



TERRA CEIA PRESERVE STATE PARK

Park Chapter

CENTRAL GULF COAST REGION

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Terra Ceia Preserve State Park

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Planning Region: Central Gulf

County: Manatee

Lease/Management Agreement Number: 4191 and 4673

Overview: Terra Ceia Preserve State Park protects the water quality of Tampa Bay, while preserving natural communities and cultural resources located within the preserve and providing recreational opportunities such as hiking, biking, paddling, fishing and wildlife observation.

Total Acreage: ±1,948.02

Natural Communities	Acres
Blackwater Stream	2.33
Coastal Berm	10.25
Depression Marsh	34.04
Estuarine Unconsolidated Substrate	104.55
Estuarine Unconsolidated Wetland	0.19
Hydric Hammock	10.54
Mangrove Swamp	987.75
Maritime Hammock	1.55
Marsh Lake	19.99
Mesic Flatwoods	4.34
Mesic Hammock	90.61
Salt Marsh	88.64
Shell Mound	0.52
Altered Landcover	Acres
Abandoned Field	194.19
Artificial Pond	0.10
Canal/Ditch	0.55
Developed	3.73
Invasive Exotic Monoculture	26.26
Restoration Natural Community	102.98
Road	4.18
Spoil Area	27.39
Successional Hardwood Forest	236.43
Utility Corridor	1.50

Acquisition: Terra Ceia Preserve State Park was initially purchased to be managed as a state buffer preserve. On February 24, 1999, the Board of Trustees of the Internal Improvement Trust Fund (BOT) purchased an undivided 50 percent interest in 1,372 acres in the Terra Ceia Buffer Preserve project from the Southwest Florida Water Management District (SWFWMD). Funding for the purchase was provided by the Conservation and Recreational Lands Program.

The BOT and SWFWMD leased 1,372 acres (Lease Number 4191) to the DEP Division of Marine Resources (known later as the Office of Coastal and Aquatic Managed Areas, and more recently as the Office of Resilience and Coastal Protection) on March 17, 1999. This 50-year lease, set to

expire on March 16, 2049, was assigned to and assumed by the Division of Recreation of Parks (DRP) via BOT and SWFWMD approved instruments dated December 5, 2003, and June 9, 2004.

The BOT and SWFWMD released 446.28 acres from Lease Number 4191 on April 25, 2011, with said acres leased from the BOT to DRP under a separate 50-year lease (Lease Number 4673) which expires on April 24, 2061. The combined lease acres of the preserve total 1,948.02 acres. DRP manages 1,501.74 acres under Lease Number 4191 and 446.28 acres under Lease Number 4673.

Resource Management Component

Hydrology

- Develop a hydrological monitoring schedule.
- Engage and coordinate with partner agencies doing regular hydrological assessments and water quality testing in the preserve and surrounding estuary.
- Cooperate with state and federal agencies and researchers in monitoring preserve hydrology, especially surface water quality.
- Complete a hydrological assessment to determine preserve's hydrological restoration needs.
- Assess all freshwater, mangrove-lined and salt-water ponds for salinity, habitat function and fish/invertebrate inventories.
- Identify potential mitigation and restoration strategies.
- Restore tidal hydrological function to over 2.6 acres of mangrove swamp and 2.3 acres of estuarine unconsolidated substrate.
- Work with partners to determine best placement of culverts under Hightower Road to restore tidal flushing and prevent further mangrove loss.
- Improve tidal flushing between stagnant estuarine lagoons and fingers.
- Monitor effects and document with photo points.
- Investigate the feasibility and subsequent function of removing spoil piles left behind by the SWIM Terra Ceia Ecosystem Restoration Project.

Natural Communities

- Maintain approximately 300 acres within the optimum fire return interval.
- Differentiate fire-type acres from those that can be managed as non-fire type.
- Develop/update annual prescribed fire plan that includes guidance for burning in adjacent sensitive communities, such as salt marsh.
- Continue to develop a restoration plan for altered land cover and utilize fire where necessary for restoration of desired natural communities.
- Update restoration plan for altered landcover.
- Develop a site-specific plan for eliminating invasive species, staying current with scientific advances in restoration ecology.
- Experiment with different project sizes and schemas to determine successful strategies for groundcover restoration.
- Set clear objectives that identify when and how additional plant materials are to be utilized.
- Implement the restoration plan on 100 upland acres of abandoned field.
- Continue to test groundcover restoration on a small scale to identify successful sequences.
- Monitor the progress of the restoration activities and document with photo points.

- Identify potential funding sources and appropriate plant material sources for larger projects as appropriate.
- Conduct natural community/habitat improvement activities on two acres of depression marsh.
- Minimize willow and hardwood encroachment from depression marsh areas.

Imperiled Species

- Develop/update baseline imperiled species occurrence inventory lists for plants and animals.
- Continue working in cooperation with FWC to facilitate acoustical monitoring for the imperiled tricolored bat.
- Implement imperiled plant species monitoring protocols for wild cotton, golden leather fern, Florida mayten, West Indian cock's comb, giant air plant (*Tillandsia utriculata*), Shell mound prickly pear.

Invasive and Nuisance Species

- Update long-term invasive plant management plan for the preserve annually.
- Identify the major vectors and pathways for invasive plants at the preserve and reduce incoming propagules where possible.
- Regularly update surveys to reflect accurate infestation levels of each management zone.
- Develop an early detection rapid response protocol for new infestations.
- Develop a species-specific action plan for each management zone with a prioritization framework.
- Monitor and maintain 65 gross acres of habitat already in maintenance condition as needed.
- Survey all maintenance areas regularly for new infestations, with species' biology determining monitoring timeframe.
- Treat areas where invasive plant spread is imminent (especially after prescribed fire, mechanical, or other disturbance).
- Reduce or maintain coverclass on approximately 745 acres not in maintenance.
- Survey and treat after prescribed fire for rapid spread of invasive species.
- Reduce high infestations with additional labor sources (e.g., contract funding, strike teams) and plan for passive or active restoration.
- Continue to monitor and implement control measures on feral hogs to protect native species and habitats.
- Monitor all preserve lands, especially historic hot spots (i.e., TC-08, TC-13, TC-28 and TC-37) for fresh hog activity.
- Conduct in-house removal where feasible; contact USDA for assistance where necessary.
- Install boundary fencing where possible to reduce the influx of new invasive/nuisance animals (i.e., in TC-33, TC-36 and TC-37).

Cultural Resources

- Monitor one resource group (MA00311) and two archaeological sites (MA00300, MA00302) annually.
- Work with the Bureau of Natural and Cultural Resources (BNCR) and DHR to create a plan for the stabilization and monitoring of the Harbor Key complex (MA00311).
- Annually monitor Big Pond and Mariposa Key for disturbance/erosion.

- Monitor 19 sites that were initially described as in “excellent” condition (i.e., listed as “good” above) within two years.
- Update condition on 23 sites that were initially described as having “minor disturbance” (i.e., listed as “fair” above) within three years.
- Update condition on 33 sites that were initially described as “deteriorated” (i.e. listed as “poor” above) within five years.
- Compile reliable documentation for all recorded historic and archaeological resources.
- Finalize the georeferenced site map (Burger 2003) to facilitate site monitoring.
- Update FMSF (with photos and/or GIS if necessary) at all monitored sites.
- Create a multi-year prioritized revisitation schedule, assigning high priority sites annually.
- Plan for stabilization of the Harbor Key Complex.
- Evaluate feasibility of rehabilitating the Haley House and outbuildings.

Land Use Component

Conceptual Land Use

Parkwide

- Update and improve interpretation and signage.
- Provide wayfinding.
- Interpret sensitive aquatic resources.
- Interpret best practices for visitor-wildlife encounters.

Bishop Harbor Road

- Improve resource protection, security, and preserve continuity along the road corridor.
- Consult with Manatee County to evaluate incorporation of the middle segment of Bishop Harbor Road into the preserve boundary.
- Install a crosswalk over Bishop Harbor Road.

Parkwide Trail System

Frog Creek Trailhead

- Improve visitor services.
- Stabilize the parking area and provide one ADA-compliant parking space.
- Install shelter and seating.
- Install directional signage along the trail.

Hightower Trailhead

- Improve visitor and operational services.
- Stabilize the parking area and provide one ADA-compliant parking space.
- Install shelter and seating.
- Install an observation platform and birding blind.
- Consider providing a residence near the trail system.
- Remove the powerline along Hightower Road.

Potential Trail Improvements and Extensions

- Improve and extend trail network.
- Conduct assessment of ecological and archaeological sensitivities.
- Construct new trail and/or designate existing management roads as trail.
- Install wayfinding and interpretation.
- Construct low water crossings.

- Construct footbridges over Frog Creek and Terra Ceia River.
- Construct crosswalk over Bishop Harbor Road.

Bishop Harbor Boat Ramp

- Improve the boat ramp and parking area.
- Stabilize the parking area and boat ramp.
- Maximize efficiency of the parking area to support sustainable visitor use patterns.
- Consider providing a self-serve paddlecraft rental kiosk.
- Improve natural communities adjacent to boat ramp.

Haley House Administration Area

- Determine feasibility of restoring the Haley House.
- Determine the cost of restoring the Haley House to adaptively reuse for administrative office space and/or staff residences.
- Coordinate with DHR to complete a condition assessment.
- Consult with the Bureau of Natural and Cultural Resources and DHR to develop an appropriate management strategy for the Haley House.
- If deconstructing the Haley House is indicated, coordinate with DHR for documentation.

Stotz Road Paddling Launch

- Discontinue use of Williams Bayou access path and roadside parking.
- Restore eroded shoreline.

Proposed Support Area

- Evaluate multiple alternative concepts and select based on cost/benefits.
- Improve operational support infrastructure.
- Connect all new structures to the municipal sewage system.
- Evaluate and implement alternative support area and native plant nursery locations.

Preserve Boundary

- Improve directional signage outside of the preserve boundary.
- Consult with the Florida Department of Transportation and Manatee County to install road signage.

Visitor Use Management

Parkwide Trail System

- Prevent future ecological damage.
- Install regulatory signage.
- Install pedestrian gates for unauthorized vehicle exclusion.

Cultural Sites

- Actively and passively interpret cultural resource protection.
- Prevent prohibited activities on preserve property.
- Design and implement public outreach programs.
- Install regulatory signage.

Optimum Boundary

Lands identified for acquisition as part of Terra Ceia Preserve are widely dispersed. Benefits of the identified acquisitions include filling of gaps and inholdings, connecting disjunct portions of the preserve to improve management and recreation, enhancing upland buffer to the Terra Ceia Aquatic Preserve for water quality protection and preserving additional sensitive archaeological sites.



