintentional and Illegal Fishing	Provide current fishing regulation information at preserve access points.	2009-2010	$500
Unintentional and Illegal Fishing	Provide fishing regulation materials at local events.	2009-2010	$1,000
Public Access Points	Encourage Division of Recreation and Parks to utilize parking surfaces that are permeable with effective stormwater treatment.	2009-2010	$300
Public Access Points	Markers will comply with state and international waterway marker standards.	2009-2010	$900
Invasive Exotic Species	Train staff to recognize anticipated and existing invasive exotic species.	2009-2010	$500
Invasive Exotic Species	Through feedback to regulatory entities, ensure that the likelihood of facilitating exotic recruitment is a consideration in evaluating proposed impacts.	2009-2010	$100

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Disaster/ Contingency Preparation	Maintain communications with DEP's Bureau of Emergency Response and the U.S. Coast Guard.	2009-2010	$500
Disaster/ Contingency Preparation	Communicate these strategies when agency personnel change.	2009-2010	$100
Disaster/ Contingency Preparation	Provide information (Clean Marina Best Management Practices) to local facilities whose hurricane preparations may prevent spills and other hurricane-related impacts.	2009-2010	$200
	Education & Outreach Subtotal		**$8,000**
Public Use			
Public Access Points	A minimum of markers needed for clear guidance will be used.	2009-2010	$2,000
Public Access Points	The trail markers will be installed and maintained by TCAP.	2009-2010	$1,500
	Public Use Subtotal		**$3,500**
$32,800	**2009-2010 Total**		

2010-2011 Cost Estimate

Ecosystem Science			
Marine Debris	Recruit a student researcher.	2010-2011	$200
Marine Debris	Categorize debris from shoreline cleanup activities in the preserve with regard to material, amount, nature, etc.	2010-2011	$500
Marine Debris	Use published information to assess the environmental hazards for the categories of debris found.	2010-2011	$100
Marine Debris	Partner with the adjacent preserve state park in defining informational needs and in organizing cleanup activities.	2010-2011	$200
Water Quality	Integrate the experimental design of TCAP monitoring efforts to be compatible with other monitoring programs in the area.	2010-2011	$200
Direct Impacts to Preserve Habitats	When possible, habitat and distribution data will be georeferenced.	2010-2011	$500
Direct Impacts to Preserve Habitats	TCAP will mine existing databases to include seagrass scarring (Fish and Wildlife Research Institute) and hardbottom topography (Eckerd College).	2010-2011	$500
Direct Impacts to Preserve Habitats	Use towed video, sonar and direct observation to identify and map submerged habitats and damage to them.	2009-2010	$1,500
Direct Impacts to Preserve Habitats	Map features into a GIS database using differential GPS.	2009-2010	$1,000
Direct Impacts to Preserve Habitats	If program resources allow, map shallow areas to at least the 6ft (2m) contour.	2009-2010	$1,000
Direct Impacts to Preserve Habitats	TCAP will gather information on habitat degradation from sources that include, but are not limited to the seagrass scarring database, compliance/enforcement case information, aerial photography and field observations of TCAP staff and others.	2010-2011	$500
Direct Impacts to Preserve Habitats	Once damaged areas are identified, restoration potential will be evaluated according to ecosystem functionality, potential for self-recovery, logistics/cost of restoration and availability of funds and other resources for restoration.	2009-2010	$500
Direct Impacts to Preserve Habitats	Define the type and scope of restoration that best matches the habitat(s) and degradation.	2010-2011	$100
Direct Impacts to Preserve Habitats	Encourage long-term monitoring.	2009-2010	$0
Direct Impacts to Preserve Habitats	Define the type and scope of restoration that best matches the habitat(s) and degradation.	2010-2011	$200
Shoreline Alteration	Develop a literature database to demonstrate the ecological importance of preserving and restoring shallow habitats.	2010-2011	$500

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Unintentional and Illegal Fishing	Maintain a GIS-based database of suspected ghost trap locations.	2010-2011	$500
Unintentional and Illegal Fishing	Seek anecdotal information specific to Terra Ceia.	2010-2011	$200
Invasive Exotic Species	Gather existing information on likely invasives, recruitment of these species and known methods of control.	2009-2010	$200
Aquaculture	Differential GPS and/or markers will be used to delineate proposed aquaculture areas for evaluation.	2009-2010	$500
Aquaculture	Continue to gather results of studies of the biotic impacts of non-local species on local species.	2009-2010	$200
Aquaculture	Encourage research on aspects of local clam culture that would make local species more economically viable for culture and harvest.	2009-2010	$0
	Ecosystem Science Subtotal		**$9,100**
Resource Management			
Marine Debris	Guarantee that access points to the preserve (boat launches, fishing piers, etc.) have monofilament line depositories.	2010-2011	$200
Marine Debris	Encourage local parks, marinas and other facilities to equip trash receptacles with lids.	2010-2011	$200
Marine Debris	Recruit volunteers to help with cleanup events.	2009-2010	$1,000
Marine Debris	Work with park staff and volunteers to achieve initial cleanups of all accessible shorelines and to establish a maintenance schedule.	2009-2010	$1,000
Marine Debris	Once inspected for leaks and other hazards, vessels either will be boomed and stabilized or towed to the nearest access point for removal.	2009-2010	$1,000
Water Quality	Protocols for operation and maintenance of the datasonde station will be updated to standards acceptable to the National Oceanic and Atmospheric Administration Centralized Data Management Office Manual or Department of Environmental Protection standards, whichever are more appropriate. (For Objectives 2.2.1 & 2.2.2.)	2009-2010	$0
Water Quality	Datasonde station hardware will be upgraded as needed and new equipment becomes available.	2010-2011	$2,000
Water Quality	Boat launches, trails and other access points will be designed, built and operated to minimize erosion.	2009-2010	$300
Direct Impacts to Preserve Habitats	Where appropriate, TCAP and or partners will mark sensitive resources and maintain markers.	2009-2010	$500
Direct Impacts to Preserve Habitats	Seek the authority to post the Washburn, Little Washburn and other nesting islands with buoys to create adequate buffer zones.	2009-2010	$500
Shoreline Alteration	Conduct annual video surveys of shorelines with a history and/or likelihood of unauthorized alteration.	2010-2011	$1,500
Shoreline Alteration	Coordinate and/or encourage funding and activities to restore dredge and fill sites.	2009-2010	$300
Shoreline Alteration	Encourage and assist in the removal of shoreline exotics and revegetation with appropriate native species on public land.	2009-2010	$500
Unintentional and Illegal Fishing	Schedule regular trap removal efforts with a frequency determined by the GIS database.	2010-2011	$1,000
Public Access Points	Limits will be placed on draft and number of vessels using the facility.	2009-2010	$0
Invasive Exotic Species	Where possible, remove old artificial substrates that are not in use.	2010-2011	$500
Aquaculture	Site evaluations will be scheduled for aquatic vegetation growing season.	2009-2010	$500
Aquaculture	Occasional inspections of lease sites will look for mechanical damage from anchoring and aquaculture-related operations.	2009-2010	$200
Aquaculture	Staff will inspect sites for encroachment on vegetation, hardbottom or other resources.	2009-2010	$500

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Disaster/ Contingency Preparation	Produce a map of sensitive areas with dimensions of required booms to protect those areas.	2010-2011	$200
Disaster/ Contingency Preparation	Discuss with U.S. Coast Guard and DEP's Bureau of Emergency Response whether on-site staging of control booms is practical.	2010-2011	$200
Disaster/ Contingency Preparation	If practical, identify appropriate entities to stage spill equipment and assist/encourage deployment.	2010-2011	$200
Disaster/ Contingency Preparation	Discuss strategies with U.S. Coast Guard and DEP's Bureau of Emergency Response.	2009-2010	$100
Disaster/ Contingency Preparation	Revise TCAP's hurricane plan annually.	2009-2010	$200
	Resource Management Subtotal		**$12,600**
Education & Outreach			
Water Quality	If appropriate and useful, make this data available to fishermen on the Internet.	2010-2011	$100
Water Quality	Encourage the public to take an interest in the water quality of their preserve, and enhance public involvement through web access of the data.	2010-2011	$500
Water Quality	TCAP will seek opportunities to educate local residents on the threats of sediments to the preserve.	2009-2010	$500
Direct Impacts to Preserve Habitats	Ensure that restoration areas are identified by signage, and contact information is provided on site.	2009-2010	$200
Direct Impacts to Preserve Habitats	Ensure that restoration areas are identified by signage, and contact information is provided on site.	2009-2010	$500
Direct Impacts to Preserve Habitats	Provide information on nesting islands and their protection at preserve access points.	2010-2011	$300
Shoreline Alteration	Provide educational literature, workshops and other means of informing the public on the importance of natural shorelines and the prevention of shoreline alteration.	2009-2010	$500
Shoreline Alteration	Continue regular monthly meetings with regulatory staff.	2009-2010	$1,000
Shoreline Alteration	Provide existing information, such as mangrove trimming guideline booklets, to residents through local events and on request.	2009-2010	$500
Shoreline Alteration	Include a shoreline protection message in presentations routinely conducted for local organizations.	2009-2010	$500
Shoreline Alteration	Encourage homeowners to remove exotic species and to replace them with native shoreline species.	2009-2010	$200
Unintentional and Illegal Fishing	Educate local citizens, law enforcement officers and fishermen on the importance of recognizing and reporting derelict fishing gear.	2010-2011	$200
Unintentional and Illegal Fishing	Provide information at preserve access points that encourages recognition and reporting of illegal fishing activities.	2010-2011	$1,000
Unintentional and Illegal Fishing	Continue to assist law enforcement entities with access and site information.	2009-2010	variable
Unintentional and Illegal Fishing	Provide current fishing regulation information at preserve access points.	2009-2010	$500
Unintentional and Illegal Fishing	Provide fishing regulation materials at local events.	2009-2010	$1,000
Public Access Points	TCAP will encourage the use of permeable surfaces and other environmentally friendly features.	2010-2011	$200
Invasive Exotic Species	Train staff to recognize anticipated and existing invasive exotic species.	2009-2010	$500
Invasive Exotic Species	Through feedback to regulatory entities, ensure that the likelihood of facilitating exotic recruitment is a consideration in evaluating proposed impacts.	2009-2010	$100

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Invasive Exotic Species	Educate the public on how to minimize the facilitation of exotic recruitment by artificial substrates, bottom disturbances and other activities.	2010-2011	$200
Disaster/ Contingency Preparation	Maintain communications with DEP's Bureau of Emergency Response and the U.S. Coast Guard.	2009-2010	$500
Disaster/ Contingency Preparation	Distribute maps to responders.	2010-2011	$400
Disaster/ Contingency Preparation	Communicate these strategies when agency personnel change.	2009-2010	$100
Disaster/ Contingency Preparation	Provide information (Clean Marina Best Management Practices) to local facilities whose hurricane preparations may prevent spills and other hurricane-related impacts.	2009-2010	$200
	Education & Outreach Subtotal		**$9,700**
Public Use			
Public Access Points	If possible, canoe/kayak traffic should be separated from boat launch traffic.	2010-2011	$0
Public Access Points	For public safety, a horsepower restriction will be considered along the trail.	2010-2011	$0
	Public Use Subtotal		**$0**
$31,400	**2010-2011 Total**		

2011-2012 Cost Estimate

Ecosystem Science			
Marine Debris	Partner with the adjacent preserve state park in defining informational needs and in organizing cleanup activities.	2010-2011	$200
Marine Debris	Recruit a student researcher (may be the same student as in the previous objective).	2011-2012	$200
Marine Debris	Categorize debris from shoreline cleanup efforts in terms of likely source.	2011-2012	$100
Marine Debris	Identify sources of debris in the Tampa Bay watershed.	2011-2012	$200
Marine Debris	Partner with the adjacent preserve state park in defining informational needs and in organizing debris collection activities.	2011-2012	$100
Water Quality	Integrate the experimental design of TCAP monitoring efforts to be compatible with other monitoring programs in the area.	2010-2011	$200
Water Quality	Seek out information on state-of-the-art wastewater treatment approaches for homes without available sewer connections.	2011-2012	$500
Water Quality	Seek information (preferably GIS-based maps) on the abundance and distribution of septic systems in the TCAP watershed.	2011-2012	$200
Direct Impacts to Preserve Habitats	When possible, habitat and distribution data will be georeferenced.	2010-2011	$500
Direct Impacts to Preserve Habitats	TCAP will mine existing databases to include seagrass scarring (Fish and Wildlife Research Institute) and hardbottom topography (Eckerd College).	2010-2011	$500
Direct Impacts to Preserve Habitats	Use towed video, sonar and direct observation to identify and map submerged habitats and damage to them.	2009-2010	$1,500
Direct Impacts to Preserve Habitats	Map features into a GIS database using differential GPS.	2009-2010	$1,000
Direct Impacts to Preserve Habitats	If program resources allow, map shallow areas to at least the 6ft (2m) contour.	2009-2010	$1,000
Direct Impacts to Preserve Habitats	TCAP will gather information on habitat degradation from sources that include, but are not limited to the seagrass scarring database, compliance/enforcement case information, aerial photography and field observations of TCAP staff and others.	2010-2011	$500

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Direct Impacts to Preserve Habitats	Once damaged areas are identified, restoration potential will be evaluated according to ecosystem functionality, potential for self-recovery, logistics/cost of restoration and availability of funds and other resources for restoration.	2009-2010	$500
Direct Impacts to Preserve Habitats	Define the type and scope of restoration that best matches the habitat(s) and degradation.	2010-2011	$100
Direct Impacts to Preserve Habitats	Encourage long-term monitoring.	2009-2010	$0
Direct Impacts to Preserve Habitats	Define the type and scope of restoration that best matches the habitat(s) and degradation.	2010-2011	$200
Shoreline Alteration	Develop a literature database to demonstrate the ecological importance of preserving and restoring shallow habitats.	2010-2011	$500
Unintentional and Illegal Fishing	Maintain a GIS-based database of suspected ghost trap locations.	2010-2011	$500
Unintentional and Illegal Fishing	Seek anecdotal information specific to Terra Ceia.	2010-2011	$200
Mooring Fields and Liveaboards	Identify existing pumpout facilities at marinas in and near the preserve.	2011-2012	$200
Invasive Exotic Species	Gather existing information on likely invasives, recruitment of these species and known methods of control.	2009-2010	$200
Aquaculture	Differential GPS and/or markers will be used to delineate proposed aquaculture areas for evaluation.	2009-2010	$500
Aquaculture	Continue to gather results of studies of the biotic impacts of non-local species on local species.	2009-2010	$200
Aquaculture	Encourage research on aspects of local clam culture that would make local species more economically viable for culture and harvest.	2009-2010	$0
	Ecosystem Science Subtotal		**$9,800**
Resource Management			
Marine Debris	Recruit volunteers to help with cleanup events.	2009-2010	$1,000
Marine Debris	Work with park staff and volunteers to achieve initial cleanups of all accessible shorelines and to establish a maintenance schedule.	2009-2010	$1,000
Marine Debris	Once inspected for leaks and other hazards, vessels either will be boomed and stabilized or towed to the nearest access point for removal.	2009-2010	$1,000
Water Quality	Protocols for operation and maintenance of the datasonde station will be updated to standards acceptable to the National Oceanic and Atmospheric Administration Centralized Data Management Office Manual or Department of Environmental Protection standards, whichever are more appropriate. (For Objectives 2.2.1 & 2.2.2.)	2009-2010	$0
Water Quality	Datasonde station hardware will be upgraded as needed and new equipment becomes available.	2010-2011	$2,000
Water Quality	Boat launches, trails and other access points will be designed, built and operated to minimize erosion.	2009-2010	$300
Direct Impacts to Preserve Habitats	Where appropriate, TCAP and or partners will mark sensitive resources and maintain markers.	2009-2010	$500
Shoreline Alteration	Conduct annual video surveys of shorelines with a history and/or likelihood of unauthorized alteration.	2010-2011	$1,500
Shoreline Alteration	Coordinate and/or encourage funding and activities to restore dredge and fill sites.	2009-2010	$300
Shoreline Alteration	Encourage and assist in the removal of shoreline exotics and revegetation with appropriate native species on public land.	2009-2010	$500
Unintentional and Illegal Fishing	Schedule regular trap removal efforts with a frequency determined by the GIS database.	2010-2011	$1,000
Public Access Points	Limits will be placed on draft and number of vessels using the facility.	2009-2010	$0

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Invasive Exotic Species	Where possible, remove old artificial substrates that are not in use.	2010-2011	$500
Aquaculture	Site evaluations will be scheduled for aquatic vegetation growing season.	2009-2010	$500
Aquaculture	Occasional inspections of lease sites will look for mechanical damage from anchoring and aquaculture-related operations.	2009-2010	$200
Aquaculture	Staff will inspect sites for encroachment on vegetation, hardbottom or other resources.	2009-2010	$500
Disaster/ Contingency Preparation	Discuss strategies with U.S. Coast Guard and DEP's Bureau of Emergency Response.	2009-2010	$100
Disaster/ Contingency Preparation	Revise TCAP's hurricane plan annually.	2009-2010	$200
	Resource Management Subtotal		**$11,100**
Education & Outreach			
Marine Debris	Ensure that, whenever possible, public access points to the preserve include signage on the threats and prevention of debris.	2011-2012	$500
Water Quality	Investigate the possible utility of stage information to paddling trail users if linked to internet-based information.	2011-2012	$100
Water Quality	If appropriate and useful, make this data available to fishermen on the Internet.	2010-2011	$100
Water Quality	Encourage the public to take an interest in the water quality of their preserve, and enhance public involvement through web access of the data.	2010-2011	$500
Water Quality	Encourage local health agencies to consider new state-of-the-art wastewater treatment ideas.	2011-2012	$500
Water Quality	TCAP will seek opportunities to educate local residents on the threats of sediments to the preserve.	2009-2010	$500
Direct Impacts to Preserve Habitats	Ensure that restoration areas are identified by signage, and contact information is provided on site.	2009-2010	$200
Direct Impacts to Preserve Habitats	Ensure that restoration areas are identified by signage, and contact information is provided on site.	2009-2010	$500
Shoreline Alteration	Provide educational literature, workshops and other means of informing the public on the importance of natural shorelines and the prevention of shoreline alteration.	2009-2010	$500
Shoreline Alteration	Continue regular monthly meetings with regulatory staff.	2009-2010	$1,000
Shoreline Alteration	Provide existing information, such as mangrove trimming guideline booklets, to residents through local events and on request.	2009-2010	$500
Shoreline Alteration	Include a shoreline protection message in presentations routinely conducted for local organizations.	2009-2010	$500
Shoreline Alteration	Encourage homeowners to remove exotic species and to replace them with native shoreline species.	2009-2010	$200
Unintentional and Illegal Fishing	Educate local citizens, law enforcement officers and fishermen on the importance of recognizing and reporting derelict fishing gear.	2010-2011	$200
Unintentional and Illegal Fishing	Continue to assist law enforcement entities with access and site information.	2009-2010	variable
Unintentional and Illegal Fishing	Provide current fishing regulation information at preserve access points.	2009-2010	$500
Unintentional and Illegal Fishing	Provide fishing regulation materials at local events.	2009-2010	$1,000
Mooring Fields and Liveaboards	Encourage installation of pumpouts where they are lacking.	2011-2012	$300
Mooring Fields and Liveaboards	Publicize facilities with pumpouts through appropriate media.	2011-2012	$200

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Invasive Exotic Species	Train staff to recognize anticipated and existing invasive exotic species.	2009-2010	$500
Invasive Exotic Species	Provide information at access points for boaters and others to use in recognizing and reporting invasive exotics.	2011-2012	$700
Invasive Exotic Species	Through feedback to regulatory entities, ensure that the likelihood of facilitating exotic recruitment is a consideration in evaluating proposed impacts.	2009-2010	$100
Invasive Exotic Species	Educate the public on how to minimize the facilitation of exotic recruitment by artificial substrates, bottom disturbances and other activities.	2010-2011	$200
Disaster/ Contingency Preparation	Maintain communications with DEP's Bureau of Emergency Response and the U.S. Coast Guard.	2009-2010	$500
Disaster/ Contingency Preparation	Distribute maps to responders.	2010-2011	$400
Disaster/ Contingency Preparation	Communicate these strategies when agency personnel change.	2009-2010	$100
Disaster/ Contingency Preparation	Provide information (Clean Marina Best Management Practices) to local facilities whose hurricane preparations may prevent spills and other hurricane-related impacts.	2009-2010	$200
	Education & Outreach Subtotal		**$10,500**
Public Use			
Public Access Points	For public safety, a horsepower restriction will be considered along the trail.	2010-2011	$0
	Public Use Subtotal		**$0**
$31,400	**2011-2012 Total**		

2012-2013 Cost Estimate

Ecosystem Science			
Marine Debris	Partner with the adjacent preserve state park in defining informational needs and in organizing cleanup activities.	2010-2011	$200
Marine Debris	Partner with the adjacent preserve state park in defining informational needs and in organizing debris collection activities.	2011-2012	$100
Water Quality	Integrate the experimental design of TCAP monitoring efforts to be compatible with other monitoring programs in the area.	2010-2011	$200
Water Quality	Investigate the availability, suitability and adequacy of existing data and their usefulness in assessing benthic habitat health.	2012-2013	$200
Water Quality	Collaborate with Hillsborough County Environmental Protection Commission to evaluate the applicability of their benthic habitat quality index in monitoring preserve conditions.	2012-2013	$400
Water Quality	Acquire additional data sets from agencies and universities and evaluate its suitability for determining habitat change and health.	2012-2013	$200
Water Quality	Baseline turbidity ranges will be established through mining existing data and through long-term monitoring.	2012-2013	$300
Direct Impacts to Preserve Habitats	When possible, habitat and distribution data will be georeferenced.	2010-2011	$500
Direct Impacts to Preserve Habitats	TCAP will mine existing databases to include seagrass scarring (Fish and Wildlife Research Institute) and hardbottom topography (Eckerd College).	2010-2011	$500
Direct Impacts to Preserve Habitats	Use towed video, sonar and direct observation to identify and map submerged habitats and damage to them.	2009-2010	$1,500
Direct Impacts to Preserve Habitats	Map features into a GIS database using differential GPS.	2009-2010	$1,000
Direct Impacts to Preserve Habitats	If program resources allow, map shallow areas to at least the 6ft (2m) contour.	2009-2010	$1,000

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Direct Impacts to Preserve Habitats	TCAP will gather information on habitat degradation from sources that include, but are not limited to the seagrass scarring database, compliance/enforcement case information, aerial photography and field observations of TCAP staff and others.	2010-2011	$500
Direct Impacts to Preserve Habitats	Once damaged areas are identified, restoration potential will be evaluated according to ecosystem functionality, potential for self-recovery, logistics/cost of restoration and availability of funds and other resources for restoration.	2009-2010	$500
Direct Impacts to Preserve Habitats	Define the type and scope of restoration that best matches the habitat(s) and degradation.	2010-2011	$100
Direct Impacts to Preserve Habitats	Encourage long-term monitoring.	2009-2010	$0
Direct Impacts to Preserve Habitats	Define the type and scope of restoration that best matches the habitat(s) and degradation.	2010-2011	$200
Shoreline Alteration	Develop a literature database to demonstrate the ecological importance of preserving and restoring shallow habitats.	2010-2011	$500
Unintentional and Illegal Fishing	Maintain a GIS-based database of suspected ghost trap locations.	2010-2011	$500
Unintentional and Illegal Fishing	Seek information from scientific studies of terrapin mortality in crab traps in other areas to determine the likelihood that special traps or other measures are warranted within the TCAP.	2012-2013	$500
Unintentional and Illegal Fishing	Seek anecdotal information specific to Terra Ceia.	2010-2011	$200
Unintentional and Illegal Fishing	Establish a convenient means of reporting terrapin bycatch within the TCAP.	2012-2013	$500
Invasive Exotic Species	Gather existing information on likely invasives, recruitment of these species and known methods of control.	2009-2010	$200
Invasive Exotic Species	Investigate the role that manmade structures play in facilitating the establishment of exotics.	2012-2013	$1,000
Aquaculture	Differential GPS and/or markers will be used to delineate proposed aquaculture areas for evaluation.	2009-2010	$500
Aquaculture	Continue to gather results of studies of the biotic impacts of non-local species on local species.	2009-2010	$200
Aquaculture	Encourage research on aspects of local clam culture that would make local species more economically viable for culture and harvest.	2009-2010	$0
Historical and Cultural Resources/ Sites	Work with archaeology professors to create a research framework for long-term archaeological study of Terra Ceia.	2012-2013	$300
Historical and Cultural Resources/ Sites	Solicit graduate student research projects.	2012-2013	$200
	Ecosystem Science Subtotal		**$12,000**
Resource Management			
Marine Debris	Recruit volunteers to help with cleanup events.	2009-2010	$1,000
Marine Debris	Work with park staff and volunteers to achieve initial cleanups of all accessible shorelines and to establish a maintenance schedule.	2009-2010	$1,000
Marine Debris	Once inspected for leaks and other hazards, vessels either will be boomed and stabilized or towed to the nearest access point for removal.	2009-2010	$1,000
Water Quality	Protocols for operation and maintenance of the datasonde station will be updated to standards acceptable to the National Oceanic and Atmospheric Administration Centralized Data Management Office Manual or Department of Environmental Protection standards, whichever are more appropriate. (For Objectives 2.2.1 & 2.2.2.)	2009-2010	$0
Water Quality	Datasonde station hardware will be upgraded as needed and new equipment becomes available.	2010-2011	$2,000