TERRA CEIA PRESERVE STATE PARK

MANATEE COUNTY, FLORIDA

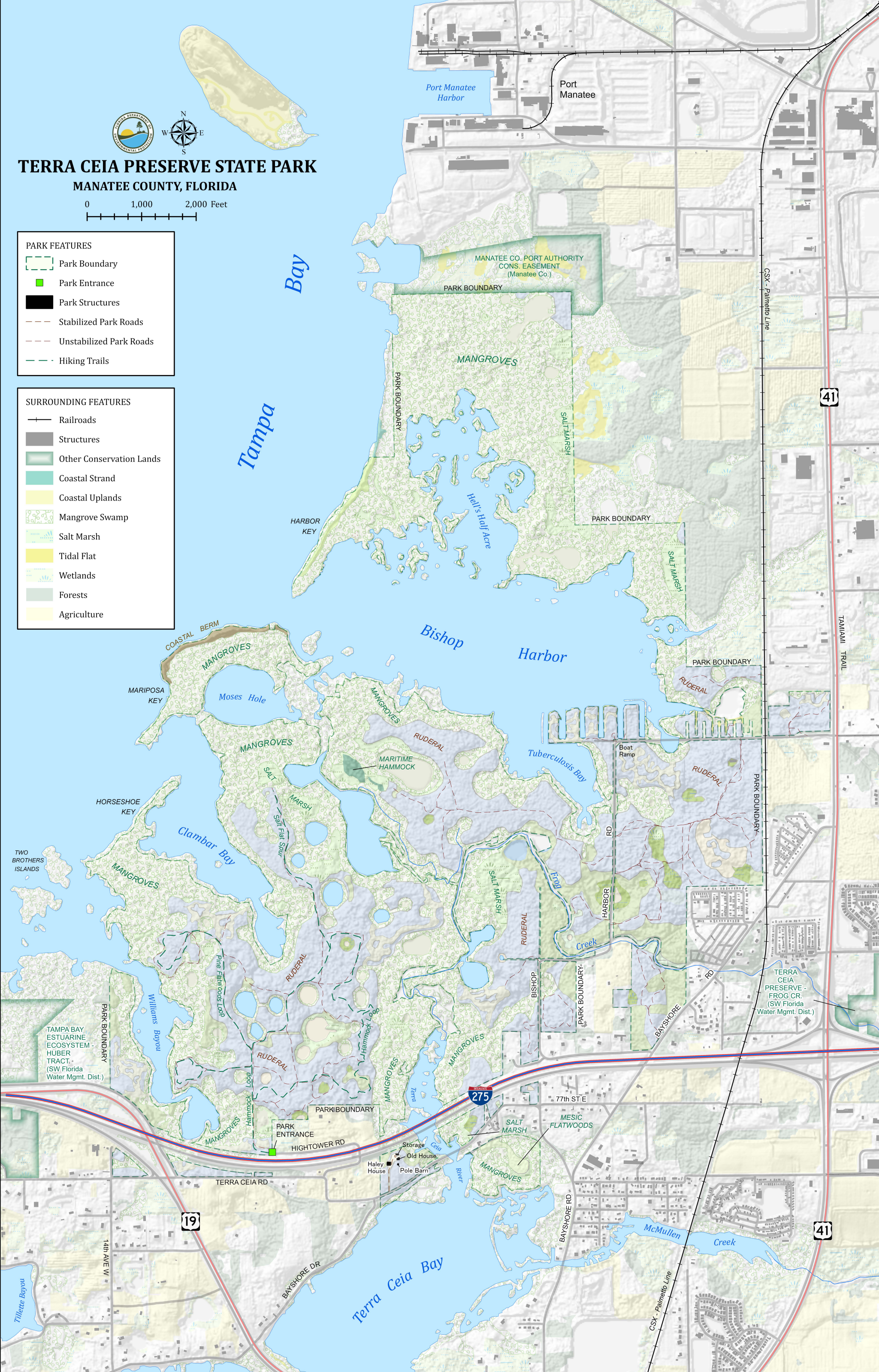
0 1,000 2,000 Feet

PARK FEATURES

- Park Boundary
- Park Entrance
- Park Structures
- Stabilized Park Roads
- Unstabilized Park Roads
- Hiking Trails

SURROUNDING FEATURES

- Railroads
- Structures
- Other Conservation Lands
- Coastal Strand
- Coastal Uplands
- Mangrove Swamp
- Salt Marsh
- Tidal Flat
- Wetlands
- Forests
- Agriculture



INTRODUCTION

LOCATION AND ACQUISITION HISTORY

Terra Ceia Preserve State Park is located in Manatee County and is accessed from U.S. Highway 41. There are significant land and water resources existing near the preserve as reflected in the Central Gulf Region map.

Terra Ceia Preserve State Park was initially purchased to be managed as a state buffer preserve. On February 24, 1999, the Board of Trustees of the Internal Improvement Trust Fund (BOT) purchased an undivided 50 percent interest in 1,372 acres in the Terra Ceia Buffer Preserve project from the Southwest Florida Water Management District (SWFWMD). Funding for the purchase was provided by funds from the Conservation and Recreational Lands Program.

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Terra Ceia Preserve State Park is designated single-use to provide public outdoor recreation and conservation. There are no legislative or executive directives that constrain the use of this property (see appendix). A legal description of the preserve property can be made available upon request to the DEP.

SECONDARY AND INCOMPATIBLE USES

In accordance with section 253.034(5), Florida Statutes (F.S.), the potential of the preserve to accommodate secondary management purposes was analyzed. These secondary purposes were considered within the context of DRP's statutory responsibilities and resource values. This analysis considered the preserve's natural and cultural resources, management needs, aesthetic values, visitation and visitor experiences. It was determined that no secondary purposes could be accommodated in a manner that would not interfere with the primary purpose of resource-based outdoor recreation and conservation.

DRP has determined that uses such as water resource development projects, water supply projects, stormwater management projects, linear facilities and sustainable agriculture and forestry (other than those management activities specifically identified in this plan) would not be consistent with the management purposes of the preserve.

Additionally, Chapter 2026-1, Laws of Florida, strengthened protections for the adjacent Terra Ceia Aquatic Preserve by prohibiting the dredging or filling of submerged lands within the preserve and

safeguarding water quality by allowing for passive recreational activities rather than commercial transportation within the preserve. As such, the objectives, management strategies and land uses contemplated in this plan reflect those increased protections.

In accordance with section 253.034(5), F.S., the potential for generating revenue to enhance management was also analyzed. Visitor fees and charges are the principal source of revenue generated by the preserve. It was determined that multiple-use management activities would not be appropriate as a means of generating revenues for land management. Instead, techniques such as entrance fees, concessions and similar measures will be employed on a case-by-case basis as a means of supplementing preserve management funding. Generating revenue from consumptive uses or from activities that are not expressly related to resource management and conservation is not under consideration.

PURPOSE AND SIGNIFICANCE OF THE PARK

Park Purpose

Terra Ceia Preserve State Park protects the water quality of Tampa Bay, while preserving natural communities and cultural resources located within the preserve and providing recreational opportunities such as hiking, biking, paddling, fishing and wildlife observation.

Park Significance

- Terra Ceia Preserve State Park preserves a significant amount of the remaining natural near-shore upland habitat along Tampa Bay.
- The preserve provides a substantial and complex natural buffer for some of the region's most diverse hardbottom habitat (native limestone outcroppings) located in the Terra Ceia Aquatic Preserve and protects critical shorebird nesting sites.
- The preserve's uplands are rich in pre-Columbian archeological sites and historic cultural artifacts, including the 1909 Haley House, an excellent example of early Florida architecture.

Central Park Theme

Terra Ceia Preserve State Park offers a firsthand look into the restoration of a seaside sanctuary buffering the shores of Tampa Bay estuary.

Internal Classification

Terra Ceia Preserve State Park is classified as a state preserve in the DRP unit classification system. In the management of a state preserve, preservation and enhancement of natural conditions is the priority. Resource considerations are given priority over user considerations and development is restricted to the minimum necessary for ensuring its protection and maintenance, limited access, user safety and convenience and appropriate interpretation. Permitted uses are primarily of a passive nature, related to the aesthetic, interpretive/educational and recreational use of the preserve, although other compatible uses may be permitted within preservation-oriented limitations. Program emphasis is placed on interpretation of the natural and cultural attributes of the preserve.

OTHER DESIGNATIONS

The unit is not within an Area of Critical State Concern as defined in section 380.05, F.S., and it is not under study for such designation. The preserve is a component of the Florida Greenways and Trails System, administered by DEP's Office of Greenways and Trails.

All waters within the preserve have been designated as Outstanding Florida Waters, pursuant to Chapter 62-302, Florida Administrative Code (F.A.C.). Surface waters in this preserve are also classified as Class II waters (shellfish propagation and harvesting area) by DEP. The preserve is adjacent to the Terra Ceia Aquatic Preserve as designated under the Florida Aquatic Preserve Act of 1975 (section 258.35, F.S.).

PARK ACCOMPLISHMENTS

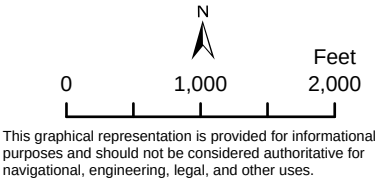
- Applied prescribed fire to 141 acres of uplands in Fiscal Year (FY) 2023-24.
- Treated 130.05 acres (with a treatment goal of 119.80 infested acres) of invasive plant infestations in FY 2024-25.
- Spearheaded by the SWFWMD's Surface Water Improvement and Management (SWIM) Program in collaboration with DEP, the Terra Ceia Ecosystem Restoration Project restored 1,100 acres of wetland and upland coastal communities.
- The preserve provided eight new interpretive programs for local groups and participated in 20 outreach events at partner parks and agencies.
- Preserve staff installed strategic fencing and eradicated hogs.

RESOURCE MANAGEMENT COMPONENT

Terra Ceia Preserve State Park Management Zones		
Management Zone	Acreage	Managed with Prescribed Fire
TC-01	13.29	Yes
TC-02	3.17	No
TC-03	9.64	No
TC-04	26.71	No
TC-05	1.89	No
TC-06	4.65	No
TC-07	6.42	No
TC-08	35.88	Yes
TC-09	14.12	Yes
TC-10	41.89	Yes
TC-11	20.73	Yes
TC-12	16.90	Yes
TC-13	63.79	Yes
TC-14	78.43	Yes
TC-15	43.85	Yes
TC-16	146.59	Yes
TC-17	67.13	Yes
TC-18	107.36	No
TC-19	31.88	No
TC-20	13.45	No
TC-21	53.37	No
TC-22	21.54	No
TC-23	9.75	No
TC-24	37.58	Yes
TC-25	19.33	Yes
TC-26	86.20	Yes
TC-27	53.65	Yes
TC-28	135.46	Yes
TC-29	78.90	Yes
TC-30	34.72	Yes
TC-31	40.86	No
TC-32	75.10	Yes
TC-33	82.19	Yes
TC-34	26.13	Yes
TC-35	10.47	No
TC-36	17.56	No
TC-37	36.33	Yes
TC-38	201.13	No



TERRA CEIA PRESERVE STATE PARK
Management Zones



Terra Ceia Preserve State Park Management Zones		
Management Zone	Acreage	Managed with Prescribed Fire
TC-39	113.77	No
TC-40	66.20	No

TOPOGRAPHY

Terra Ceia Preserve State Park is located on the northwest coast of Manatee County and is bordered by Tampa Bay and several smaller inlets and bays to the west.

Generally, the elevation ranges from zero to 10 feet above mean sea level moving west to east. Uplands within the preserve's boundary consist of a mixture of oak and cabbage palm hammocks, pine flatwoods and partially restored agricultural lands. Mangrove fringe forests and interior salt flats comprise much of the remainder of the preserve. Other features onsite include a variety of wetlands (blackwater creek, depression marshes, high and low estuarine marshes, transitional marshes) and pre-Columbian midden and burial mounds with elevations up to approximately 30 feet.

The terrain is typical of the Peninsular Coastal Lowlands Province (U.S. Geological Survey 2022), which is an area of low elevation that gradually slopes downward towards the coastline near the mouth of the two large estuaries at Tampa Bay and Charlotte Harbor. Most of the gradation is due to past sea level fluctuation that created a terraced effect, especially along rivers in this region. This is evident along Frog Creek, a blackwater stream that bisects the property. In addition, hydrological alterations created by aboriginal habitation, historic agricultural practices, feral hogs and wetland restoration define the dominant topographic features of the preserve's landscape.

As an example of the anthropogenic influences to this area, in 1961 a local business conducted a dredge-and-fill project which created five finger-like projections along the southeastern shoreline of Bishop Harbor. The intent of this project was to create a Venetian-style housing community. The development was not completed and in 2002, a more natural contour was restored to most of the impacted shoreline. The existing Bishop Harbor boat launch and parking area are located at the southwest corner on one of the remaining fingers. The current earthen ramp and parking area have been suspected of contributing to sedimentation and turbidity in the Harbor.

From 2002-2014, extensive land clearing for invasive plant removal, as well as wetland creation and enhancement as part of the Terra Ceia Ecosystem Restoration Project by the SWFWMD's SWIM program, further transformed the landscape (SWFWMD 2014). See Additional Considerations section for more detailed information about this regional restoration effort.