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Water Quality	Boat launches, trails and other access points will be designed, built and operated to minimize erosion.	2009-2010	$300
Direct Impacts to Preserve Habitats	Where appropriate, TCAP and or partners will mark sensitive resources and maintain markers.	2009-2010	$500
Shoreline Alteration	Conduct annual video surveys of shorelines with a history and/or likelihood of unauthorized alteration.	2010-2011	$1,500
Shoreline Alteration	Coordinate and/or encourage funding and activities to restore dredge and fill sites.	2009-2010	$300
Shoreline Alteration	Encourage and assist in the removal of shoreline exotics and revegetation with appropriate native species on public land.	2009-2010	$500
Unintentional and Illegal Fishing	Schedule regular trap removal efforts with a frequency determined by the GIS database.	2010-2011	$1,000
Public Access Points	Limits will be placed on draft and number of vessels using the facility.	2009-2010	$0
Public Access Points	The manmade berm will be breached to allow flushing of the pond on the property and to permit coming and going of paddling traffic.	2012-2013	$1,500
Public Access Points	TCAP will encourage the use of permeable surfaces and other environmentally friendly features.	2012-2013	$200
Invasive Exotic Species	Where possible, remove old artificial substrates that are not in use.	2010-2011	$500
Aquaculture	Site evaluations will be scheduled for aquatic vegetation growing season.	2009-2010	$500
Aquaculture	Occasional inspections of lease sites will look for mechanical damage from anchoring and aquaculture-related operations.	2009-2010	$200
Aquaculture	Staff will inspect sites for encroachment on vegetation, hardbottom or other resources.	2009-2010	$500
Disaster/ Contingency Preparation	Discuss strategies with U.S. Coast Guard and DEP's Bureau of Emergency Response.	2009-2010	$100
Disaster/ Contingency Preparation	Revise TCAP's hurricane plan annually.	2009-2010	$200
	Resource Management Subtotal		**$12,800**
Education & Outreach			
Marine Debris	Post contact information for reporting derelict vessels at preserve access points.	2012-2013	$500
Water Quality	If appropriate and useful, make this data available to fishermen on the Internet.	2010-2011	$100
Water Quality	Encourage the public to take an interest in the water quality of their preserve, and enhance public involvement through web access of the data.	2010-2011	$500
Water Quality	Encourage local health agencies to consider new state-of-the-art wastewater treatment ideas.	2011-2012	$500
Water Quality	Enforcement entities will be made aware of the availability of nearly real-time turbidity data through datasonde telemetry.	2012-2013	$500
Water Quality	Training on best management practices for contractors and regulators will be encouraged.	2012-2013	$500
Water Quality	TCAP will seek opportunities to educate local residents on the threats of sediments to the preserve.	2009-2010	$500
Direct Impacts to Preserve Habitats	Ensure that restoration areas are identified by signage, and contact information is provided on site.	2009-2010	$200
Direct Impacts to Preserve Habitats	Ensure that restoration areas are identified by signage, and contact information is provided on site.	2009-2010	$500
Shoreline Alteration	Provide educational literature, workshops and other means of informing the public on the importance of natural shorelines and the prevention of shoreline alteration.	2009-2010	$500

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Shoreline Alteration	Continue regular monthly meetings with regulatory staff.	2009-2010	$1,000
Shoreline Alteration	Provide existing information, such as mangrove trimming guideline booklets, to residents through local events and on request.	2009-2010	$500
Shoreline Alteration	Include a shoreline protection message in presentations routinely conducted for local organizations.	2009-2010	$500
Shoreline Alteration	Encourage homeowners to remove exotic species and to replace them with native shoreline species.	2009-2010	$200
Unintentional and Illegal Fishing	Educate local citizens, law enforcement officers and fishermen on the importance of recognizing and reporting derelict fishing gear.	2010-2011	$200
Unintentional and Illegal Fishing	Continue to assist law enforcement entities with access and site information.	2009-2010	variable
Unintentional and Illegal Fishing	Provide current fishing regulation information at preserve access points.	2009-2010	$500
Unintentional and Illegal Fishing	Provide fishing regulation materials at local events.	2009-2010	$1,000
Unintentional and Illegal Fishing	If warranted, encourage terrapin-safe crab traps within the preserve.	2012-2013	$200
Mooring Fields and Liveaboards	Publicize facilities with pumpouts through appropriate media.	2011-2012	$200
Invasive Exotic Species	Train staff to recognize anticipated and existing invasive exotic species.	2009-2010	$500
Invasive Exotic Species	Through feedback to regulatory entities, ensure that the likelihood of facilitating exotic recruitment is a consideration in evaluating proposed impacts.	2009-2010	$100
Invasive Exotic Species	Educate the public on how to minimize the facilitation of exotic recruitment by artificial substrates, bottom disturbances and other activities.	2010-2011	$200
Historical and Cultural Resources/ Sites	Work with the Department of State, Division of Historical Resources to train staff in recognizing archaeological sites.	2012-2013	$200
Historical and Cultural Resources/ Sites	Work with the Division of Historical Resources to compile relevant laws and policies into a user-friendly form.	2012-2013	$500
Disaster/ Contingency Preparation	Maintain communications with DEP's Bureau of Emergency Response and the U.S. Coast Guard.	2009-2010	$500
Disaster/ Contingency Preparation	Distribute maps to responders.	2010-2011	$400
Disaster/ Contingency Preparation	Communicate these strategies when agency personnel change.	2009-2010	$100
Disaster/ Contingency Preparation	Provide information (Clean Marina Best Management Practices) to local facilities whose hurricane preparations may prevent spills and other hurricane-related impacts.	2009-2010	$200
	Education & Outreach Subtotal		**$11,300**
Public Use			
Public Access Points	A paddling launch will be added to the Haley property near the mouth of the Terra Ceia River.	2012-2013	$3,000
Public Access Points	For public safety, a horsepower restriction will be considered along the trail.	2010-2011	$0
	Public Use Subtotal		$3,000
$39,100	**2012-2013 Total**		

Issue	Strategy	Project Initiation	Estimated Yearly Cost
2013-2014 Cost Estimate			
Ecosystem Science			
Marine Debris	Partner with the adjacent preserve state park in defining informational needs and in organizing cleanup activities.	2010-2011	$200
Marine Debris	Partner with the adjacent preserve state park in defining informational needs and in organizing debris collection activities.	2011-2012	$100
Water Quality	Appropriate agencies will be contacted, and, where possible, their water quality data will be obtained to be archived in digital form.	2013-2014	$500
Water Quality	A datasonde-based permanent water quality station will be installed with a platform near the mouth of the Terra Ceia River.	2013-2014	$12,000
Water Quality	Integrate the experimental design of TCAP monitoring efforts to be compatible with other monitoring programs in the area.	2010-2011	$200
Direct Impacts to Preserve Habitats	When possible, habitat and distribution data will be georeferenced.	2010-2011	$500
Direct Impacts to Preserve Habitats	TCAP will mine existing databases to include seagrass scarring (Fish and Wildlife Research Institute) and hardbottom topography (Eckerd College).	2010-2011	$500
Direct Impacts to Preserve Habitats	Use towed video, sonar and direct observation to identify and map submerged habitats and damage to them.	2009-2010	$1,500
Direct Impacts to Preserve Habitats	Map features into a GIS database using differential GPS.	2009-2010	$1,000
Direct Impacts to Preserve Habitats	If program resources allow, map shallow areas to at least the 6ft (2m) contour.	2009-2010	$1,000
Direct Impacts to Preserve Habitats	TCAP will gather information on habitat degradation from sources that include, but are not limited to the seagrass scarring database, compliance/enforcement case information, aerial photography and field observations of TCAP staff and others.	2010-2011	$500
Direct Impacts to Preserve Habitats	Once damaged areas are identified, restoration potential will be evaluated according to ecosystem functionality, potential for self-recovery, logistics/cost of restoration and availability of funds and other resources for restoration.	2009-2010	$500
Direct Impacts to Preserve Habitats	Define the type and scope of restoration that best matches the habitat(s) and degradation.	2010-2011	$100
Direct Impacts to Preserve Habitats	Encourage long-term monitoring.	2009-2010	$0
Direct Impacts to Preserve Habitats	Define the type and scope of restoration that best matches the habitat(s) and degradation.	2010-2011	$200
Shoreline Alteration	Develop a literature database to demonstrate the ecological importance of preserving and restoring shallow habitats.	2010-2011	$500
Unintentional and Illegal Fishing	Maintain a GIS-based database of suspected ghost trap locations.	2010-2011	$500
Unintentional and Illegal Fishing	Seek anecdotal information specific to Terra Ceia.	2010-2011	$200
Invasive Exotic Species	Gather existing information on likely invasives, recruitment of these species and known methods of control.	2009-2010	$200
Aquaculture	Differential GPS and/or markers will be used to delineate proposed aquaculture areas for evaluation.	2009-2010	$500
Aquaculture	Continue to gather results of studies of the biotic impacts of non-local species on local species.	2009-2010	$200
Aquaculture	Encourage research on aspects of local clam culture that would make local species more economically viable for culture and harvest.	2009-2010	$0
Historical and Cultural Resources/ Sites	Establish a GIS database to include shoreline sites.	2013-2014	$500
Historical and Cultural Resources/ Sites	Seek funding sources for archaeological surveys of submerged lands at Terra Ceia.	2013-2014	$300

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Historical and Cultural Resources/ Sites	Work with archaeology professors to create a research framework for long-term archaeological study of Terra Ceia.	2012-2013	$300
Historical and Cultural Resources/ Sites	Solicit graduate student research projects.	2012-2013	$200
	Ecosystem Science Subtotal		**$22,200**
Resource Management			
Marine Debris	Recruit volunteers to help with cleanup events.	2009-2010	$1,000
Marine Debris	Work with park staff and volunteers to achieve initial cleanups of all accessible shorelines and to establish a maintenance schedule.	2009-2010	$1,000
Marine Debris	Once inspected for leaks and other hazards, vessels either will be boomed and stabilized or towed to the nearest access point for removal.	2009-2010	$1,000
Water Quality	Protocols for operation and maintenance of the datasonde station will be updated to standards acceptable to the National Oceanic and Atmospheric Administration Centralized Data Management Office Manual or Department of Environmental Protection standards, whichever are more appropriate. (For Objectives 2.2.1, 2.2.2., & 2.2.3)	2009-2010 & 2013-2014	$0
Water Quality	Datasonde station hardware will be upgraded as needed and new equipment becomes available.	2010-2011	$2,000
Water Quality	Boat launches, trails and other access points will be designed, built and operated to minimize erosion.	2009-2010	$300
Direct Impacts to Preserve Habitats	Where appropriate, TCAP and or partners will mark sensitive resources and maintain markers.	2009-2010	$500
Shoreline Alteration	Conduct annual video surveys of shorelines with a history and/or likelihood of unauthorized alteration.	2010-2011	$1,500
Shoreline Alteration	Coordinate and/or encourage funding and activities to restore dredge and fill sites.	2009-2010	$300
Shoreline Alteration	Encourage and assist in the removal of shoreline exotics and revegetation with appropriate native species on public land.	2009-2010	$500
Unintentional and Illegal Fishing	Schedule regular trap removal efforts with a frequency determined by the GIS database.	2010-2011	$1,000
Public Access Points	Limits will be placed on draft and number of vessels using the facility.	2009-2010	$0
Invasive Exotic Species	Where possible, remove old artificial substrates that are not in use.	2010-2011	$500
Aquaculture	Site evaluations will be scheduled for aquatic vegetation growing season.	2009-2010	$500
Aquaculture	Occasional inspections of lease sites will look for mechanical damage from anchoring and aquaculture-related operations.	2009-2010	$200
Aquaculture	Staff will inspect sites for encroachment on vegetation, hardbottom or other resources.	2009-2010	$500
Historical and Cultural Resources/ Sites	Design forms, protocols, and training for volunteers to assist in monitoring historical resource sites.	2013-2014	$200
Disaster/ Contingency Preparation	Discuss strategies with U.S. Coast Guard and DEP's Bureau of Emergency Response.	2009-2010	$100
Disaster/ Contingency Preparation	Revise TCAP's hurricane plan annually.	2009-2010	$200
	Resource Management Subtotal		**$11,300**

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Education & Outreach			
Water Quality	If appropriate and useful, make this data available to fishermen on the Internet.	2010-2011	$100
Water Quality	If appropriate and useful, make this data available to fishermen and paddlers on the Internet.	2013-2014	$100
Water Quality	Encourage the public to take an interest in the water quality of their preserve, and enhance public involvement through web access of the data.	2010-2011	$500
Water Quality	Encourage local health agencies to consider new state-of-the-art wastewater treatment ideas.	2011-2012	$500
Water Quality	Enforcement entities will be made aware of the availability of nearly real-time turbidity data through datasonde telemetry.	2012-2013	$500
Water Quality	Training on best management practices for contractors and regulators will be encouraged.	2012-2013	$500
Water Quality	TCAP will seek opportunities to educate local residents on the threats of sediments to the preserve.	2009-2010	$500
Direct Impacts to Preserve Habitats	Ensure that restoration areas are identified by signage, and contact information is provided on site.	2009-2010	$200
Direct Impacts to Preserve Habitats	Ensure that restoration areas are identified by signage, and contact information is provided on site.	2009-2010	$500
Shoreline Alteration	Provide educational literature, workshops and other means of informing the public on the importance of natural shorelines and the prevention of shoreline alteration.	2009-2010	$500
Shoreline Alteration	Continue regular monthly meetings with regulatory staff.	2009-2010	$1,000
Shoreline Alteration	Provide existing information, such as mangrove trimming guideline booklets, to residents through local events and on request.	2009-2010	$500
Shoreline Alteration	Include a shoreline protection message in presentations routinely conducted for local organizations.	2009-2010	$500
Shoreline Alteration	Encourage homeowners to remove exotic species and to replace them with native shoreline species.	2009-2010	$200
Unintentional and Illegal Fishing	Educate local citizens, law enforcement officers and fishermen on the importance of recognizing and reporting derelict fishing gear.	2010-2011	$200
Unintentional and Illegal Fishing	Continue to assist law enforcement entities with access and site information.	2009-2010	variable
Unintentional and Illegal Fishing	Provide current fishing regulation information at preserve access points.	2009-2010	$500
Unintentional and Illegal Fishing	Provide fishing regulation materials at local events.	2009-2010	$1,000
Unintentional and Illegal Fishing	If warranted, encourage terrapin-safe crab traps within the preserve.	2012-2013	$200
Mooring Fields and Liveaboards	Publicize facilities with pumpouts through appropriate media.	2011-2012	$200
Invasive Exotic Species	Train staff to recognize anticipated and existing invasive exotic species.	2009-2010	$500
Invasive Exotic Species	Through feedback to regulatory entities, ensure that the likelihood of facilitating exotic recruitment is a consideration in evaluating proposed impacts.	2009-2010	$100
Invasive Exotic Species	Educate the public on how to minimize the facilitation of exotic recruitment by artificial substrates, bottom disturbances and other activities.	2010-2011	$200
Historical and Cultural Resources/ Sites	Work with the Department of State, Division of Historical Resources to train staff in recognizing archaeological sites.	2012-2013	$200
Historical and Cultural Resources/ Sites	Make trainings and information available to law enforcement officers operating in the preserve.	2013-2014	$1,000
Historical and Cultural Resources/ Sites	Recruit and train local volunteers to monitor historical sites.	2013-2014	$500

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Disaster/ Contingency Preparation	Maintain communications with DEP's Bureau of Emergency Response and the U.S. Coast Guard.	2009-2010	$500
Disaster/ Contingency Preparation	Distribute maps to responders.	2010-2011	$400
Disaster/ Contingency Preparation	Communicate these strategies when agency personnel change.	2009-2010	$100
Disaster/ Contingency Preparation	Provide information (Clean Marina Best Management Practices) to local facilities whose hurricane preparations may prevent spills and other hurricane-related impacts.	2009-2010	$200
	Education & Outreach Subtotal		**$11,900**
Public Use			
Public Access Points	For public safety, a horsepower restriction will be considered along the trail.	2010-2011	$0
	Public Use Subtotal		**$0**
$45,400	**2013-2014 Total**		

2014-2015 Cost Estimate

Ecosystem Science			
Marine Debris	Partner with the adjacent preserve state park in defining informational needs and in organizing cleanup activities.	2010-2011	$200
Marine Debris	Partner with the adjacent preserve state park in defining informational needs and in organizing debris collection activities.	2011-2012	$100
Water Quality	Appropriate agencies will be contacted, and, where possible, their water quality data will be obtained to be archived in digital form.	2013-2014	$500
Water Quality	Integrate the experimental design of TCAP monitoring efforts to be compatible with other monitoring programs in the area.	2010-2011	$200
Water Quality	Add literature addressing pet sanitation in coastal areas to TCAP literature database.	2014-2015	$1,000
Direct Impacts to Preserve Habitats	When possible, habitat and distribution data will be georeferenced.	2010-2011	$500
Direct Impacts to Preserve Habitats	TCAP will mine existing databases to include seagrass scarring (Fish and Wildlife Research Institute) and hardbottom topography (Eckerd College).	2010-2011	$500
Direct Impacts to Preserve Habitats	Use towed video, sonar and direct observation to identify and map submerged habitats and damage to them.	2009-2010	$1,500
Direct Impacts to Preserve Habitats	Map features into a GIS database using differential GPS.	2009-2010	$1,000
Direct Impacts to Preserve Habitats	If program resources allow, map shallow areas to at least the 6ft (2m) contour.	2009-2010	$1,000
Direct Impacts to Preserve Habitats	TCAP will gather information on habitat degradation from sources that include, but are not limited to the seagrass scarring database, compliance/enforcement case information, aerial photography and field observations of TCAP staff and others.	2010-2011	$500
Direct Impacts to Preserve Habitats	Once damaged areas are identified, restoration potential will be evaluated according to ecosystem functionality, potential for self-recovery, logistics/cost of restoration and availability of funds and other resources for restoration.	2009-2010	$500
Direct Impacts to Preserve Habitats	Define the type and scope of restoration that best matches the habitat(s) and degradation.	2010-2011	$100
Direct Impacts to Preserve Habitats	Encourage long-term monitoring.	2009-2010	$0
Direct Impacts to Preserve Habitats	Define the type and scope of restoration that best matches the habitat(s) and degradation.	2010-2011	$200

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Shoreline Alteration	Develop a literature database to demonstrate the ecological importance of preserving and restoring shallow habitats.	2010-2011	$500
Unintentional and Illegal Fishing	Maintain a GIS-based database of suspected ghost trap locations.	2010-2011	$500
Unintentional and Illegal Fishing	Seek anecdotal information specific to Terra Ceia.	2010-2011	$200
Invasive Exotic Species	Gather existing information on likely invasives, recruitment of these species and known methods of control.	2009-2010	$200
Aquaculture	Differential GPS and/or markers will be used to delineate proposed aquaculture areas for evaluation.	2009-2010	$500
Aquaculture	Continue to gather results of studies of the biotic impacts of non-local species on local species.	2009-2010	$200
Aquaculture	Encourage research on aspects of local clam culture that would make local species more economically viable for culture and harvest.	2009-2010	$0
Historical and Cultural Resources/ Sites	Establish a GIS database to include shoreline sites.	2013-2014	$500
Historical and Cultural Resources/ Sites	Seek funding sources for archaeological surveys of submerged lands at Terra Ceia.	2013-2014	$300
Historical and Cultural Resources/ Sites	Work with archaeology professors to create a research framework for long-term archaeological study of Terra Ceia.	2012-2013	$300
Historical and Cultural Resources/ Sites	Solicit graduate student research projects.	2012-2013	$200
	Ecosystem Science Subtotal		**$11,200**
Resource Management			
Marine Debris	Recruit volunteers to help with cleanup events.	2009-2010	$1,000
Marine Debris	Work with park staff and volunteers to achieve initial cleanups of all accessible shorelines and to establish a maintenance schedule.	2009-2010	$1,000
Marine Debris	Once inspected for leaks and other hazards, vessels either will be boomed and stabilized or towed to the nearest access point for removal.	2009-2010	$1,000
Water Quality	Protocols for operation and maintenance of the datasonde station will be updated to standards acceptable to the National Oceanic and Atmospheric Administration Centralized Data Management Office Manual or Department of Environmental Protection standards, whichever are more appropriate. (For Objectives 2.2.1, 2.2.2., & 2.2.3)	2009-2010 & 2013-2014	$0
Water Quality	Datasonde station hardware will be upgraded as needed and new equipment becomes available.	2010-2011	$2,000
Water Quality	Develop an adequate mooring system for anticipated site conditions.	2014-2015	$15,000
Water Quality	Add wireless telemetry for prompt notification of changes in water quality.	2014-2015	$1,500
Water Quality	TCAP staff will encourage management entities to monitor pet cleanup stations.	2014-2015	$100
Water Quality	Boat launches, trails and other access points will be designed, built and operated to minimize erosion.	2009-2010	$300
Direct Impacts to Preserve Habitats	Where appropriate, TCAP and or partners will mark sensitive resources and maintain markers.	2009-2010	$500
Shoreline Alteration	Conduct annual video surveys of shorelines with a history and/or likelihood of unauthorized alteration.	2010-2011	$1,500
Shoreline Alteration	Coordinate and/or encourage funding and activities to restore dredge and fill sites.	2009-2010	$300
Shoreline Alteration	Encourage and assist in the removal of shoreline exotics and revegetation with appropriate native species on public land.	2009-2010	$500