GEOLOGY

Manatee County exists within part of the Terraced Coastal Lowlands, which is a subdivision of the Coastal Plain Province. "At the beginning of the Pleistocene, most of southeast Georgia, a portion of southwest Georgia, and probably the entire Florida peninsula was beneath the sea and part of the continental shelf" (New Georgia Encyclopedia 2004). The Pleistocene was a time of fluctuating sea levels as the great continental glaciers of North America and Eurasia advanced and retreated, causing sea levels to rise and fall. During this time, five marine terraces and four shorelines were formed in Manatee County. The preserve predominantly occupies the most recently formed terrace known as the Pamlico Terrace. This terrace is made up of sand, muck and alluvium deposits formed when sea levels were approximately 20 feet above current levels. The Pamlico Terrace is underlain with layers of late

Pleistocene sediments of sand, sandy limestone and shell. The layers vary in thickness from a few inches up to 100 feet and are underlain by discontinuous Pliocene beds of Caloosahatchee marl, three to 10 feet thick. The marl consists of sand, marine shell, fossilized bones and quartz and phosphorite pebbles.

SOILS

Bradenton fine sand, Chobee loamy fine sand, Eau Gallie fine sand, Floridana-Immokalee-Okeelanta association, Wabasso fine sand and Wulfert-Kesson association are soils that occur most frequently within the boundaries of the preserve (see Soils Map). These coastal soils are generally sandy and/or loamy marine deposits over limestone. The Bradenton and Wabasso fine sands make up much of the upland regions of the preserve and are classified as supporting sandy flatwoods and hammock vegetation. Where organic material has accumulated, the Wulfert-Kesson soils predominate, supporting saltwater marshes and swamps over more than 50 percent of the property.

There is a history of ground disturbance across the preserve, including row and citrus cropping, as well as clearing and regeneration through restoration plantings. Farming practices were likely to have altered the soil chemical profile, and past soil testing demonstrated higher than typical levels of nutrients and metals (University of Florida 2019). Mixed pine and oak plantings with sparse native groundcover are the legacy of the SWFWMD's SWIM Terra Ceia Ecosystem Restoration Project. There is historical reference that suggests that the east side of the preserve was more likely to support pine flatwoods than the west side (Simpson 1890, Burger 2010). However, this should be interpreted with caution, as Terra Ceia was already inhabited by settlers and farmed in the late 19th century.

The long-term success of planted flatwoods species is further threatened by climate-driven threats such as the increasing frequency of saltwater inundation. This was witnessed multiple times in the last few years after hurricanes inundated the site for multiple days and caused a high rate of pine mortality across the site. Past soil surveys, as well as current management results and future projections for coastal properties, can and should be utilized to determine appropriate revegetation strategies for this site.

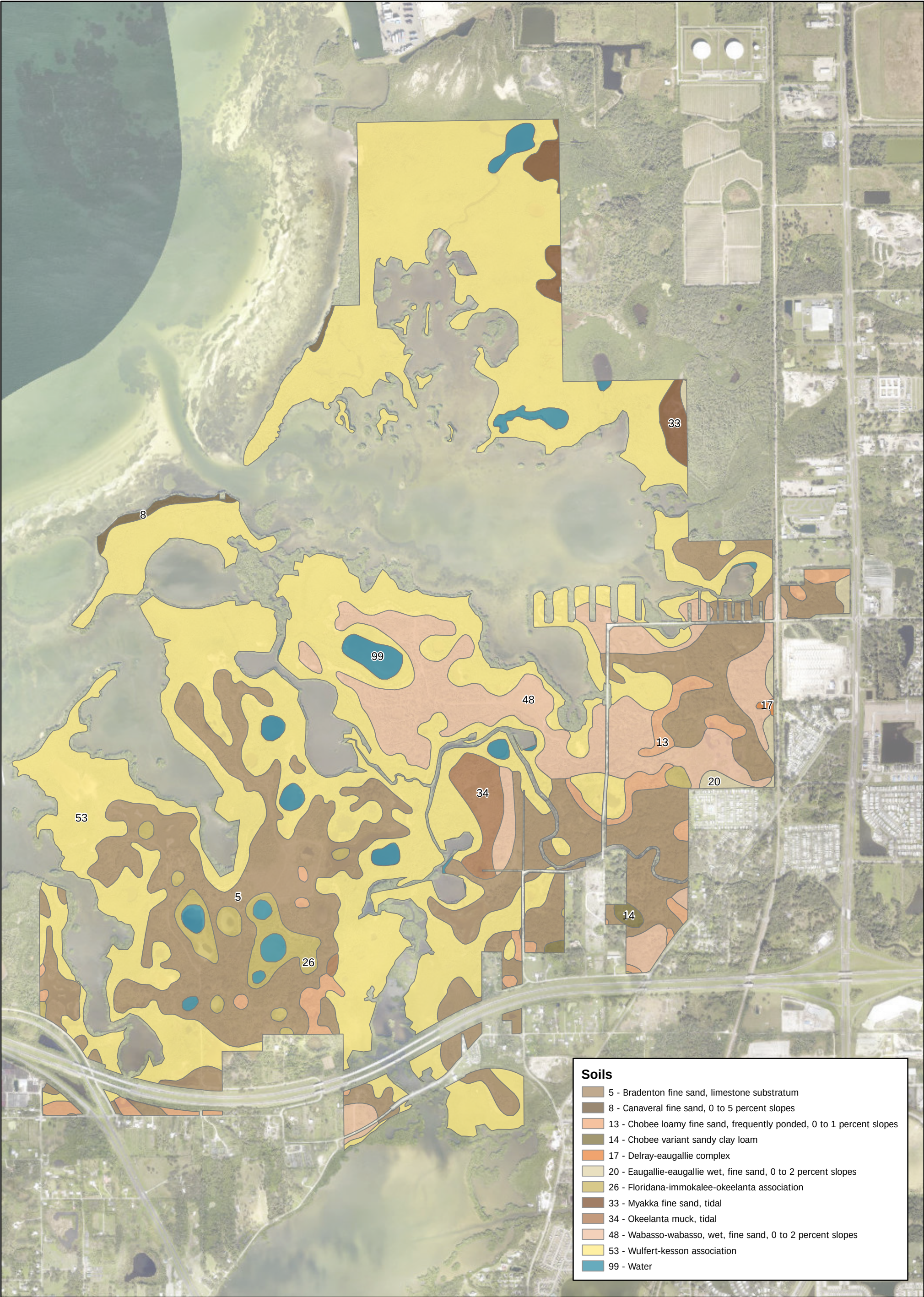
MINERALS

Before the establishment of the preserve, shell and marl were mined for roadway construction. Although this product can be mined via excavation pits, evidence shows that it was taken from shell middens or temple mounds. No other mineral resources are known to occur in the preserve; however, a comprehensive survey for mineral resources has never been conducted.

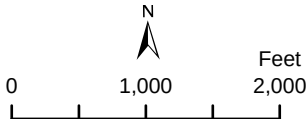
HYDROLOGY

The waters in and around Terra Ceia Preserve represent a valuable estuarine sanctuary spanning both the Lower Tampa Bay and Terra Ceia Bay watersheds and include many individual water bodies. Water bodies within the preserve include Frog Creek and a mosaic of wetlands, from freshwater lakes and ephemeral ponds to intertidal lagoons, salt marsh and mangroves.

The preserve's hydrology has been severely impacted by extensive agricultural use, mosquito ditching and other anthropogenic activities throughout the 20th century. From 2000 to 2014, the SWFWMD's SWIM Program embarked on the largest scale coastal restoration project ever conceived at the time, to restore the hydrology, increase wetland habitat and improve water quality in Terra Ceia and the broader Tampa Bay. Restoration work included the creation of intertidal wetlands and lagoons to increase



TERRA CEIA PRESERVE STATE PARK
Soils



This graphical representation is provided for informational purposes and should not be considered authoritative for navigational, engineering, legal, and other uses.

wetland habitat, restoration of natural drainage patterns and freshwater wetlands via ditch blocks and removal of berms and enhancement of high and low saltwater marsh systems to improve the quality of surface runoff. During the wetland creation and improvement as part of the SWFWMD's SWIM Terra Ceia Ecosystem Restoration Project, approximately three miles of relic agricultural ditches were filled to surrounding grade. Restoration work of this size and scope leaves an indelible footprint. The SWFWMD's SWIM Program continues to monitor the sites every six to 10 years.

The estuarine waters of Williams Bayou and Aldermans Bayou (i.e., Clambar Bay) are finger-like lagoons, which are approximately 1 to 1.5 miles long, located off the west coast of the preserve and partially surrounded by the preserve's boundary. Depths in Williams Bayou reach ± 3 feet National Geodetic Vertical Datum (NGVD) and ± 5 feet NGVD in Clambar Bay. Both water bodies have sand/silt substrates, but Clambar Bay has an additional organic component. Patchy seagrass beds are present in both (Florida Fish and Wildlife Conservation Commission 2024), and Williams Bayou may support widgeon grass (*Ruppia maritima*) (DEP 2015).

Three species of mangrove—red (*Rhizophora mangle*), black (*Avicennia germinans*) and white (*Laguncularia racemosa*)—surround both shorelines. Uplands from the mangrove fringe are ridges of mesic hammock communities dominated by live oaks (*Quercus virginiana*) and cabbage palms (*Sabal palmetto*). Numerous wading birds have been observed utilizing both areas.

Located in the north-central portion of the preserve, Bishop Harbor is a large, shallow bay with depths to ± 5 feet NGVD. The substrate is unconsolidated sand with organic matter and supports turtle grass and manatee grass (*Syringodium filiforme*). Seagrass grows most continuously in shallow water near the mangrove shorelines around the perimeter of the harbor, with more patchy coverage in the center (Florida Fish and Wildlife Conservation Commission 2024). Three mangrove species are present, accompanied by a small percentage of salt marsh vegetation. Oyster bars occur intermittently, with two main concentrations located mid-harbor. Coastal berm communities occur sporadically around the harbor and include sea grape (*Coccoloba uvifera*) and red cedar (*Juniperus virginiana*). During extreme low tides, the harbor's mudflats support a diverse population of wading birds. These natural community types are described further in following sections. Here they are discussed as adjacent components to the numerous wetlands that provide essential habitat to the region's valuable wildlife species.

Approximately 6 miles long and 1 mile wide at its broadest point, Terra Ceia Bay is the largest body of water adjacent to the preserve aside from Tampa Bay. This bay is located directly south of the preserve between the mainland and the Terra Ceia peninsula. The Terra Ceia peninsula divides the two major water bodies, Terra Ceia Bay to the south and Lower Tampa Bay that forms the west shoreline of the preserve. Where the mouth of Terra Ceia Bay meets Tampa Bay, it is bordered by Sned Island to the south and Rattlesnake Key to the north. The mouth of the Manatee River is on the south side of Sned Island. The shoreline is partially developed with rural residential housing, while the remainder is undeveloped. The bay's channel depth is ± 5 feet NGVD, with surrounding depths of ± 1 foot to ± 3 feet NGVD. Silty sands with some organics comprise the substrate and support turtle and manatee grasses. All three species of mangrove are present and have formed some solitary islands in the northern reaches of the bay. Resident and migratory wading birds, as well as multiple species of terns, have been observed in flight on mudflats and in mangroves.

Frog Creek is a 6-mile tidal creek that flows approximately 2 miles within the preserve boundary. The main drainage systems are Cabbage Slough, Cedar Drain and Buffalo Creek, which are channelized tributaries east of the preserve. Frog Creek drains into Terra Ceia Bay to the south. Within the preserve boundary, the banks maintain their natural character – a more gradual slope and native vegetation.

Three broad vegetation regions or salinity zones occur within the preserve, including a freshwater zone east of Bishop Harbor Road, a brackish “mixing” zone and a high salinity, tidally influenced zone dominated by mangroves (University of South Florida – Florida Center for Community Design & Research Tidal Creek Assessment 2013). A few lagoons branch off from the creek in the estuarine zone, and are characterized by shallow depths, mangrove perimeters and hammock ridges. The lagoons appear to be collapsed limestone (karst) formations that have been connected to the main waterway (DEP 2009, Burger 2010). Depths in the creek range from ± 1 to ± 3 feet NGVD in the lagoons to ± 2 to ± 6 feet NGVD in the main channel.

Information obtained from SWFWMD surveys indicates that Frog Creek has a significant underlying "salt wedge" in its depths (Flannery 1996). In November 1996, 14 monitoring stations were established along the creek, located in freshwater, brackish water and saltwater. Results indicate that samples taken at stations considered "freshwater environments" at the surface (0.5, 3.0, 3.2 and 7.0 parts per trillion at 10 centimeters), registered 15, 17, 27 and 25.8 parts per trillion respectively when sampled at a depth of 1 meter. These results suggest favorable conditions for mixing zones, which promote the migration of fish up and downstream. These migration patterns are important for species such as snook (*Centropomus undecimalis*) and striped mullet (*Mugil cephalus*) to feed, breed and overwinter.

Scattered throughout the preserve are many other smaller karst features that hold water for a good portion of the year, providing freshwater for an innumerable number of resident and migratory wildlife. Other freshwater resources in the preserve include 40 known artesian wells. These wells are scattered throughout the preserve and were originally drilled for agricultural purposes. The wells vary in diameter from 2 inches to nearly 8 inches, with depths from 60 to 714 feet. All of the known relic wells have been investigated by the SWFWMD's Quality of Water Improvement Program to prevent any further degradation to groundwater resources. A few of these well points were stabilized for resource management purposes but have deteriorated with age and will probably have to be permanently capped in the future. Artesian wells are known to run dry during seasonal droughts, as discharge depends on water table level, head pressure and well depth. Thus far, 35 wells have been abandoned and permanently capped (i.e., filled with concrete and rubble).

Several agencies (i.e., DEP, U.S. Geological Survey, SWFWMD, Manatee and Hillsborough counties) are regularly collecting water quantity and quality data, available online through the Tampa Bay Water Atlas (Tampa Bay Estuary Program, University of South Florida Water Institute, 2024).

Water Quantity

Originally intended as a buffer preserve for the surrounding aquatic preserve, preserve lands are an excellent vessel for groundwater recharge in the lower Tampa Bay area and should continue to be protected as such. Surface water monitoring level and flow data is available online for Frog Creek (University of South Florida, 2025), but no groundwater monitoring data is currently available. The data sondes that were managed as part of the SWFWMD's SWIM Terra Ceia Ecosystem Restoration Project were abandoned years ago. This information is often valuable in land management decision making (e.g., prescribed fire planning).

Water Quality

The water bodies in and adjacent to the preserve have been designated as an aquatic preserve and Outstanding Florida Water. These designations afford the highest regulatory protection possible with the intent of protecting natural resources and maintaining water quality.

Waters in and adjacent to the preserve are classified as Class II waters, under Rule 62-302.400(41)(j),

F.A.C. 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 the Class II waters designation have been classified as mostly "conditionally approved," except for Miguel Bay and Bishop Harbor, which are "conditionally restricted," and Terra Ceia Bay, which is "prohibited." All man-made ditches and canals are also "prohibited." For classification, explanation and water quality criteria, see Chapter 62-302 and Chapter 62-303, F.A.C., Florida Impaired Waters Rule 2007.

Lower Tampa Bay and Terra Ceia Bay have been designated as "impaired" by DEP, and total maximum daily loads have been established for several of the waterbodies within. As is typical to large watersheds, these water resources face several threats, largely from upstream sources.

It is important that preserve staff stay advised of surrounding water quality issues as they can have direct impacts on preserve resources such as seagrass and marsh habitat. In addition, the presence of excess nutrients may be linked to red tide events.

Hydrological Alterations

The preserve's hydrology has been severely impacted by extensive historic agricultural use. Restoring the hydrology was one of the focuses of the overall restoration of the preserve's natural communities. Measures implemented through the SWFWMD's SWIM Program from 2002 to 2014 include the creation of intertidal wetlands and lagoons to increase wetland habitat, restoration of natural drainage patterns and freshwater wetlands via ditch blocks and removal of berms, and enhancement of high and low saltwater marsh systems to improve the quality of surface runoff. During the wetland creation and improvement as part of the SWFWMD's SWIM Terra Ceia Ecosystem Restoration Project, some of the berms were left intact due to the existence of valuable native and imperiled plant species.

Coastal Erosion/Sedimentation

Water clarity (turbidity) in the Lower Tampa Bay can be poor at times, especially during storm events or high boater traffic. This is often true in the larger bays where fetch can create whitecaps and stir up sediments.

Lower Tampa Bay is a shallow water estuary, and a long coastal shelf extending westward from Mariposa Key and Harbor Key creates an even shallower area around the preserve. Harbor Key forms a peninsula in northwest Bishop Harbor. Historic imagery shows the sandy shoreline extending to the southern tip of Harbor Key, which has now succeeded to a mangrove edge on the south end of the peninsula.

Seagrass beds occur beneath the shallow water, adjacent to the mangrove islands and mainland shore. Boat traffic in shallow water can cause deep scarring and damage to seagrass beds when boat propellers run aground. Seagrass scarring occurs most extensively in shallow water, main channels and places with heavy boat traffic (National Park Service 2008), and seagrass scars can take years to recover. When deep scarring pulls seagrass out with the roots, it can cause erosion and greater loss of surrounding seagrass. Seagrass surveys conducted by the SWFWMD show the change in seagrass coverage over the last 20 years, and the main channel of Bishop Harbor is deeply scarred where boat traffic is highest (National Park Service 2008, SWFWMD 2022).

The Bishop Harbor Boat Ramp provides public boat access to Lower Tampa Bay. This ramp and parking area is a source of erosion and in need of improvement. A boat launch improvement project was not funded during the previous planning cycle. Future launch improvement plans should consider

revegetation strategies and the feasibility of a living shoreline to stabilize the bank. It should be noted that due to the shallow depth of Bishop Harbor, any boat ramp improvements will still limit users to vessels with shallow draft. See the Land Use Component for additional details.

A critical component of successful mitigation must educate the public with improved signage on shallow watercraft warnings, vessel restrictions, seagrass scars, bird entanglement and other site-specific outreach.

There are several other areas within the preserve where visitor access may contribute to shoreline erosion. All areas where there is heavy visitor traffic should be evaluated and designed for improved water quality protection as necessary.

Monitoring and Assessment

Objective: Develop a hydrological monitoring schedule.

Actions:

- Engage and coordinate with partner agencies doing regular hydrological assessments and water quality testing in the preserve and surrounding estuary.
- Continue to review site-specific water quality monitoring data.
- Continue to engage with partners and researchers to determine gaps and additional needs.
- Continue to report water quality issues to appropriate agencies.
- Cooperate with state and federal agencies and researchers in monitoring preserve hydrology, particularly surface water quality.

There are still fingers of mangrove swamp that have been effectively cut off from effective tidal flushing, which results in pockets of mangrove mortality. The SWFWMD will continue to monitor the restoration project every six years, with monitoring data being uploaded to an online database. The SWFWMD should be consulted as additional restoration needs are identified. Preserve staff will continue to collaborate with partners, including the SWFWMD, DEP, Tampa Bay Estuary Program, U.S. Geological Survey, Florida Fish and Wildlife Conservation Commission (FWC) and Manatee County.

Objective: Complete a hydrological assessment to determine the preserve's hydrological restoration needs.

Actions:

- Work with partners, agencies and subject matter experts to:
 - Assess all freshwater, mangrove-lined and salt-water ponds for salinity, habitat function and fish/invertebrate inventories.
 - Identify potential mitigation and restoration strategies.

The Bishop Harbor Boat Ramp area is eroded in several areas, and a living shoreline project is needed to stabilize the bank and prevent additional erosion.

Restoration

Objective: Restore tidal hydrological function to over 2.6 acres of mangrove swamp and 2.3 acres of estuarine unconsolidated substrate.

Actions:

- Work with partners to determine best placement of culverts under Hightower Road to restore tidal flushing and prevent further mangrove loss.
- Improve tidal flushing between stagnant estuarine lagoons and fingers.
- Monitor effects and document with photo points.

Objective: Investigate the feasibility and subsequent function of removing spoil piles left behind by the SWFWMD's SWIM Terra Ceia Ecosystem Restoration Project.

The SWIM Terra Ceia Ecosystem Restoration Project created numerous spoil piles. Many were created intentionally to create mangrove islands and estuarine and wetland habitat. The project also resulted in piles of leftover clay from excavations used to fill ditches and build roads. Ultimately, a contractor dumped a large amount in Management Zone TC-16, which was spread to grade but completely changed the soil and took many years to revegetate. There are also several piles in Management Zone TC-10 which were left over from restoration projects. They are covered by Guinea grass (*Urochloa maxima*) and immediately adjacent to a service road. Tall vegetation makes it difficult to see and they should be removed.

NATURAL COMMUNITIES

The preserve contains 13 distinct natural communities as well as several altered landcover types (see Natural Communities map). A list of currently known plants and animals occurring in the preserve is presented in the Southwest District Species Matrix appendix.

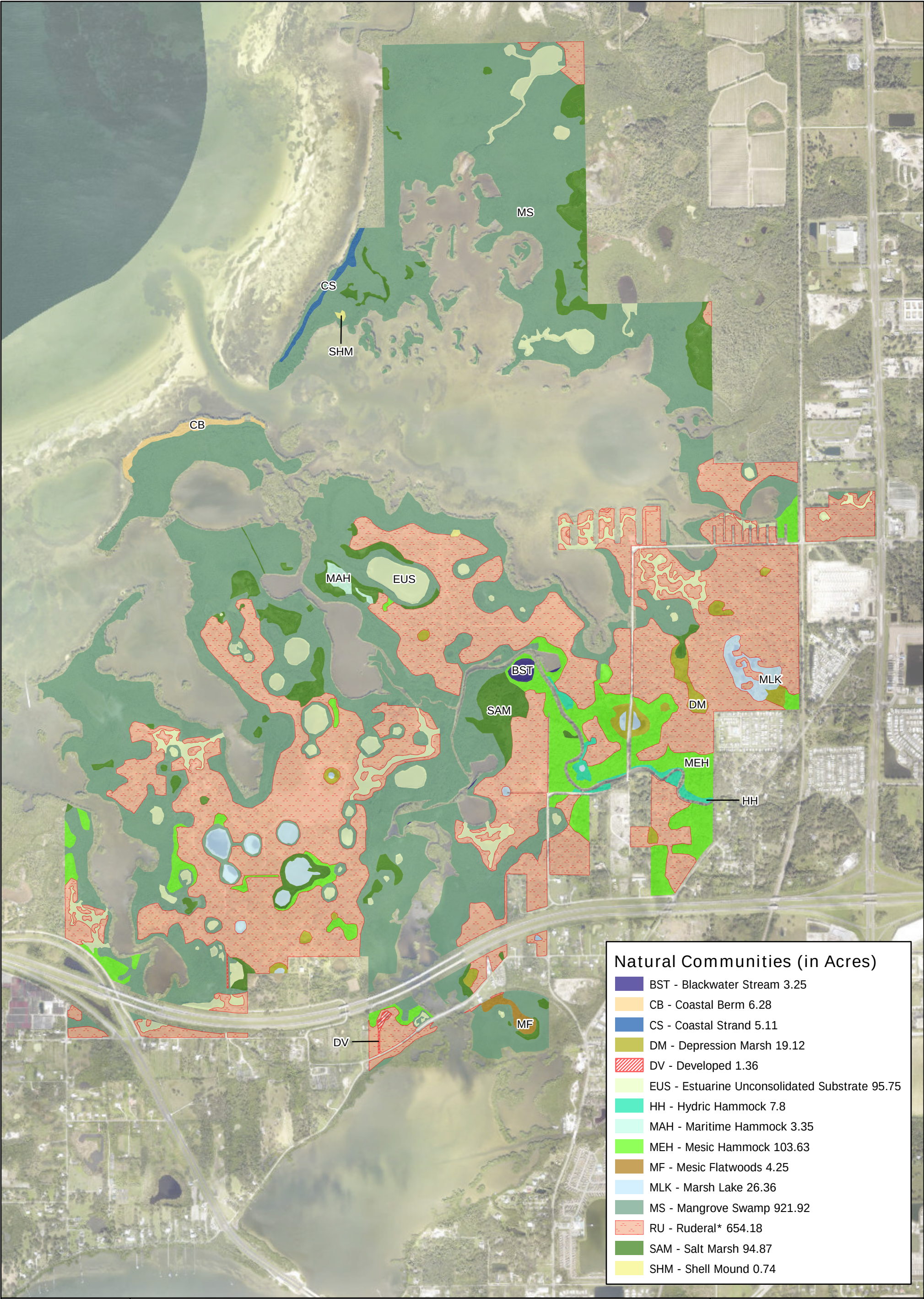
Mesic Hammock

This community type represents one of the climactic stages of succession in coastal areas and can be found scattered throughout the preserve. Dominant species include cabbage palm, live oak, red cedar, laurel oak (*Quercus laurifolia*), wax myrtle (*Morella cerifera*), saw palmetto (*Serenoa repens*), Brazilian pepper (*Schinus terebinthifolia*) and Australian pine (*Casuarina equisetifolia*). Many of the live oaks support epiphytic species, including butterfly orchid (*Encyclia tampensis*). Several South Florida slash pine (*Pinus elliottii*) occur in drier areas. These hammocks possess the greatest vegetative diversity in the preserve, providing critical habitat for neo-tropical and over-wintering migrant birds, resident birds and small mammals. This community may have historically co-dominated the area along with the mesic/hydric pine flatwoods community.