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Unintentional and Illegal Fishing	Schedule regular trap removal efforts with a frequency determined by the GIS database.	2010-2011	$1,000
Mooring Fields and Liveaboards	Work with the Florida Fish and Wildlife Conservation Commission on enforcement actions for illegal mooring.	2014-2015	$200
Public Access Points	Limits will be placed on draft and number of vessels using the facility.	2009-2010	$0
Invasive Exotic Species	Where possible, remove old artificial substrates that are not in use.	2010-2011	$500
Aquaculture	Site evaluations will be scheduled for aquatic vegetation growing season.	2009-2010	$500
Aquaculture	Occasional inspections of lease sites will look for mechanical damage from anchoring and aquaculture-related operations.	2009-2010	$200
Aquaculture	Staff will inspect sites for encroachment on vegetation, hardbottom or other resources.	2009-2010	$500
Disaster/ Contingency Preparation	Discuss strategies with U.S. Coast Guard and DEP's Bureau of Emergency Response.	2009-2010	$100
Disaster/ Contingency Preparation	Revise TCAP's hurricane plan annually.	2009-2010	$200
	Resource Management Subtotal		**$27,900**
Education & Outreach			
Water Quality	If appropriate and useful, make this data available to fishermen on the Internet.	2010-2011	$100
Water Quality	If appropriate and useful, make this data available to fishermen and paddlers on the Internet.	2013-2014	$100
Water Quality	Encourage the public to take an interest in the water quality of their preserve, and enhance public involvement through web access of the data.	2010-2011	$500
Water Quality	Encourage local health agencies to consider new state-of-the-art wastewater treatment ideas.	2011-2012	$500
Water Quality	Include informational signs on the hazards of pet waste at access points.	2014-2015	$500
Water Quality	Enforcement entities will be made aware of the availability of nearly real-time turbidity data through datasonde telemetry.	2012-2013	$500
Water Quality	Training on best management practices for contractors and regulators will be encouraged.	2012-2013	$500
Water Quality	TCAP will seek opportunities to educate local residents on the threats of sediments to the preserve.	2009-2010	$500
Direct Impacts to Preserve Habitats	Ensure that restoration areas are identified by signage, and contact information is provided on site.	2009-2010	$200
Direct Impacts to Preserve Habitats	Ensure that restoration areas are identified by signage, and contact information is provided on site.	2009-2010	$500
Shoreline Alteration	Provide educational literature, workshops and other means of informing the public on the importance of natural shorelines and the prevention of shoreline alteration.	2009-2010	$500
Shoreline Alteration	Continue regular monthly meetings with regulatory staff.	2009-2010	$1,000
Shoreline Alteration	Provide existing information, such as mangrove trimming guideline booklets, to residents through local events and on request.	2009-2010	$500
Shoreline Alteration	Include a shoreline protection message in presentations routinely conducted for local organizations.	2009-2010	$500
Shoreline Alteration	Encourage homeowners to remove exotic species and to replace them with native shoreline species.	2009-2010	$200
Unintentional and Illegal Fishing	Educate local citizens, law enforcement officers and fishermen on the importance of recognizing and reporting derelict fishing gear.	2010-2011	$200

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Unintentional and Illegal Fishing	Continue to assist law enforcement entities with access and site information.	2009-2010	variable
Unintentional and Illegal Fishing	Provide current fishing regulation information at preserve access points.	2009-2010	$500
Unintentional and Illegal Fishing	Provide fishing regulation materials at local events.	2009-2010	$1,000
Unintentional and Illegal Fishing	If warranted, encourage terrapin-safe crab traps within the preserve.	2012-2013	$200
Mooring Fields and Liveaboards	Educate TCAP staff and local residents to recognize and report illegal long-term mooring within the preserve.	2014-2015	$100
Mooring Fields and Liveaboards	Publicize facilities with pumpouts through appropriate media.	2011-2012	$200
Invasive Exotic Species	Train staff to recognize anticipated and existing invasive exotic species.	2009-2010	$500
Invasive Exotic Species	Through feedback to regulatory entities, ensure that the likelihood of facilitating exotic recruitment is a consideration in evaluating proposed impacts.	2009-2010	$100
Invasive Exotic Species	Educate the public on how to minimize the facilitation of exotic recruitment by artificial substrates, bottom disturbances and other activities.	2010-2011	$200
Historical and Cultural Resources/ Sites	Work with the Department of State, Division of Historical Resources to train staff in recognizing archaeological sites.	2012-2013	$200
Historical and Cultural Resources/ Sites	Make trainings and information available to law enforcement officers operating in the preserve.	2013-2014	$1,000
Disaster/ Contingency Preparation	Maintain communications with DEP's Bureau of Emergency Response and the U.S. Coast Guard.	2009-2010	$500
Disaster/ Contingency Preparation	Distribute maps to responders.	2010-2011	$400
Disaster/ Contingency Preparation	Communicate these strategies when agency personnel change.	2009-2010	$100
Disaster/ Contingency Preparation	Provide information (Clean Marina Best Management Practices) to local facilities whose hurricane preparations may prevent spills and other hurricane-related impacts.	2009-2010	$200
	Education & Outreach Subtotal		**$12,000**
Public Use			
Public Access Points	For public safety, a horsepower restriction will be considered along the trail.	2010-2011	$0
	Public Use Subtotal		**$0**
$51,100	**2014-2015 Total**		

2015-2016 Cost Estimate

Ecosystem Science			
Marine Debris	Partner with the adjacent preserve state park in defining informational needs and in organizing cleanup activities.	2010-2011	$200
Marine Debris	Partner with the adjacent preserve state park in defining informational needs and in organizing debris collection activities.	2011-2012	$100
Water Quality	Appropriate agencies will be contacted, and, where possible, their water quality data will be obtained to be archived in digital form.	2013-2014	$500
Water Quality	Integrate the experimental design of TCAP monitoring efforts to be compatible with other monitoring programs in the area.	2010-2011	$200
Direct Impacts to Preserve Habitats	When possible, habitat and distribution data will be georeferenced.	2010-2011	$500

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Direct Impacts to Preserve Habitats	TCAP will mine existing databases to include seagrass scarring (Fish and Wildlife Research Institute) and hardbottom topography (Eckerd College).	2010-2011	$500
Direct Impacts to Preserve Habitats	Use towed video, sonar and direct observation to identify and map submerged habitats and damage to them.	2009-2010	$1,500
Direct Impacts to Preserve Habitats	Map features into a GIS database using differential GPS.	2009-2010	$1,000
Direct Impacts to Preserve Habitats	If program resources allow, map shallow areas to at least the 6ft (2m) contour.	2009-2010	$1,000
Direct Impacts to Preserve Habitats	TCAP will gather information on habitat degradation from sources that include, but are not limited to the seagrass scarring database, compliance/enforcement case information, aerial photography and field observations of TCAP staff and others.	2010-2011	$500
Direct Impacts to Preserve Habitats	Once damaged areas are identified, restoration potential will be evaluated according to ecosystem functionality, potential for self-recovery, logistics/cost of restoration and availability of funds and other resources for restoration.	2009-2010	$500
Direct Impacts to Preserve Habitats	Define the type and scope of restoration that best matches the habitat(s) and degradation.	2010-2011	$100
Direct Impacts to Preserve Habitats	Encourage long-term monitoring.	2009-2010	$0
Direct Impacts to Preserve Habitats	Define the type and scope of restoration that best matches the habitat(s) and degradation.	2010-2011	$200
Shoreline Alteration	Develop a literature database to demonstrate the ecological importance of preserving and restoring shallow habitats.	2010-2011	$500
Unintentional and Illegal Fishing	Maintain a GIS-based database of suspected ghost trap locations.	2010-2011	$500
Unintentional and Illegal Fishing	Seek anecdotal information specific to Terra Ceia.	2010-2011	$200
Invasive Exotic Species	Gather existing information on likely invasives, recruitment of these species and known methods of control.	2009-2010	$200
Aquaculture	Differential GPS and/or markers will be used to delineate proposed aquaculture areas for evaluation.	2009-2010	$500
Aquaculture	Continue to gather results of studies of the biotic impacts of non-local species on local species.	2009-2010	$200
Aquaculture	Encourage research on aspects of local clam culture that would make local species more economically viable for culture and harvest.	2009-2010	$0
Historical and Cultural Resources/ Sites	Establish a GIS database to include shoreline sites.	2013-2014	$500
Historical and Cultural Resources/ Sites	Seek funding sources for archaeological surveys of submerged lands at Terra Ceia.	2013-2014	$300
Historical and Cultural Resources/ Sites	Work with archaeology professors to create a research framework for long-term archaeological study of Terra Ceia.	2012-2013	$300
Historical and Cultural Resources/ Sites	Solicit graduate student research projects.	2012-2013	$200
	Ecosystem Science Subtotal		**$10,200**
Resource Management			
Marine Debris	Recruit volunteers to help with cleanup events.	2009-2010	$1,000
Marine Debris	Work with park staff and volunteers to achieve initial cleanups of all accessible shorelines and to establish a maintenance schedule.	2009-2010	$1,000
Marine Debris	Once inspected for leaks and other hazards, vessels either will be boomed and stabilized or towed to the nearest access point for removal.	2009-2010	$1,000

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Water Quality	Protocols for operation and maintenance of the datasonde station will be updated to standards acceptable to the National Oceanic and Atmospheric Administration Centralized Data Management Office Manual or Department of Environmental Protection standards, whichever are more appropriate. (For Objectives 2.2.1, 2.2.2., & 2.2.3)	2009-2010 & 2013-2014	$0
Water Quality	Datasonde station hardware will be upgraded as needed and new equipment becomes available.	2010-2011	$2,000
Water Quality	TCAP staff will encourage management entities to monitor pet cleanup stations.	2014-2015	$100
Water Quality	Boat launches, trails and other access points will be designed, built and operated to minimize erosion.	2009-2010	$300
Direct Impacts to Preserve Habitats	Where appropriate, TCAP and or partners will mark sensitive resources and maintain markers.	2009-2010	$500
Shoreline Alteration	Conduct annual video surveys of shorelines with a history and/or likelihood of unauthorized alteration.	2010-2011	$1,500
Shoreline Alteration	Coordinate and/or encourage funding and activities to restore dredge and fill sites.	2009-2010	$300
Shoreline Alteration	Encourage and assist in the removal of shoreline exotics and revegetation with appropriate native species on public land.	2009-2010	$500
Unintentional and Illegal Fishing	Schedule regular trap removal efforts with a frequency determined by the GIS database.	2010-2011	$1,000
Mooring Fields and Liveaboards	Work with the Florida Fish and Wildlife Conservation Commission on enforcement actions for illegal mooring.	2014-2015	$200
Public Access Points	Limits will be placed on draft and number of vessels using the facility.	2009-2010	$0
Invasive Exotic Species	Where possible, remove old artificial substrates that are not in use.	2010-2011	$500
Aquaculture	Site evaluations will be scheduled for aquatic vegetation growing season.	2009-2010	$500
Aquaculture	Occasional inspections of lease sites will look for mechanical damage from anchoring and aquaculture-related operations.	2009-2010	$200
Aquaculture	Staff will inspect sites for encroachment on vegetation, hardbottom or other resources.	2009-2010	$500
Disaster/ Contingency Preparation	Discuss strategies with U.S. Coast Guard and DEP's Bureau of Emergency Response.	2009-2010	$100
Disaster/ Contingency Preparation	Revise TCAP's hurricane plan annually.	2009-2010	$200
	Resource Management Subtotal		**$11,400**
Education & Outreach			
Water Quality	If appropriate and useful, make this data available to fishermen on the Internet.	2010-2011	$100
Water Quality	If appropriate and useful, make this data available to fishermen and paddlers on the Internet.	2013-2014	$100
Water Quality	Encourage the public to take an interest in the water quality of their preserve, and enhance public involvement through web access of the data.	2010-2011	$500
Water Quality	Encourage local health agencies to consider new state-of-the-art wastewater treatment ideas.	2011-2012	$500
Water Quality	Enforcement entities will be made aware of the availability of nearly real-time turbidity data through datasonde telemetry.	2012-2013	$500
Water Quality	Training on best management practices for contractors and regulators will be encouraged.	2012-2013	$500
Water Quality	TCAP will seek opportunities to educate local residents on the threats of sediments to the preserve.	2009-2010	$500