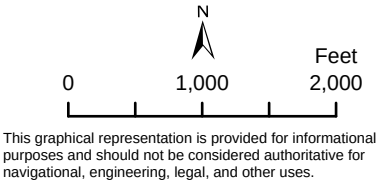
The line between naturally occurring hammock and successional hammock has been blurred by the history of repeated disturbance at this site. As was mentioned in the Soils section, oak species were planted along with pine species in many areas to reflect historical conditions. As the soils in much of the preserve may also be indicative of hardwood hammock species, it is acceptable to manage as such where prescribed fire is unfeasible as a management tool.

Mesic Flatwoods

From land surveyor notes and witness trees to personal accounts from families that have lived in this



TERRA CEIA PRESERVE STATE PARK
Natural Communities - Existing Conditions



area for multiple generations, it is commonly thought that this habitat type constituted a significant portion (along with mesic hammock) of the upland landcover in this region. Given this habitat is also conducive for agricultural operations, the occurrence of natural mesic flatwoods is very limited within the preserve because due to historical land uses. Management Zone TC-04 contains approximately 4 acres of mesic flatwoods. This area was once referred to as Punk Island because of the dense melaleuca (*Melaleuca quinquenervia*) stand that existed on its southernmost tip. The ecological condition of this area is poor to fair due to hydrological alterations as a result of drainage ditches. Increasing the extent of this community was one of the objectives of the SWFWMD's upland restoration projects and will be discussed in more detail under the Altered Landcover section below. It should be noted, however, that the hydrology within Management Zone TC-04 will likely never be fully restored because the drainage ditches convey stormwater from the adjacent residential area to Terra Ceia Bay.

Coastal Berm

Within the preserve, this type of habitat is found on the Tampa Bay coastline of Harbor and Mariposa keys (Management Zones TC-20 and TC-21). The classification of Harbor Key as coastal berm is a correction to the 2012 DRP management plan and is supported by recent scientific research (Jackson 2023). Typical plant species found in this area include seagrass, buttonwood (*Conocarpus erectus*), cabbage palm and a variety of salt-tolerant herbaceous species. Brazilian pepper, Australian pine and a few other invasive species had invaded this area, but invasive plant removal over several decades has succeeded to reduce the infestation to a more manageable level.

Beginning as early as 2001, Harbor Key was treated and monitored as an environmental mitigation site as part of the Gulfstream Natural Gas Pipeline Project (Erwin 2001). A restoration plan for Mariposa Key was also developed in 2010 and implemented by WilsonMiller Inc., with funding from various local environmental organizations such as Tampa Bay Audubon, the U.S. Fish and Wildlife Service's (USFWS) Coastal Program and the Tampa Bay Estuary Program. The focus of this project was to treat invasive vegetation and plant native species (Mariposa Key Plan 2010). WilsonMiller Inc.'s plan included three years of follow-up maintenance and monitoring.

After these phases, the keys have had sporadic treatments with both DRP and FWC funding to be maintained free of invasive plants. In addition, preserve staff have followed up and hosted volunteer cleanup events.

Maritime Hammock

This community type is scarce in the preserve, only present in Management Zone TC-28. Though maritime hammock is typically found in association with mature coastal dune systems, this designation was retained from the 2012 management plan. It appears to be the climax community to the coastal berm/shell mound association of the nearby bay front. This community has evolved on an upland island that is surrounded by mangrove swamp, salt marsh and salt flats. Live oak, cabbage palm and red cedar dominate the canopy, while white stopper (*Eugenia axillaris*) occurs in the mid-story. Future research may provide more insight as to the origin of this distinct community in the preserve. The dense canopy produces a considerable amount of shade, which results in very little herbaceous groundcover. However, there is a substantial amount of leaf litter and dead wood (fuel) built-up. Management is a challenge in this area, as there are no maintenance roads and access by foot is limited by tidal influence.

Shell Mound

Shell mound is present in scattered locations within the preserve. Shell mound is generally similar to

maritime hammock, except for the presence of a calciferous shell substrate. The associated plant species include white and Spanish stopper (*Eugenia spp.*), red cedar, live oak, cabbage palm, cactus (*Opuntia sp.*), marlberry (*Ardisia escallonioides*), Jamaica capertree (*Quadrella jamaicensis*) and saffron plum (*Sideroxylon celastrinum*). One example of this community is particularly notable as it is situated approximately 30 feet above mean high water.

Depression Marsh

This habitat type is one of the more difficult to classify at the preserve due to historical agricultural practices. The preserve's interior depression marshes were historically most likely freshwater karst ponds and hydrologically sustained by a flow of groundwater upward from the Floridan aquifer (DRP 2015). This community is in poor condition and minimally exhibits the characteristics that classify this habitat type. Historic invasive plant infestations and hydrological impacts have contributed to this condition.

Any of these landlocked bodies of water (seasonally flooded or not) that were within or adjacent to an agricultural area were connected by ditches to the closest larger body of water, which was typically saltwater. This was necessary because during periods of heavy rain, the depressional areas would stage water, consequently flooding adjacent areas. This natural occurrence was not favorable to the farmers who had their crops growing between the depressions. Connecting these freshwater depressions to saltwater bodies completely changed their hydroperiod, vegetative structure and source of water.

Before ditching, the dominant vegetation would have been freshwater marsh grass species. Post-ditching, these areas became tidally influenced, oligo- to hyper-saline systems with a mangrove fringe. As a part of the SWFWMD's SWIM Terra Ceia Ecosystem Restoration Project, some of these tidal connections were severed by filling the ditches. This has returned the main input to freshwater and has changed the vegetation structure.

This community was targeted for restoration by the SWFWMD's SWIM Program. Specifically, ditch blocks were used to eliminate tidal influences where they were historically not present, and berms were removed to promote sheet flow of water. In addition, new freshwater wetlands were created.

Hydric Hammock

This community type exists along Frog Creek in Management Zones TC-26, TC-27, TC-30 and TC-31 in the absence of a well-developed floodplain. The spoil material piled on the northern and southern banks are evidence that the creek has been dredged in the past. These berms interfere with the normal sheet-flow associated with periods of high water, and trap water landward of the creek. Over time, the berms have failed in some locations, allowing floodwater to ebb and flow more easily. These areas are currently dominated by leather fern (*Acrostichum danaeifolium*), sand cord grass (*Spartina bakeri*), black needle rush (*Juncus roemerianus*) and invasive Britton's wild petunia (*Ruellia simplex*). This community also has a history of infestation with Brazilian pepper and will require continued maintenance to keep it infestation free.

Salt Marsh

While relatively little of this community type exists in the preserve, this habitat type is productive in terms of biomass and provides a transition zone between terrestrial and aquatic habitats. These tidally influenced ecotones are generally found between tidal flats and tidal swamps. Migrant marsh birds such as American bittern (*Botaurus lentiginosus*) and black rail (*Laterallus jamaicensis*) utilize this community, although they have not been observed at the preserve. One of the goals of the SWFWMD's

SWIM Terra Ceia Ecosystem Restoration Project was to increase this community type (SWIM 2009). Though it was successful at the time, the perimeter of many areas has now been encroached by mangrove species, as is typical for restoration projects at this latitude. Prior damage from feral hog rooting is visible in some areas.

A simple comparison of aerial photographs over the last couple of decades reveals that this habitat is dwindling in size, with the magnitude of loss still unknown but possibly attributed to anthropogenic changes to local hydrology and sea level rise. Due to the inhospitable nature of this natural community, invasive plant species are typically not a concern. However, feral hogs pose a threat to these areas. Feral hogs frequently utilize salt marsh to forage for crustaceans and tubers. The damage is often quite devastating. A family of three to seven individuals could alter a few acres in a single night. Most of the obvious damage is from rooting, but the trails that result from heavy hoof traffic also affect sheet flow into and out of the salt marsh. In the last decade, feral hogs have been nearly eradicated at Terra Ceia Preserve, but staff should continue to be vigilant to make sure their population does not rebound.

Salt Flat variant of Salt Marsh

This variant of salt marsh is a very harsh and dynamic community, which mostly occurs in the northern coastal portions of the preserve. From an aerial perspective, salt flats are easy to pick out because of their typical treeless, open white sandy areas. This habitat type is characterized by relatively treeless, flat or gently undulating land with barren sand or a sparse to dense groundcover of grasses, prostrate vines and other herbaceous salt-tolerant species that are adapted to the hyper-saline maritime conditions. Only the hardiest plants reside here, such as black needle rush, salt marsh hay (*Spartina patens*), salt grass (*Distichlis spicata*), jointed seashore paspalum (*Paspalum vaginatum*), glasswort (*Salicornia spp.*) and saltwort (*Batis maritima*). The landscape of this habitat type is constantly changing. Semidiurnal tidal oscillations continuously resculpt these areas, creating new channels and sand deposits.

Despite the seemingly inhospitable conditions, several shorebirds desire this community for nesting due to its flat, open sand substrate, which aids in the detection of predators. Salt flats may succeed to coastal strand or flatwoods if the frequency of overwash is reduced due to natural or artificial processes.

The foraging practices of feral hogs could drastically alter the flow patterns of water, both storm and tidal, and subject these dynamic areas to longer or shorter periods of inundation. Over time, this could allow for the transition of a relatively barren salt flat into an herbaceous salt marsh.

Mangrove Swamp

Mangrove swamp represents the largest natural community, accounting for nearly half of the preserve's acreage. It is ecologically important as wildlife habitat and providing storm protection for interior preserve lands. Mangrove communities are abundant, hosting all three species of mangroves and buttonwood. Their fallen leaves produce detrital matter, which provides the base of the aquatic food chain. Many avian species such as black-necked stilt, heron species, white ibis and pelican depend on mangroves for nesting, loafing and roosting. The roots of mangroves trap sediments and act as a land-building mechanism. They also serve as fish nursery habitats. Worth noting are the old-growth mangroves on the coastlines surrounding Williams Bayou and Clambar Bay, which display extensive prop roots and heights up to 25 feet. Due to the historic agricultural use of the preserve, all the former freshwater ponds and wetland areas had been connected via ditches to the surrounding salt water of Tampa Bay or Bishop Harbor. Ditching has affected the development of the freshwater system and has allowed the establishment of mangrove species along these ditch shorelines.

Marsh Lake

These ponds were included in the SWFWMD's SWIM Terra Ceia Ecosystem Restoration Project. Invasive vegetation was mechanically and/or chemically treated from the surrounding land. In some cases, manmade drainage ditches were filled or blocked. No wetland species were planted to replace the dead invasive plants. Although the treatment of invasive vegetation is beneficial, the resultant mostly barren shorelines lack their natural concentric bands of wetland vegetation and were soon reinfested. Many bird species, American alligator, otter and various turtles have been observed utilizing the small open water areas that characterize these systems. These karst features are exceptionally important to migrating waterfowl. In addition, black-necked stilts (*Himantopus mexicanus*) have nested near these features for several years and even nested in the middle of one during an exceptionally dry spring.

Blackwater Stream

This habitat type best describes Frog Creek, the main waterway bisecting the preserve. The legal boundaries of Terra Ceia Preserve State Park typically start and stop at the banks of Frog Creek. Exceptions are found within Management Zones TC-24, TC-26 and TC-27, where there is minimal acreage of this habitat type within the preserve boundary. Even though Frog Creek is predominately not included within the boundaries of the preserve, for descriptive purposes the entire system will be discussed.

Where it enters the preserve, Frog Creek is predominantly freshwater. It then gradually becomes tidal and, finally, noticeably brackish approximately 0.75 miles downstream from the Bishop Harbor Road Bridge. The creek's banks are incised, and there are spoil berms in some locations that have prevented the development of a well-defined floodplain. Carolina willow, cattail, bulrush (*Scirpus* sp.), wild petunia, leather fern, torpedo grass (*Panicum repens*), wild taro (*Colocasia esculenta*), pickerelweed (*Pontederia cordata*) and alligator weed (*Alternanthera philoxeroides*) dominate the banks in freshwater regions. Marsh elder shrub (*Iva frutescens*) and sea oxeye daisy are also present, but in smaller numbers. The flanking ecosystems transition from hydric and mesic hammocks to salt marsh and mangrove swamp further downstream towards Terra Ceia Bay.

In some of these upland areas, there are resprouts of Brazilian pepper. The freshwater-saltwater transitional zone is marked by a swamp lily (*Crinum americanum*) leather fern association. A few estuarine lagoons that branch off from the creek are characterized by shallow depths, mangrove perimeters and adjacent hammock ridges. From aerials, these lagoons appear to be karst formations which, over time, have naturally connected to the main waterway. The first appearance of black mangroves occurs approximately one-half mile downstream of the Bishop Harbor Road Bridge. Some of the older individuals in this region of the creek reach heights of 20 to 25 feet.

Approximately one mile downstream from the bridge, Frog Creek flows into the Terra Ceia River, which connects to Terra Ceia Bay and Bishop Harbor. The creek and its immediate environs provide habitat for several species of reptiles, amphibians, songbirds and small mammals that otherwise could not use the estuarine habitats in the preserve. Another notable feature is the variety and abundance of *Tillandsia* species in the branches of hammock trees, buttonwoods and mangroves.

Estuarine Unconsolidated Substrate

This community includes mud flats and sandy shorelines throughout the preserve. While seemingly inert, these areas are some of the most productive in the preserve, serving as habitat for both micro-flora and fauna that are an important food source for many species of fish, birds, mammals and

invertebrates. These areas should be protected from detrimental activities such as illegal dumping, dredging and excess erosion.

Altered Landcover Types

Restoring old fields can be far from straightforward and Terra Ceia Preserve State Park is a testament to that. The varied anthropogenic uses of the land still have a footprint after decades of invasive plant removal and restoring natural processes to the land. What follows is an attempt to reclassify acreage that was formally classified as “ruderal” (DEP 2015), using Florida Natural Area Inventory (FNAI) altered landcover classifications. In some cases, this reclassification is a direct result of having witnessed change, or lack thereof, on the land.

Abandoned Field/Abandoned Pasture

From the 1880s to the 1970s, the lands that constitute the preserve were used extensively for farming purposes and then left fallow. During this period, almost all the uplands were farmed to each mangrove edge. An extensive ditching system with one-way culverts was developed at the landward side of the mangrove line to mitigate for tidal and stormwater intrusion. This practice effectively created a linear dike that has prevented the ecosystems from functioning and maintaining their natural character. These abandoned fields can vary – from some that are relatively intact with native groundcover vegetation resprouting amongst invasive species, to others hydrologically altered where row cropping, berming and ditching persisted, or even completely infested with invasive species. This presents a challenge when it comes to landcover classification; however, any acreage that cannot be confidently described as a natural community or one of the following categories has been classified as abandoned field due to the history of repeated disturbance at the site.

There are quite a few species that utilize these open grassy areas for foraging, including raptor species such as the swallow-tail kite (*Elanoides forficatus*), short-tailed hawk (*Buteo brachyurus*) and peregrine falcon (*Falco peregrinus*), in addition to some non-imperiled raptor species and mammals such as bobcat (*Lynx rufus*) and coyote (*Canis latrans*).

Where intact native species are dominant, invasive plant management and groundcover restoration projects should continue. These areas can serve as a seed source for future projects if managed effectively.

Canal/Ditch

Although the SWFWMD’s SWIM Terra Ceia Ecosystem Restoration Project sought to improve hydrological conditions, an extensive network of ditches that were a result of historic mosquito control efforts and farming practices remains. It would be impractical to fill in all these ditches, as they often are clearly tied into the surrounding drainage network of neighboring developed communities.

Hydrological improvements should be considered on a case-by-case basis as advised by collaboration with appropriate experts.

Developed

Developed areas consist of natural communities that have been permanently cleared and replaced by structures. The main developed areas within the preserve are the site of the historic Haley House and its associated buildings (Management Zone TC-01) and one strip of road that was built during the agriculture era (Management Zone TC-10). Management Zone TC-01 is the current location of administrative offices and shop facilities for preserve staff. The Haley House was utilized as an administrative office for DRP and aquatic preserve staff for several years but has been vacant and not

climate-controlled since 2018. The rehabilitation of the Haley House is being considered to provide preserve staff with adequate office space. Although, a new support area is being proposed in Management Zone TC-36 if restoration and utilization of the structure isn't feasible. Additional details can be found in the Land Use Component section.

Historically, this area has supported a citrus grove, landscape plant nursery and research greenhouse. Moreover, the front yard area was manicured and landscaped with non-native vegetation such as Surinam cherry (*Eugenia uniflora*), Australian pine, queen crepe myrtle (*Lagerstroemia speciosa*), bougainvillea (*Bougainvillea* sp.) and java plum (*Syzygium cuminii*). There are still a few of these specimen trees remaining but most have been removed. The entrance driveway to the Haley House was planted with royal palms (*Roystonea regia*) in the 1930s, but many of the original palms have since fallen in storms. Restoration activities have occurred at this site since 2002, and the area was planted with South Florida slash pine, saw palmetto, sand cord grass and Fakahatchee grass (*Tripsacum dactyloides*). The extensive saltwater inundation that accompanied several hurricanes in the past few years has left most of the planted pines in the preserve dead or injured. Continued monitoring will determine whether these restoration areas develop as pine flatwoods or a community better suited to changing coastal conditions.

Impoundment/Artificial Pond

Ponds that were created as part of the SWFWMD's SWIM Terra Ceia Ecosystem Restoration Project and are not present on historic aerials have been noted on the Natural Communities Map as Restoration Natural Community (RNC) where appropriate. Drainage features created as part of road construction are indicated as well. While the former are treated as their respective natural community types, the latter are serving as infrastructure and are therefore noted as this altered landcover type. Any hydrological alteration to these ponds would need to be assessed for impacts on the surrounding communities.

Restoration of Natural Community

Over 800 acres of both wetland and upland landcover types have been targeted for restoration. In addition to hydrological restoration and invasive plant removal, past projects included freshwater and estuarine wetland creation, as well as pine and oak revegetation in old field areas. Many of these areas are still falling far short of any reference conditions for pine flatwoods or mesic hammock. Restoration of old fields is a challenging, ongoing process and will be discussed in a later section.

In general, it is difficult to draw fine lines between areas of invasive monoculture, saltwater inundated planting areas from storms and naturally succeeded hammock, but these areas all exist at the preserve as altered landcover types. Areas that were described in the past are "ruderal," have been updated for this management cycle to reflect ongoing work, but should be interpreted with caution. After the storm seasons of 2023 and 2024 caused the mortality of many of the mature pines in the preserve, continued monitoring will determine how much pine flatwoods will continue to persist naturally. The increased frequency of catastrophic storms and/or sea level rise may cause restoration practitioners to seek more adaptive strategies (Gann, et al. 2019).

Best practices moving forward are that the desired future conditions (DFC) of each community type should be determined by the soil type, persistence of indicator species, history and recurrence of disturbance and overall desired ecosystem functionality. DFC include pine flatwoods, mesic hammock and depression marsh for many of the former old field areas, although there is much variation from one project area to the next.

Invasive Monoculture

The SWFWMD's SWIM Terra Ceia Ecosystem Restoration Project succeeded in an initial attack on large woody species such as Australian pine, melaleuca and Brazilian pepper. However, subsequent treatments and plantings were not successful in reestablishing the native groundcover throughout much of the site. At the time of DRP's full assumption of management activities from the SWFWMD in 2014, many areas were nearly 100 percent infested with both woody and herbaceous species. Through targeted efforts from preserve staff and funding from sources such as the FWC Uplands Program, the last decade has witnessed a sharp reduction in woody species, but much of the herbaceous groundcover still needs restoration.

Included in this category are a landscape plant nursery (The Old Nursery/Management Zone TC-31) and cattle pasture (Hagen Parcel/Management Zone TC-30). The nursery is located immediately north of Frog Creek and east of Bishop Harbor Road. This area is densely populated with palm species such as Chinese fan palm (*Livistona chinensis*), Senegal (reclining) date palm (*Phoenix reclinata*), traveler's palm (*Ravenala madagascariensis*), queen palm (*Syagrus romanzoffiana*), slender lady palm (*Rhapis humilis*) and bamboo palm (*Chamaedorea seifrizii*). There are also some native species planted in this area, such as bald cypress (*Taxodium distichum*) and sycamore (*Platanus occidentalis*), but they are poorly located and/or outside of their native range. Approximately 8 acres of the nursery area was used as a citrus grove as well.

Road

While most of the preserve is accessed via earthen fire breaks, a road through the Hightower parcel that is known as "Abel Road" on historical maps connected early settlers of the area to the surrounding community and there is still evidence of their occupation in its proximity. This road was later fortified and utilized by contractors during the SWFWMD's SWIM Terra Ceia Ecosystem Restoration Project for operations and fill hauling. It was covered with clay and gravel and now serves as an important conduit for management activities in the Hightower section of the preserve.

While not technically part of preserve property, two major asphalt roads that bisect the preserve include Interstate 275 and Bishop Harbor Road. These roads serve as important accessways for preserve staff but also can double as pathways for degrading influences such as litter, pollution and invasive plants and animals.

Spoil Area

Miles of berms were constructed during the agricultural era of Terra Ceia. In addition, there are countless spoil piles left over from mosquito ditching in the 1940s. Decades later, SWFWMD surveys of the revegetated piles discovered many rare and imperiled species and were left in place scattered around the intertidal zone. A long spoil berm runs from north to south on the west side of the mangrove edge, west of Frog Creek/Terra Ceia River. A few unusual berms are in Management Zone TC-33 which have revegetated with old mature cabbage palms and firebush.

The SWFWMD's SWIM Terra Ceia Ecosystem Restoration Project reduced and breeched some of the extensive network of spoil areas, but much of it remains. Some of the berm areas protect imperiled species and should be considered as potential for other conservation efforts, such as the ex-situ conservation of *Harrisia aboriginum*, a federally endangered species that is currently being repopulated by the USFWS. This species was vouchered last in Manatee County at nearby Madira Bickel Mound State Archaeological Site.

Successional Hardwood Forest

There are extensive areas of hardwood dominated canopy, especially on the east side of the preserve where historic citrus groves had been abandoned. In addition, the planting and subsequent proliferation of sugarberry (*Celtis laevigata*) has further confounded the restoration process in these areas. Because weedy species such as sugarberry and Carolina cherry-laurel (*Prunus caroliniana*) persist both as canopy trees and are dominant recruiters in the understory, these areas are classified as successional hardwood forest. These areas can be an important source of forage for larger mammals such as white-tailed deer (*Odocoileus virginianus*). The population of white-tailed deer in the preserve seems to be growing as is seen in these areas. Maintaining browsing areas for such mammal species, with subsequent population growth could be kept as an important metric for the success of the overall restoration. In time, limiting new invasive plant infestations, using prescribed fire where appropriate in adjacent communities and/or improving the understory with native plantings appropriate to mesic flatwoods are likely strategies to improve these areas.