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Direct Impacts to Preserve Habitats	Ensure that restoration areas are identified by signage, and contact information is provided on site.	2009-2010	$200
Direct Impacts to Preserve Habitats	Ensure that restoration areas are identified by signage, and contact information is provided on site.	2009-2010	$500
Shoreline Alteration	Provide educational literature, workshops and other means of informing the public on the importance of natural shorelines and the prevention of shoreline alteration.	2009-2010	$500
Shoreline Alteration	Continue regular monthly meetings with regulatory staff.	2009-2010	$1,000
Shoreline Alteration	Provide existing information, such as mangrove trimming guideline booklets, to residents through local events and on request.	2009-2010	$500
Shoreline Alteration	Include a shoreline protection message in presentations routinely conducted for local organizations.	2009-2010	$500
Shoreline Alteration	Encourage homeowners to remove exotic species and to replace them with native shoreline species.	2009-2010	$200
Unintentional and Illegal Fishing	Educate local citizens, law enforcement officers and fishermen on the importance of recognizing and reporting derelict fishing gear.	2010-2011	$200
Unintentional and Illegal Fishing	Continue to assist law enforcement entities with access and site information.	2009-2010	variable
Unintentional and Illegal Fishing	Provide current fishing regulation information at preserve access points.	2009-2010	$500
Unintentional and Illegal Fishing	Provide fishing regulation materials at local events.	2009-2010	$1,000
Unintentional and Illegal Fishing	If warranted, encourage terrapin-safe crab traps within the preserve.	2012-2013	$200
Mooring Fields and Liveaboards	Educate TCAP staff and local residents to recognize and report illegal long-term mooring within the preserve.	2014-2015	$100
Mooring Fields and Liveaboards	Publicize facilities with pumpouts through appropriate media.	2011-2012	$200
Invasive Exotic Species	Train staff to recognize anticipated and existing invasive exotic species.	2009-2010	$500
Invasive Exotic Species	Through feedback to regulatory entities, ensure that the likelihood of facilitating exotic recruitment is a consideration in evaluating proposed impacts.	2009-2010	$100
Invasive Exotic Species	Educate the public on how to minimize the facilitation of exotic recruitment by artificial substrates, bottom disturbances and other activities.	2010-2011	$200
Historical and Cultural Resources/ Sites	Work with the Department of State, Division of Historical Resources to train staff in recognizing archaeological sites.	2012-2013	$200
Historical and Cultural Resources/ Sites	Make trainings and information available to law enforcement officers operating in the preserve.	2013-2014	$1,000
Disaster/ Contingency Preparation	Maintain communications with DEP's Bureau of Emergency Response and the U.S. Coast Guard.	2009-2010	$500
Disaster/ Contingency Preparation	Distribute maps to responders.	2010-2011	$400
Disaster/ Contingency Preparation	Communicate these strategies when agency personnel change.	2009-2010	$100
Disaster/ Contingency Preparation	Provide information (Clean Marina Best Management Practices) to local facilities whose hurricane preparations may prevent spills and other hurricane-related impacts.	2009-2010	$200
	Education & Outreach Subtotal		**$11,500**

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Public Use			
Public Access Points	This facility will be developed with a restoration plan for the site.	2015-2016	$500
Public Access Points	For public safety, a horsepower restriction will be considered along the trail.	2010-2011	$0
	Public Use Subtotal		**$500**
$33,600	**2015-2016 Total**		

2016-2017 Cost Estimate

Ecosystem Science			
Marine Debris	Partner with the adjacent preserve state park in defining informational needs and in organizing cleanup activities.	2010-2011	$200
Marine Debris	Partner with the adjacent preserve state park in defining informational needs and in organizing debris collection activities.	2011-2012	$100
Water Quality	Appropriate agencies will be contacted, and, where possible, their water quality data will be obtained to be archived in digital form.	2013-2014	$500
Water Quality	Integrate the experimental design of TCAP monitoring efforts to be compatible with other monitoring programs in the area.	2010-2011	$200
Direct Impacts to Preserve Habitats	When possible, habitat and distribution data will be georeferenced.	2010-2011	$500
Direct Impacts to Preserve Habitats	TCAP will mine existing databases to include seagrass scarring (Fish and Wildlife Research Institute) and hardbottom topography (Eckerd College).	2010-2011	$500
Direct Impacts to Preserve Habitats	Use towed video, sonar and direct observation to identify and map submerged habitats and damage to them.	2009-2010	$1,500
Direct Impacts to Preserve Habitats	Map features into a GIS database using differential GPS.	2009-2010	$1,000
Direct Impacts to Preserve Habitats	If program resources allow, map shallow areas to at least the 6ft (2m) contour.	2009-2010	$1,000
Direct Impacts to Preserve Habitats	TCAP will gather information on habitat degradation from sources that include, but are not limited to the seagrass scarring database, compliance/enforcement case information, aerial photography and field observations of TCAP staff and others.	2010-2011	$500
Direct Impacts to Preserve Habitats	Once damaged areas are identified, restoration potential will be evaluated according to ecosystem functionality, potential for self-recovery, logistics/cost of restoration and availability of funds and other resources for restoration.	2009-2010	$500
Direct Impacts to Preserve Habitats	Define the type and scope of restoration that best matches the habitat(s) and degradation.	2010-2011	$100
Direct Impacts to Preserve Habitats	Encourage long-term monitoring.	2009-2010	$0
Direct Impacts to Preserve Habitats	Define the type and scope of restoration that best matches the habitat(s) and degradation.	2010-2011	$200
Shoreline Alteration	Develop a literature database to demonstrate the ecological importance of preserving and restoring shallow habitats.	2010-2011	$500
Unintentional and Illegal Fishing	Maintain a GIS-based database of suspected ghost trap locations.	2010-2011	$500
Unintentional and Illegal Fishing	Seek anecdotal information specific to Terra Ceia.	2010-2011	$200
Invasive Exotic Species	Gather existing information on likely invasives, recruitment of these species and known methods of control.	2009-2010	$200
Aquaculture	Differential GPS and/or markers will be used to delineate proposed aquaculture areas for evaluation.	2009-2010	$500
Aquaculture	Continue to gather results of studies of the biotic impacts of non-local species on local species.	2009-2010	$200
Aquaculture	Encourage research on aspects of local clam culture that would make local species more economically viable for culture and harvest.	2009-2010	$0

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Historical and Cultural Resources/ Sites	Establish a GIS database to include shoreline sites.	2013-2014	$500
Historical and Cultural Resources/ Sites	Seek funding sources for archaeological surveys of submerged lands at Terra Ceia.	2013-2014	$300
Historical and Cultural Resources/ Sites	Work with archaeology professors to create a research framework for long-term archaeological study of Terra Ceia.	2012-2013	$300
Historical and Cultural Resources/ Sites	Solicit graduate student research projects.	2012-2013	$200
	Ecosystem Science Subtotal		**$10,200**
Resource Management			
Marine Debris	Recruit volunteers to help with cleanup events.	2009-2010	$1,000
Marine Debris	Work with park staff and volunteers to achieve initial cleanups of all accessible shorelines and to establish a maintenance schedule.	2009-2010	$1,000
Marine Debris	Once inspected for leaks and other hazards, vessels either will be boomed and stabilized or towed to the nearest access point for removal.	2009-2010	$1,000
Water Quality	Protocols for operation and maintenance of the datasonde station will be updated to standards acceptable to the National Oceanic and Atmospheric Administration Centralized Data Management Office Manual or Department of Environmental Protection standards, whichever are more appropriate. (For Objectives 2.2.1, 2.2.2., & 2.2.3)	2009-2010 & 2013-2014	$0
Water Quality	Datasonde station hardware will be upgraded as needed and new equipment becomes available.	2010-2011	$2,000
Water Quality	TCAP staff will encourage management entities to monitor pet cleanup stations.	2014-2015	$100
Water Quality	Boat launches, trails and other access points will be designed, built and operated to minimize erosion.	2009-2010	$300
Direct Impacts to Preserve Habitats	Where appropriate, TCAP and or partners will mark sensitive resources and maintain markers.	2009-2010	$500
Shoreline Alteration	Conduct annual video surveys of shorelines with a history and/or likelihood of unauthorized alteration.	2010-2011	$1,500
Shoreline Alteration	Coordinate and/or encourage funding and activities to restore dredge and fill sites.	2009-2010	$300
Shoreline Alteration	Encourage and assist in the removal of shoreline exotics and revegetation with appropriate native species on public land.	2009-2010	$500
Unintentional and Illegal Fishing	Schedule regular trap removal efforts with a frequency determined by the GIS database.	2010-2011	$1,000
Mooring Fields and Liveaboards	Work with the Florida Fish and Wildlife Conservation Commission on enforcement actions for illegal mooring.	2014-2015	$200
Public Access Points	Limits will be placed on draft and number of vessels using the facility.	2009-2010	$0
Public Access Points	Parking and/or roads, if added, will be permeable.	2016-2017	$50,000
Invasive Exotic Species	Where possible, remove old artificial substrates that are not in use.	2010-2011	$500
Aquaculture	Site evaluations will be scheduled for aquatic vegetation growing season.	2009-2010	$500
Aquaculture	Occasional inspections of lease sites will look for mechanical damage from anchoring and aquaculture-related operations.	2009-2010	$200
Aquaculture	Staff will inspect sites for encroachment on vegetation, hardbottom or other resources.	2009-2010	$500

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Disaster/ Contingency Preparation	Discuss strategies with U.S. Coast Guard and DEP's Bureau of Emergency Response.	2009-2010	$100
Disaster/ Contingency Preparation	Revise TCAP's hurricane plan annually.	2009-2010	$200
	Resource Management Subtotal		**$61,400**
Education & Outreach			
Water Quality	If appropriate and useful, make this data available to fishermen on the Internet.	2010-2011	$100
Water Quality	If appropriate and useful, make this data available to fishermen and paddlers on the Internet.	2013-2014	$100
Water Quality	Encourage the public to take an interest in the water quality of their preserve, and enhance public involvement through web access of the data.	2010-2011	$500
Water Quality	Encourage local health agencies to consider new state-of-the-art wastewater treatment ideas.	2011-2012	$500
Water Quality	Enforcement entities will be made aware of the availability of nearly real-time turbidity data through datasonde telemetry.	2012-2013	$500
Water Quality	Training on best management practices for contractors and regulators will be encouraged.	2012-2013	$500
Water Quality	TCAP will seek opportunities to educate local residents on the threats of sediments to the preserve.	2009-2010	$500
Direct Impacts to Preserve Habitats	Ensure that restoration areas are identified by signage, and contact information is provided on site.	2009-2010	$200
Direct Impacts to Preserve Habitats	Ensure that restoration areas are identified by signage, and contact information is provided on site.	2009-2010	$500
Shoreline Alteration	Provide educational literature, workshops and other means of informing the public on the importance of natural shorelines and the prevention of shoreline alteration.	2009-2010	$500
Shoreline Alteration	Continue regular monthly meetings with regulatory staff.	2009-2010	$1,000
Shoreline Alteration	Provide existing information, such as mangrove trimming guideline booklets, to residents through local events and on request.	2009-2010	$500
Shoreline Alteration	Include a shoreline protection message in presentations routinely conducted for local organizations.	2009-2010	$500
Shoreline Alteration	Encourage homeowners to remove exotic species and to replace them with native shoreline species.	2009-2010	$200
Unintentional and Illegal Fishing	Educate local citizens, law enforcement officers and fishermen on the importance of recognizing and reporting derelict fishing gear.	2010-2011	$200
Unintentional and Illegal Fishing	Continue to assist law enforcement entities with access and site information.	2009-2010	variable
Unintentional and Illegal Fishing	Provide current fishing regulation information at preserve access points.	2009-2010	$500
Unintentional and Illegal Fishing	Provide fishing regulation materials at local events.	2009-2010	$1,000
Unintentional and Illegal Fishing	If warranted, encourage terrapin-safe crab traps within the preserve.	2012-2013	$200
Mooring Fields and Liveaboards	Educate TCAP staff and local residents to recognize and report illegal long-term mooring within the preserve.	2014-2015	$100
Mooring Fields and Liveaboards	Publicize facilities with pumpouts through appropriate media.	2011-2012	$200
Invasive Exotic Species	Train staff to recognize anticipated and existing invasive exotic species.	2009-2010	$500
Invasive Exotic Species	Through feedback to regulatory entities, ensure that the likelihood of facilitating exotic recruitment is a consideration in evaluating proposed impacts.	2009-2010	$100

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Invasive Exotic Species	Educate the public on how to minimize the facilitation of exotic recruitment by artificial substrates, bottom disturbances and other activities.	2010-2011	$200
Historical and Cultural Resources/ Sites	Work with the Department of State, Division of Historical Resources to train staff in recognizing archaeological sites.	2012-2013	$200
Historical and Cultural Resources/ Sites	Make trainings and information available to law enforcement officers operating in the preserve.	2013-2014	$1,000
Disaster/ Contingency Preparation	Maintain communications with DEP's Bureau of Emergency Response and the U.S. Coast Guard.	2009-2010	$500
Disaster/ Contingency Preparation	Distribute maps to responders.	2010-2011	$400
Disaster/ Contingency Preparation	Communicate these strategies when agency personnel change.	2009-2010	$100
Disaster/ Contingency Preparation	Provide information (Clean Marina Best Management Practices) to local facilities whose hurricane preparations may prevent spills and other hurricane-related impacts.	2009-2010	$200
	Education & Outreach Subtotal		**$11,500**
Public Use			
Public Access Points	A temporary pullout site will be developed with a launch site to be developed later.	2016-2017	$2,000
Public Access Points	For public safety, a horsepower restriction will be considered along the trail.	2010-2011	$0
	Public Use Subtotal		**$2,000**
$85,100	**2016-2017 Total**		

2017-2018 Cost Estimate

Ecosystem Science			
Marine Debris	Partner with the adjacent preserve state park in defining informational needs and in organizing cleanup activities.	2010-2011	$200
Marine Debris	Partner with the adjacent preserve state park in defining informational needs and in organizing debris collection activities.	2011-2012	$100
Water Quality	Appropriate agencies will be contacted, and, where possible, their water quality data will be obtained to be archived in digital form.	2013-2014	$500
Water Quality	Integrate the experimental design of TCAP monitoring efforts to be compatible with other monitoring programs in the area.	2010-2011	$200
Direct Impacts to Preserve Habitats	When possible, habitat and distribution data will be georeferenced.	2010-2011	$500
Direct Impacts to Preserve Habitats	TCAP will mine existing databases to include seagrass scarring (Fish and Wildlife Research Institute) and hardbottom topography (Eckerd College).	2010-2011	$500
Direct Impacts to Preserve Habitats	Use towed video, sonar and direct observation to identify and map submerged habitats and damage to them.	2009-2010	$1,500
Direct Impacts to Preserve Habitats	Map features into a GIS database using differential GPS.	2009-2010	$1,000
Direct Impacts to Preserve Habitats	If program resources allow, map shallow areas to at least the 6ft (2m) contour.	2009-2010	$1,000
Direct Impacts to Preserve Habitats	TCAP will gather information on habitat degradation from sources that include, but are not limited to the seagrass scarring database, compliance/enforcement case information, aerial photography and field observations of TCAP staff and others.	2010-2011	$500

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Direct Impacts to Preserve Habitats	Once damaged areas are identified, restoration potential will be evaluated according to ecosystem functionality, potential for self-recovery, logistics/cost of restoration and availability of funds and other resources for restoration.	2009-2010	$500
Direct Impacts to Preserve Habitats	Define the type and scope of restoration that best matches the habitat(s) and degradation.	2010-2011	$100
Direct Impacts to Preserve Habitats	Encourage long-term monitoring.	2009-2010	$0
Direct Impacts to Preserve Habitats	Define the type and scope of restoration that best matches the habitat(s) and degradation.	2010-2011	$200
Shoreline Alteration	Develop a literature database to demonstrate the ecological importance of preserving and restoring shallow habitats.	2010-2011	$500
Unintentional and Illegal Fishing	Maintain a GIS-based database of suspected ghost trap locations.	2010-2011	$500
Unintentional and Illegal Fishing	Seek anecdotal information specific to Terra Ceia.	2010-2011	$200
Invasive Exotic Species	Gather existing information on likely invasives, recruitment of these species and known methods of control.	2009-2010	$200
Aquaculture	Differential GPS and/or markers will be used to delineate proposed aquaculture areas for evaluation.	2009-2010	$500
Aquaculture	Continue to gather results of studies of the biotic impacts of non-local species on local species.	2009-2010	$200
Aquaculture	Encourage research on aspects of local clam culture that would make local species more economically viable for culture and harvest.	2009-2010	$0
Historical and Cultural Resources/ Sites	Establish a GIS database to include shoreline sites.	2013-2014	$500
Historical and Cultural Resources/ Sites	Seek funding sources for archaeological surveys of submerged lands at Terra Ceia.	2013-2014	$300
Historical and Cultural Resources/ Sites	Work with archaeology professors to create a research framework for long-term archaeological study of Terra Ceia.	2012-2013	$300
Historical and Cultural Resources/ Sites	Solicit graduate student research projects.	2012-2013	$200
	Ecosystem Science Subtotal		**$10,200**
Resource Management			
Marine Debris	Recruit volunteers to help with cleanup events.	2009-2010	$1,000
Marine Debris	Work with park staff and volunteers to achieve initial cleanups of all accessible shorelines and to establish a maintenance schedule.	2009-2010	$1,000
Marine Debris	Once inspected for leaks and other hazards, vessels either will be boomed and stabilized or towed to the nearest access point for removal.	2009-2010	$1,000
Water Quality	Protocols for operation and maintenance of the datasonde station will be updated to standards acceptable to the National Oceanic and Atmospheric Administration Centralized Data Management Office Manual or Department of Environmental Protection standards, whichever are more appropriate. (For Objectives 2.2.1, 2.2.2., & 2.2.3)	2009-2010 & 2013-2014	$0
Water Quality	Datasonde station hardware will be upgraded as needed and new equipment becomes available.	2010-2011	$2,000
Water Quality	TCAP staff will encourage management entities to monitor pet cleanup stations.	2014-2015	$100
Water Quality	Boat launches, trails and other access points will be designed, built and operated to minimize erosion.	2009-2010	$300
Direct Impacts to Preserve Habitats	Where appropriate, TCAP and or partners will mark sensitive resources and maintain markers.	2009-2010	$500

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Shoreline Alteration	Conduct annual video surveys of shorelines with a history and/or likelihood of unauthorized alteration.	2010-2011	$1,500
Shoreline Alteration	Coordinate and/or encourage funding and activities to restore dredge and fill sites.	2009-2010	$300
Shoreline Alteration	Encourage and assist in the removal of shoreline exotics and revegetation with appropriate native species on public land.	2009-2010	$500
Unintentional and Illegal Fishing	Schedule regular trap removal efforts with a frequency determined by the GIS database.	2010-2011	$1,000
Mooring Fields and Liveaboards	Work with the Florida Fish and Wildlife Conservation Commission on enforcement actions for illegal mooring.	2014-2015	$200
Public Access Points	Limits will be placed on draft and number of vessels using the facility.	2009-2010	$0
Invasive Exotic Species	Where possible, remove old artificial substrates that are not in use.	2010-2011	$500
Aquaculture	Site evaluations will be scheduled for aquatic vegetation growing season.	2009-2010	$500
Aquaculture	Occasional inspections of lease sites will look for mechanical damage from anchoring and aquaculture-related operations.	2009-2010	$200
Aquaculture	Staff will inspect sites for encroachment on vegetation, hardbottom or other resources.	2009-2010	$500
Disaster/ Contingency Preparation	Discuss strategies with U.S. Coast Guard and DEP's Bureau of Emergency Response.	2009-2010	$100
Disaster/ Contingency Preparation	Revise TCAP's hurricane plan annually.	2009-2010	$200
	Resource Management Subtotal		**$11,400**
Education & Outreach			
Water Quality	If appropriate and useful, make this data available to fishermen on the Internet.	2010-2011	$100
Water Quality	If appropriate and useful, make this data available to fishermen and paddlers on the Internet.	2013-2014	$100
Water Quality	Encourage the public to take an interest in the water quality of their preserve, and enhance public involvement through web access of the data.	2010-2011	$500
Water Quality	Encourage local health agencies to consider new state-of-the-art wastewater treatment ideas.	2011-2012	$500
Water Quality	Enforcement entities will be made aware of the availability of nearly real-time turbidity data through datasonde telemetry.	2012-2013	$500
Water Quality	Training on best management practices for contractors and regulators will be encouraged.	2012-2013	$500
Water Quality	TCAP will seek opportunities to educate local residents on the threats of sediments to the preserve.	2009-2010	$500
Direct Impacts to Preserve Habitats	Ensure that restoration areas are identified by signage, and contact information is provided on site.	2009-2010	$200
Direct Impacts to Preserve Habitats	Ensure that restoration areas are identified by signage, and contact information is provided on site.	2009-2010	$500
Shoreline Alteration	Provide educational literature, workshops and other means of informing the public on the importance of natural shorelines and the prevention of shoreline alteration.	2009-2010	$500
Shoreline Alteration	Continue regular monthly meetings with regulatory staff.	2009-2010	$1,000
Shoreline Alteration	Provide existing information, such as mangrove trimming guideline booklets, to residents through local events and on request.	2009-2010	$500
Shoreline Alteration	Include a shoreline protection message in presentations routinely conducted for local organizations.	2009-2010	$500

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Shoreline Alteration	Encourage homeowners to remove exotic species and to replace them with native shoreline species.	2009-2010	$200
Unintentional and Illegal Fishing	Educate local citizens, law enforcement officers and fishermen on the importance of recognizing and reporting derelict fishing gear.	2010-2011	$200
Unintentional and Illegal Fishing	Continue to assist law enforcement entities with access and site information.	2009-2010	variable
Unintentional and Illegal Fishing	Provide current fishing regulation information at preserve access points.	2009-2010	$500
Unintentional and Illegal Fishing	Provide fishing regulation materials at local events.	2009-2010	$1,000
Unintentional and Illegal Fishing	If warranted, encourage terrapin-safe crab traps within the preserve.	2012-2013	$200
Mooring Fields and Liveaboards	Educate TCAP staff and local residents to recognize and report illegal long-term mooring within the preserve.	2014-2015	$100
Mooring Fields and Liveaboards	Publicize facilities with pumpouts through appropriate media.	2011-2012	$200
Invasive Exotic Species	Train staff to recognize anticipated and existing invasive exotic species.	2009-2010	$500
Invasive Exotic Species	Through feedback to regulatory entities, ensure that the likelihood of facilitating exotic recruitment is a consideration in evaluating proposed impacts.	2009-2010	$100
Invasive Exotic Species	Educate the public on how to minimize the facilitation of exotic recruitment by artificial substrates, bottom disturbances and other activities.	2010-2011	$200
Historical and Cultural Resources/ Sites	Work with the Department of State, Division of Historical Resources to train staff in recognizing archaeological sites.	2012-2013	$200
Historical and Cultural Resources/ Sites	Make trainings and information available to law enforcement officers operating in the preserve.	2013-2014	$1,000
Disaster/ Contingency Preparation	Maintain communications with DEP's Bureau of Emergency Response and the U.S. Coast Guard.	2009-2010	$500
Disaster/ Contingency Preparation	Distribute maps to responders.	2010-2011	$400
Disaster/ Contingency Preparation	Communicate these strategies when agency personnel change.	2009-2010	$100
Disaster/ Contingency Preparation	Provide information (Clean Marina Best Management Practices) to local facilities whose hurricane preparations may prevent spills and other hurricane-related impacts.	2009-2010	$200
	Education & Outreach Subtotal		**$11,500**
Public Use			
Public Access Points	For public safety, a horsepower restriction will be considered along the trail.	2010-2011	$0
	Public Use Subtotal		**$0**
$33,100	**2017-2018 Total**		

2018-2019 Cost Estimate

Ecosystem Science			
Marine Debris	Partner with the adjacent preserve state park in defining informational needs and in organizing cleanup activities.	2010-2011	$200
Marine Debris	Partner with the adjacent preserve state park in defining informational needs and in organizing debris collection activities.	2011-2012	$100
Water Quality	Appropriate agencies will be contacted, and, where possible, their water quality data will be obtained to be archived in digital form.	2013-2014	$500