Prescribed Fire

Objective: Maintain approximately 300 acres within the optimum fire return interval.

Actions:

- Differentiate fire-type acres (RNC mesic flatwoods) from those that can be managed as non-fire type (mesic hammock).
- Develop/update annual prescribed fire plan that includes guidance for burning in adjacent sensitive communities, such as salt marsh.
- Continue to develop a restoration plan for altered land cover and utilize fire where necessary for restoration of desired natural communities.

The table below lists all fire-dependent natural communities found within the preserve, their associated acreage and optimal fire return interval and the annual average target for acres to be burned.

Prescribed Fire Management		
Natural Community	Acres	Optimal Fire Return Interval (Years)
Depression Marsh	34	With adjacent
Salt Marsh	88	With adjacent
Abandoned field	102	As needed for restoration
Restoration Natural Community	194	As needed for restoration
Invasive Monoculture	26	As needed for restoration
Annual Target Acreage	148-444	3-year rotation

Notes:

*Implementation of this interval will be dependent on restoration of adjacent habitat. The frequency of fire will be a function of the fire frequency in the surrounding matrix community, as well as the fire-carrying characteristics of the developing communities.

**The maximum acreage will be determined once Natural Community Map is finalized.

Terra Ceia is a highly altered landscape, with approximately 800 upland acres of former agricultural land and development. These past alterations have made it challenging to discern where prescribed fire can be effectively applied as a management tool. It remains to be determined how much fire-type acreage will persist. Fire is largely used to support restoration activities, invasive species goals and

DFC. Terra Ceia had no fire history prior to 2012 while the intensive SWFWMD SWIM Terra Ceia Ecosystem Restoration Project was underway. Since 2012, nearly all upland acreage has received at least one fire treatment, and some have seen two to four cycles. One of the primary objectives of applying fire to every zone was to determine the DFC, and which uplands should be managed with fire accordingly.

Approximately 400 acres of altered land cover is identified for restoration to fire dependent and/or influenced community types and managed for those conditions. These acreages continue to be refined and identified as restoration plans are developed for each RNC.

One of the challenges of prescribed burning at Terra Ceia Preserve State Park is the lack of fire-type vegetation in this vastly altered landscape. Even where contract efforts have been successful to eradicate invasive grasses, the same treatment has also resulted in non-target damage to native species. There is little pyrogenic groundcover species to carry fire in many areas, thus the existent native seed bank needs supplementation with active restoration plantings to convert the groundcover into the community structure and species composition that is conducive to carry fire. Fire and invasive species treatments alone are not sufficient to meet the DFC's of a mesic flatwood community.

There are mature pine communities that occur in isolated pockets surrounded by mangroves, water and/or ditches that make them inaccessible for equipment. While these relic pockets may have seen fire in centuries past, reintroduction of fire into these mature pine communities may no longer be feasible. For the late-stage remnant pine communities, the processes of sea level rise and saltwater inundation are the ascendant forces that now shape these unique communities. Though small and isolated, they are highly valuable as some of the only natural community reference sites in Terra Ceia. Therefore, photo points and as much information about species composition for each of these remnant communities should be collected to inform future restoration plans. Should lightning strikes and fire succeed, burning out the entire pocket should be considered to maximize fire extent.

One of these remnant pockets, the only mesic flatwood community, slightly exceeds 4 acres in Management Zone TC-04 and is surrounded by salt marsh and mangroves on Terra Ceia Bay and rural residential homes to the north. A ditch further cuts off access from the land side, rendering it only accessible on foot, by way of a neighbor's yard to traverse the ditch. While potentially feasible to apply fire, it may only preserve ecological objectives temporarily, as it is subject to coastal flooding and surge events, making attrition of the mature pines inevitable and young pine recruitment and survival unrealistic.

The salt marsh community at Terra Ceia contains several imperiled plant and animal species. Salt marshes are considered a fire type natural community; however, the optimal fire return intervals have been disputed over the years. Recent research suggests that a two-to-four-year fire return interval is optimal for maintaining habitat and occupancy of rare salt marsh bird species (Cox et al. 2025). It is also believed that historical fires were sporadic, either caused by direct lightning strikes or began in uplands occasionally burning into the salt marshes before extinguishing (FNAI 2010). Periodic salt marsh fires help control fuel build-up, thus minimizing catastrophic fires, in addition to help control hardwood encroachment (particularly mangroves and buttonwood) before they become too tall to be affected by fire. The *Spartina* sp. understory in salt marsh and intertidal areas burns readily and completely, while the altered upland fuels often do not. The salt marsh should be inventoried for imperiled species, along with habitat preferences and nesting seasons before burning so that appropriate mitigation measures are in place to protect the salt marsh from catastrophic fires.

Fire is a complex and dynamic process; therefore, management must be adaptive and ecologically

driven. When adjacent pyric communities are managed with fire, extreme care is essential not to cut firebreaks or maintenance roads through shell mound and other sensitive natural communities.

Restoration

Objective: Update restoration plan for altered land cover.

Actions:

- Develop a site-specific plan for eliminating invasive species, staying current with scientific advances in restoration ecology.
- Experiment with different project sizes and schemas to determine successful strategies for groundcover restoration.
- Set clear objectives that identify when and how additional plant materials are to be utilized.

Preserve uplands were heavily degraded by historic agriculture operations, followed by a significant restoration project which cleared and reshaped the landscape. This multi-phase restoration operation used heavy machinery to mulch invasive stands of Brazilian pepper and Australian pine forests and recontour the fallow row-crop fields. Longleaf and slash pines were planted in the newly cleared and contoured earth. Some groundcover species were planted on 30-foot centers and there were quarterly treatments for the invasive grasses that came in as secondary invaders. Though this continued for three years at each phase of the project, it was largely unsuccessful in establishing a native and/or functional groundcover.

The restoration formula commonly used in that era was to treat invasives, recontour fields, plant pines, burn, and the rest will follow. The importance of establishing groundcover before canopy and addressing the causes and constraining factors of degradation were lessons hard learned from these early restoration efforts. The upland understory that emerged is 75 to 95 percent Guinea grass and other non-native or native ruderal species. Building on past successes to achieve desired future conditions is integral to success. There is much more available to land managers in scientific literature now to inform the process (e.g., Gann et al. 2019). In addition, the University of Florida is conducting research on using ruderal grasses in restoration (LaPierre et al. 2025).

To create an effective plan, staff should continue to use indicator species, soil type and localized hydrology as well as post-fire evaluations to determine boundaries of DFC mesic flatwoods versus salt marsh, mesic hammock and other pyric and non-pyric community types. Focusing on function and functional groups (Kimball et al. 2013) is just one of the many new concepts available to the modern restoration practitioner.

Objective: Implement the restoration plan on 100 upland acres of abandoned field.

Actions:

- Continue to test groundcover restoration on a small scale to identify successful sequences.
- Monitor the progress of the restoration activities and document with photo points.
- Identify potential funding sources and appropriate plant material sources for larger projects as appropriate.

In the past, key elements of this restoration plan included conducting historical research, selecting reference sites, addressing underlying factors that may hinder success and utilizing the best available science. An in-house nursery was set up to aid with the acquisition of native plant materials to test on small-scale projects in invasive-free areas that can be later scaled up following the example of Bakker et

al. in 2018. Finally, and perhaps most important, monitoring to evaluate and adapt action plans are essential.

Improvement

Objective: Conduct natural community/habitat improvement activities on 2 acres of depression marsh.

Action:

- Minimize willow and hardwood encroachment from depression marsh areas.

Develop a sensitive, feasible methodology for removing hardwood shrubs that invade depression marshes to encourage herbaceous species growth where necessary.

IMPERILED SPECIES

Despite the complex history of disturbance at Terra Ceia Preserve State Park, the preserve is home to a number of state imperiled species, and quite a few unrecorded others are suspected. Wading birds such as the reddish egret (*Egretta rufescens*), tri-colored heron (*Egretta tricolor*) and little blue heron (*Egretta caerulea*) are regular visitors to the many ponds and wetlands of the preserve. Shorebirds such as the least tern (*Sternula antillarum*) and the federal imperiled piping plover (*Charadrius melodus*) were documented in the preserve shortly after the SWFWMD's SWIM Terra Ceia Ecosystem Restoration Project began, but they were likely to have been drawn to the large sandy areas free of vegetation when the land was cleared of Brazilian pepper. The only imperiled shorebird species to demonstrate nesting behavior in recent years was the Wilson's plover. This was limited to territorial behavior, and a nest was never found, though there were previous nests throughout the preserve reported in the Florida Shorebird Database (FWC 2012, 2017). Although the Wilson's plover is not currently state or federally listed, it is tracked by FNAI and is under review for state listing. Larger shorebirds like the American oystercatcher (*Haematopus palliatus*) and seabirds such as the black skimmer (*Rynchops niger*) have also been reported in the preserve, foraging in its productive estuarine waters.

Two imperiled mammal species have been well documented at the preserve. The Florida manatee (*Trichechus manatus latirostris*) is common along the shores of the preserve, benefitting from the rich estuarine waters and extensive seagrass forage. In an acoustical monitoring study conducted by FWC, the tricolored bat (*Perimyotis subflavus*) was documented in multiple locations of the preserve along with three other unlisted bat species (FWC 2020). This species is not currently state or federally listed but is proposed for listing as federally endangered. This is due to a suspected sharp decrease in its population suspected to be caused by a fungal pathogen that causes white-nosed syndrome. White-Nosed Syndrome is a fungal disease in hibernating bats caused by *Pseudogymnoascus destructans*. *Pseudogymnoascus destructans* grows in cold, dark, damp places and infects bats' skin during hibernation, sometimes appearing as white fuzz on their faces. It disrupts hibernation, causing bats to awaken too often and use up crucial fat reserves. Infected bats may behave unusually, such as flying outside during winter days.

There are several species for which preserve staff should be especially observant. The gopher tortoise (*Gopherus polyphemus*) is an important keystone species, with over 300 commensal species that use their burrows. There have been occasional sightings along the roads of the preserve, likely transient, since in most places of the preserve the water table is too close to the surface for ideal burrowing

habitat. However, in 2019, a tortoise was observed entering a burrow in Management Zone TC-37 and has not been seen since. Continued habitat management of mesic flatwoods and coastal strand with prescribed fire and invasive plant removal may reveal a limited carrying capacity for a gopher tortoise population. However, storms of recent years have all but decimated these communities and continued monitoring will determine the extent of their recovery. An additional species that was historically present, though anecdotally, is the eastern indigo snake (*Drymarchon couperi*), although none have been seen in nearly two decades.

The eastern black rail is a tiny bird that thrives in marshy areas, typically in just a few inches of water where marsh grasses are predominant. This bird is federally imperiled and has been researched for its presence in the preserve in the past (Kent 2019). Although there were no detections at that time, the extent of marsh habitat at the preserve would serve as an excellent location for the recovery efforts put forth by the USFWS. Additional survey may find presence as the USFWS refines the detection process, especially with passive equipment such as Automated Recording Units (Lamb et al. 2025). The preserve is also potential habitat for a local nesting subspecies, the Southeastern American kestrel (*Falco sparverius paulus*). Though historic observations have located kestrels in the preserve that are likely to be a migrant population (winter), nearby observations outside of the preserve suggest that there may be local nesting (Knight 2026).

Imperiled plant species were identified during the initial SWFWMD SWIM Terra Ceia Ecosystem Restoration Project and persisted due to proper plan adjustments (i.e., breaching rather than eliminating berms with imperiled plant species located on them). Wild cotton (*Gossypium hirsutum*), Florida mayten (*Tricerna phyllanthoides*) and shell mound prickly-pear (*Opuntia stricta*) can all be found thriving on old agricultural berms. In the decades that followed the initial groundbreaking, several other imperiled plant species have been located throughout the preserve, including epiphytes (*Tillandsia spp.*) and other coastal species like West Indian cock's comb (*Celosia nitida*) and golden leather fern (*Acrostichum aureum*). Surveying for such rarities is an important part of the management of these lands as they progress from severely disturbed to functionally restored.