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Water Quality	Integrate the experimental design of TCAP monitoring efforts to be compatible with other monitoring programs in the area.	2010-2011	$200
Direct Impacts to Preserve Habitats	When possible, habitat and distribution data will be georeferenced.	2010-2011	$500
Direct Impacts to Preserve Habitats	TCAP will mine existing databases to include seagrass scarring (Fish and Wildlife Research Institute) and hardbottom topography (Eckerd College).	2010-2011	$500
Direct Impacts to Preserve Habitats	Use towed video, sonar and direct observation to identify and map submerged habitats and damage to them.	2009-2010	$1,500
Direct Impacts to Preserve Habitats	Map features into a GIS database using differential GPS.	2009-2010	$1,000
Direct Impacts to Preserve Habitats	If program resources allow, map shallow areas to at least the 6ft (2m) contour.	2009-2010	$1,000
Direct Impacts to Preserve Habitats	TCAP will gather information on habitat degradation from sources that include, but are not limited to the seagrass scarring database, compliance/enforcement case information, aerial photography and field observations of TCAP staff and others.	2010-2011	$500
Direct Impacts to Preserve Habitats	Once damaged areas are identified, restoration potential will be evaluated according to ecosystem functionality, potential for self-recovery, logistics/cost of restoration and availability of funds and other resources for restoration.	2009-2010	$500
Direct Impacts to Preserve Habitats	Define the type and scope of restoration that best matches the habitat(s) and degradation.	2010-2011	$100
Direct Impacts to Preserve Habitats	Encourage long-term monitoring.	2009-2010	$0
Direct Impacts to Preserve Habitats	Define the type and scope of restoration that best matches the habitat(s) and degradation.	2010-2011	$200
Shoreline Alteration	Develop a literature database to demonstrate the ecological importance of preserving and restoring shallow habitats.	2010-2011	$500
Unintentional and Illegal Fishing	Maintain a GIS-based database of suspected ghost trap locations.	2010-2011	$500
Unintentional and Illegal Fishing	Seek anecdotal information specific to Terra Ceia.	2010-2011	$200
Invasive Exotic Species	Gather existing information on likely invasives, recruitment of these species and known methods of control.	2009-2010	$200
Aquaculture	Differential GPS and/or markers will be used to delineate proposed aquaculture areas for evaluation.	2009-2010	$500
Aquaculture	Continue to gather results of studies of the biotic impacts of non-local species on local species.	2009-2010	$200
Aquaculture	Encourage research on aspects of local clam culture that would make local species more economically viable for culture and harvest.	2009-2010	$0
Historical and Cultural Resources/ Sites	Establish a GIS database to include shoreline sites.	2013-2014	$500
Historical and Cultural Resources/ Sites	Seek funding sources for archaeological surveys of submerged lands at Terra Ceia.	2013-2014	$300
Historical and Cultural Resources/ Sites	Work with archaeology professors to create a research framework for long-term archaeological study of Terra Ceia.	2012-2013	$300
Historical and Cultural Resources/ Sites	Solicit graduate student research projects.	2012-2013	$200
	Ecosystem Science Subtotal		**$10,200**
Resource Management			
Marine Debris	Recruit volunteers to help with cleanup events.	2009-2010	$1,000
Marine Debris	Work with park staff and volunteers to achieve initial cleanups of all accessible shorelines and to establish a maintenance schedule.	2009-2010	$1,000

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Marine Debris	Once inspected for leaks and other hazards, vessels either will be boomed and stabilized or towed to the nearest access point for removal.	2009-2010	$1,000
Water Quality	Protocols for operation and maintenance of the datasonde station will be updated to standards acceptable to the National Oceanic and Atmospheric Administration Centralized Data Management Office Manual or Department of Environmental Protection standards, whichever are more appropriate. (For Objectives 2.2.1, 2.2.2., & 2.2.3)	2009-2010 & 2013-2014	$0
Water Quality	Datasonde station hardware will be upgraded as needed and new equipment becomes available.	2010-2011	$2,000
Water Quality	TCAP staff will encourage management entities to monitor pet cleanup stations.	2014-2015	$100
Water Quality	Boat launches, trails and other access points will be designed, built and operated to minimize erosion.	2009-2010	$300
Direct Impacts to Preserve Habitats	Where appropriate, TCAP and or partners will mark sensitive resources and maintain markers.	2009-2010	$500
Shoreline Alteration	Conduct annual video surveys of shorelines with a history and/or likelihood of unauthorized alteration.	2010-2011	$1,500
Shoreline Alteration	Coordinate and/or encourage funding and activities to restore dredge and fill sites.	2009-2010	$300
Shoreline Alteration	Encourage and assist in the removal of shoreline exotics and revegetation with appropriate native species on public land.	2009-2010	$500
Unintentional and Illegal Fishing	Schedule regular trap removal efforts with a frequency determined by the GIS database.	2010-2011	$1,000
Mooring Fields and Liveaboards	Work with the Florida Fish and Wildlife Conservation Commission on enforcement actions for illegal mooring.	2014-2015	$200
Public Access Points	Limits will be placed on draft and number of vessels using the facility.	2009-2010	$0
Invasive Exotic Species	Where possible, remove old artificial substrates that are not in use.	2010-2011	$500
Aquaculture	Site evaluations will be scheduled for aquatic vegetation growing season.	2009-2010	$500
Aquaculture	Occasional inspections of lease sites will look for mechanical damage from anchoring and aquaculture-related operations.	2009-2010	$200
Aquaculture	Staff will inspect sites for encroachment on vegetation, hardbottom or other resources.	2009-2010	$500
Disaster/Contingency Preparation	Discuss strategies with U.S. Coast Guard and DEP's Bureau of Emergency Response.	2009-2010	$100
Disaster/Contingency Preparation	Revise TCAP's hurricane plan annually.	2009-2010	$200
	Resource Management Subtotal		**$11,400**
Education & Outreach			
Water Quality	If appropriate and useful, make this data available to fishermen on the Internet.	2010-2011	$100
Water Quality	If appropriate and useful, make this data available to fishermen and paddlers on the Internet.	2013-2014	$100
Water Quality	Encourage the public to take an interest in the water quality of their preserve, and enhance public involvement through web access of the data.	2010-2011	$500
Water Quality	Encourage local health agencies to consider new state-of-the-art wastewater treatment ideas.	2011-2012	$500
Water Quality	Enforcement entities will be made aware of the availability of nearly real-time turbidity data through datasonde telemetry.	2012-2013	$500
Water Quality	Training on best management practices for contractors and regulators will be encouraged.	2012-2013	$500
Water Quality	TCAP will seek opportunities to educate local residents on the threats of sediments to the preserve.	2009-2010	$500

Issue	Strategy	Project Initiation	Estimated Yearly Cost
Direct Impacts to Preserve Habitats	Ensure that restoration areas are identified by signage, and contact information is provided on site.	2009-2010	$200
Direct Impacts to Preserve Habitats	Ensure that restoration areas are identified by signage, and contact information is provided on site.	2009-2010	$500
Shoreline Alteration	Provide educational literature, workshops and other means of informing the public on the importance of natural shorelines and the prevention of shoreline alteration.	2009-2010	$500
Shoreline Alteration	Continue regular monthly meetings with regulatory staff.	2009-2010	$1,000
Shoreline Alteration	Provide existing information, such as mangrove trimming guideline booklets, to residents through local events and on request.	2009-2010	$500
Shoreline Alteration	Include a shoreline protection message in presentations routinely conducted for local organizations.	2009-2010	$500
Shoreline Alteration	Encourage homeowners to remove exotic species and to replace them with native shoreline species.	2009-2010	$200
Unintentional and Illegal Fishing	Educate local citizens, law enforcement officers and fishermen on the importance of recognizing and reporting derelict fishing gear.	2010-2011	$200
Unintentional and Illegal Fishing	Continue to assist law enforcement entities with access and site information.	2009-2010	variable
Unintentional and Illegal Fishing	Provide current fishing regulation information at preserve access points.	2009-2010	$500
Unintentional and Illegal Fishing	Provide fishing regulation materials at local events.	2009-2010	$1,000
Unintentional and Illegal Fishing	If warranted, encourage terrapin-safe crab traps within the preserve.	2012-2013	$200
Mooring Fields and Liveaboards	Educate TCAP staff and local residents to recognize and report illegal long-term mooring within the preserve.	2014-2015	$100
Mooring Fields and Liveaboards	Publicize facilities with pumpouts through appropriate media.	2011-2012	$200
Invasive Exotic Species	Train staff to recognize anticipated and existing invasive exotic species.	2009-2010	$500
Invasive Exotic Species	Through feedback to regulatory entities, ensure that the likelihood of facilitating exotic recruitment is a consideration in evaluating proposed impacts.	2009-2010	$100
Invasive Exotic Species	Educate the public on how to minimize the facilitation of exotic recruitment by artificial substrates, bottom disturbances and other activities.	2010-2011	$200
Historical and Cultural Resources/ Sites	Work with the Department of State, Division of Historical Resources to train staff in recognizing archaeological sites.	2012-2013	$200
Historical and Cultural Resources/ Sites	Make trainings and information available to law enforcement officers operating in the preserve.	2013-2014	$1,000
Disaster/Contingency Preparation	Maintain communications with DEP's Bureau of Emergency Response and the U.S. Coast Guard.	2009-2010	$500
Disaster/Contingency Preparation	Distribute maps to responders.	2010-2011	$400
Disaster/Contingency Preparation	Communicate these strategies when agency personnel change.	2009-2010	$100
Disaster/Contingency Preparation	Provide information (Clean Marina Best Management Practices) to local facilities whose hurricane preparations may prevent spills and other hurricane-related impacts.	2009-2010	$200
	Education & Outreach Subtotal		**$11,500**
Public Use			
Public Access Points	For public safety, a horsepower restriction will be considered along the trail.	2010-2011	$0
	Public Use Subtotal		**$0**
$33,100	**2018-2019 Total**		

*D.3 / **Budget Summary Table***

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

2009-2010 Cost Estimate	
Ecosystem Science Subtotal	$13,100
Resource Management Subtotal	$8,200
Education & Outreach Subtotal	$8,000
Public Use Subtotal	**$3,500**
2009-2010 Total	**$32,800**

2014-2015 Cost Estimate	
Ecosystem Science Subtotal	$11,200
Resource Management Subtotal	$27,900
Education & Outreach Subtotal	$12,000
Public Use Subtotal	**$0**
2014-2015 Total	**$51,100**

2010-2011 Cost Estimate	
Ecosystem Science Subtotal	$9,100
Resource Management Subtotal	$12,600
Education & Outreach Subtotal	$9,700
Public Use Subtotal	**$0**
2010-2011 Total	**$31,400**

2015-2016 Cost Estimate	
Ecosystem Science Subtotal	$10,200
Resource Management Subtotal	$11,400
Education & Outreach Subtotal	$11,500
Public Use Subtotal	**$500**
2015-2016 Total	**$33,600**

2011-2012 Cost Estimate	
Ecosystem Science Subtotal	$9,800
Resource Management Subtotal	$11,100
Education & Outreach Subtotal	$10,500
Public Use Subtotal	**$0**
2011-2012 Total	**$31,400**

2016-2017 Cost Estimate	
Ecosystem Science Subtotal	$10,200
Resource Management Subtotal	$61,400
Education & Outreach Subtotal	$11,500
Public Use Subtotal	**$2,000**
2016-2017 Total	**$85,100**

2012-2013 Cost Estimate	
Ecosystem Science Subtotal	$12,000
Resource Management Subtotal	$12,800
Education & Outreach Subtotal	$11,300
Public Use Subtotal	**$3,000**
2012-2013 Total	**$39,100**

2017-2018 Cost Estimate	
Ecosystem Science Subtotal	$10,200
Resource Management Subtotal	$11,400
Education & Outreach Subtotal	$11,500
Public Use Subtotal	**$0**
2017-2018 Total	**$33,100**

2013-2014 Cost Estimate	
Ecosystem Science Subtotal	$22,200
Resource Management Subtotal	$11,300
Education & Outreach Subtotal	$11,900
Public Use Subtotal	**$0**
2013-2014 Total	**$45,400**

2018-2019 Cost Estimate	
Ecosystem Science Subtotal	$10,200
Resource Management Subtotal	$11,400
Education & Outreach Subtotal	$11,500
Public Use Subtotal	**$0**
2018-2019 Total	**$33,100**

Terra Ceia Aquatic Preserve

Management Plan • August 2009 - July 2019

Terra Ceia Aquatic Preserve
130 Terra Ceia Road
Terra Ceia, FL 34250

Florida Department of Environmental Protection
Coastal and Aquatic Managed Areas
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