Imperiled Species Inventory						
Common and Scientific Name	Imperiled Species Status				Management Actions	Monitoring Level
	FWC	USFWS	FDACS	FNAI		
PLANTS						
Golden leather fern <i>Acrostichum aureum</i>			LT	G5/S3	2, 9, 10	2
West Indian cock's comb <i>Celosia nitida</i>			LE	G5?/S2	2, 9, 10	2
Wild cotton <i>Gossypium hirsutum</i>			LE	G4G5/S3	2, 9, 10	2

Imperiled Species Inventory						
Common and Scientific Name	Imperiled Species Status				Management Actions	Monitoring Level
	FWC	USFWS	FDACS	FNAI		
Shell mound prickly-pear <i>Opuntia stricta</i>			LT	G4?/S3S4	2, 9, 10	2
Giant air plant <i>Tillandsia utriculata</i>			LE	G5/S3	9, 10	2
Florida mayten <i>Tricerna phyllanthoides</i>			LT	G3G5/S3	2, 9, 10	2
REPTILES						
American alligator <i>Alligator mississippiensis</i>	FT (S/A)	T (S/A)		G5/S4	10, 13	1
Gopher tortoise <i>Gopherus polyphemus</i>	ST	LT		G3/S3	1, 10, 13	1
Gulf salt marsh snake <i>Nerodia clarkii clarkii</i>				G4T3/S2	10, 13	1
BIRDS						
Short-tailed hawk <i>Buteo brachyurus</i>				G4G5/S1	10, 13	1
Wilson's plover <i>Charadrius wilsonia</i>		UR		G5/S2	10, 13	2
Little blue heron <i>Egretta caerulea</i>	ST			G5/S4	10, 13	1
Reddish egret <i>Egretta rufescens</i>	ST			G4/S2	10, 13	1
Tricolored heron <i>Egretta tricolor</i>	ST			G5/S4	10, 13	1
Merlin <i>Falco columbarius</i>				G5/S2	10, 13	1
Peregrine falcon <i>Falco peregrinus</i>				G4/S2	10, 13	1
Southeastern American kestrel <i>Falco sparverius paulus</i>	ST			G5T4/S3	10, 13	1
American oystercatcher <i>Haematopus palliatus</i>	ST			G5/S2	10, 13	1
Caspian tern <i>Hydroprogne caspia</i>				G5/S2	10, 13	1

Imperiled Species Inventory						
Common and Scientific Name	Imperiled Species Status				Management Actions	Monitoring Level
	FWC	USFWS	FDACS	FNAI		
Wood stork <i>Mycteria americana</i>	FT	DL		G4/S2	10, 13	1
Roseate spoonbill <i>Platalea ajaja</i>	ST			G5/S2	10, 13	1
Black skimmer <i>Rhynchops niger</i>	ST			G5/S3	10, 13	1
MAMMALS						
Tri-colored bat <i>Perimyotis subflavus</i>		PE		G3/G4, S2S3	10,13	2
Florida manatee <i>Trichechus manatus</i>	FE	LE		G2/S2	10, 13	1

Management Actions:

- | | | |
|---|-----------------------------------|-------------------------------------|
| 1. Prescribed Fire | 5. Nest Boxes/Artificial Cavities | 10. Protection from Visitor Impacts |
| 2. Invasive Plant Removal | 6. Hardwood Control | 11. Decoys (Shorebirds) |
| 3. Translocation/Augmentation | 7. Mechanical Treatment | 12. Vegetation Planting |
| 4. Hydrological Maintenance/Restoration | 8. Predator Control | 13. Outreach/Education |
| | 9. Erosion Control | 14. Other |

Monitoring Level:

Tier 1. Non-Targeted Observation/Documentation: includes documentation of species presence through casual/passive observation during routine preserve activities (i.e., not conducting species-specific searches). Documentation may be in the form of Wildlife Observation Forms or other district specific methods used to communicate observations.

Tier 2. Targeted Presence/Absence: includes monitoring methods/activities that are specifically intended to document presence/absence of a particular species or suite of species.

Tier 3. Population Estimate/Index: an approximation of the true population size or population index based on a widely accepted method of sampling.

Tier 4. Population Census: A complete count of an entire population with demographic analysis, including mortality, reproduction, emigration and immigration.

Tier 5. Other: may include habitat assessments for a particular species or suite of species or any other specific methods used as indicators to gather information about a particular species. [If referenced in table, provide discussion in narrative]

Inventory

Objective: Develop/update baseline imperiled species occurrence inventory lists for plants and animals.

Action:

- Continue to inventory the preserve to update imperiled species inventory lists.

The preserve should continue to develop a list of imperiled species that have been historically documented, locally observed or on FNAI element occurrence list. There are several species that were

on the previous plan but have been removed due to lack of verifiable and/or recent evidence. Breeding subspecies populations such as the Southeastern American kestrel are especially worth noting when seen in May and June, when non-breeding migrants are not present (FWC 2013).

Fauna

Objective: Continue monitoring for one selected imperiled animal species.

Action:

- Continue working in cooperation with FWC to facilitate acoustical monitoring for the tricolored bat.

Past cooperation between the preserve and FWC has enabled the identification of a potentially vulnerable species. It is possible that this species will be listed by the USFWS as endangered, necessitating a recovery plan. Preserve staff should stay informed of any changing status and continue to work in cooperation with experts.

Flora

Objective: Monitor and document six selected imperiled plant species in the preserve.

Action:

- Implement monitoring protocols for wild cotton, golden leather fern, Florida mayten, West Indian cock's comb, giant air plant (*Tillandsia utriculata*) and Shell mound prickly pear.

The preserve should monitor imperiled populations prior to prescribed burning, and staff and contractors working in proximity should be knowledgeable in identifying imperiled species.

Shell mound, maritime hammock and coastal berm communities should be surveyed for imperiled species. Additionally, preserve staff should work with the district office to standardize the collection of imperiled species data.

INVASIVE SPECIES

As has been discussed, much of the property that makes up the preserve was historically used for farming and other agricultural purposes. As a result, invasive plants became established throughout the highly disturbed fallow fields. Brazilian pepper, Guinea grass, cogon grass (*Imperata cylindrica*), Caesar's weed (*Urena lobata*), rosary pea (*Abrus precatorius*) and climbing fern (*Lygodium spp.*) pose the largest threat to the natural, restored and improved natural communities. Other invasive species such as air potato vine (*Dioscorea bulbifera*), melaleuca, Chinaberry (*Melia azedarach*) and Australian pine are also present, but to a slightly lesser amount. GIS is used to track treatment of specific areas and species.

The treatment of invasive species is an ongoing management activity at the preserve. This is especially true where fire is used in shaping the landscape of the upland areas. Although fire is often a successful tool to add to integrated vegetation management (DiTomaso and Johnson, et al. 2006), certain species like cogon grass and climbing fern can alter fire regimes and serve to increase invasive plant populations (Stone and Andreu 2022). Strategic timing of treatments, including fire, is essential to achieve control of these species.

Fire can also be especially useful to provide access for additional woody species treatment; however, mechanical or chemical application is often needed first as extensive infestations of species such as Brazilian pepper can alter fire regimes by acting as an unnatural barrier.

In these areas where disturbance is more severe, it is important to develop a strategy so that efforts are efficiently maximized. Prioritizing new infestations (i.e., Early Detection Rapid Response) and focusing first on areas that are in maintenance are essential to avoid a never-ending cycle of unsuccessful control efforts. Much of the focus of invasive work is within the preserve is centered on cogon grass, climbing fern and Brazilian pepper.

Hundreds of acres of Brazilian pepper have been put in a maintenance rotation. As of 2020, both cogon grass and climbing fern are in a one-year maintenance rotation. Keeping long-term sustained pressure on these species while attacking other infestations when resources allow is essential for long-term success. Treating before and after prescribed fire is crucial. Contract work funded by FWC's Uplands Program and other resource management funding such as Florida Conservation Corps/AmeriCorps, strike teams and DRP district workdays will be needed to help reduce the larger infestations. This allows preserve staff to focus on the more manageable areas (i.e., cover class less than 25 percent) and control other species while containing severe infestations. Revegetation is also an important strategy, as was discussed in the Restoration section.

Work in these areas should not take priority over regular treatment and maintenance of less-infested areas. Preserve staff should focus on containing severe infestations until sufficient funding and resources are available for the necessary large-scale treatment. Where fire is introduced, it should be done strategically, with emphasis on smaller manageable acreage that can be followed up thoroughly and revegetated if necessary.

Although recent efforts have significantly reduced the preserve's feral hog population, continued monitoring and management are needed to prevent an increase in invasive animals. Their past activities have left a footprint on the landscape, altering hydrology in many areas around wetlands. Where damage exists in the uplands, it is disruptive to restoration projects, has damaged preserve equipment and has been documented to impede the progression of the flame front during prescribed fires (DEP 2018). Since contracting with the U.S. Department of Agriculture's (USDA) National Feral Swine Damage Management Program in 2018, feral hog sightings have become rare.

Non-native reptiles have been observed sporadically in the preserve. In 2020, some of the first documented sightings in Manatee County of the Argentine black and white tegu were recorded in and around the preserve (Eddmaps 2020). While it is possible that it was an isolated pet release, the population of this invasive reptile has been expanding throughout the state and should be carefully monitored. The vast but largely secluded lands of the preserve are often targeted for illegal pet releases. In 2022, an African spurred tortoise was found wandering visitor areas and was removed. Preserve staff need to be trained to recognize potential invasive animal species and respond promptly when they are detected.

Invasive Plant Species			
Species Name <i>Scientific Name</i> - Common Name	FISC Category	Distribution	Management Zone ID
Rosary pea <i>Abrus precatorius</i>	I	Scattered Plants or Clumps	TC-01, TC-02, TC-04, TC-07, TC-08, TC-10, TC-12, TC-13, TC-15, TC-16, TC-18, TC-19, TC-21, TC-22, TC-24, TC-25, TC-26, TC-27, TC-28, TC-29, TC-30, TC-31, TC-32, TC-34, TC-36, TC-40
		Scattered Dense Patches	TC-09, TC-11, TC-14, TC-17, TC-33, TC-34, TC-35
Sprenger's asparagus-fern <i>Asparagus aethiopicus</i>	I	Single Plant or Clump	TC-22, TC-26
		Scattered Plants or Clumps	TC-04, TC-28
Bishopwood <i>Bischofia javanica</i>	I	Scattered Plants or Clumps	TC-03, TC-10, TC-25
Australian pine <i>Casuarina equisetifolia</i>	I	No invasive plants present	TC-13, TC-18
		Single Plant or Clump	TC-01, TC-16
		Scattered Plants or Clumps	TC-26, TC-37
		Scattered Dense Patches	TC-16
Camphor-tree <i>Cinnamomum camphora</i>	I	Single Plant or Clump	TC-10, TC-11, TC-22
		Scattered Plants or Clumps	TC-07, TC-25, TC-27
Wild taro <i>Colocasia esculenta</i>	I	Scattered Plants or Clumps	TC-26, TC-27
Redflower ragleaf <i>Crassocephalum crepidioides</i>	II	Scattered Plants or Clumps	TC-30
Carrotwood <i>Cupaniopsis anacardioides</i>	I	Single Plant or Clump	TC-23
		Scattered Plants or Clumps	TC-01, TC-02, TC-03, TC-04, TC-07, TC-08, TC-09, TC-10, TC-22, TC-24, TC-25, TC-26, TC-27, TC-28, TC-29, TC-31, TC-32, TC-33, TC-36, TC-40
		Scattered Dense Patches	TC-40
Umbrella plant <i>Cyperus involucratus</i>	II	Single Plant or Clump	TC-01, TC-23
Durban crowfootgrass <i>Dactyloctenium aegyptium</i>	II	Scattered Plants or Clumps	TC-01, TC-03
		Scattered Dense Patches	TC-08, TC-11
Air-potato <i>Dioscorea bulbifera</i>	I	Single Plant or Clump	TC-22
		Scattered Plants or Clumps	TC-01, TC-07, TC-10, TC-12, TC-26, TC-30, TC-36
		Scattered Dense Patches	TC-23, TC-24, TC-25, TC-27, TC-31

Invasive Plant Species			
Species Name <i>Scientific Name</i> - Common Name	FISC Category	Distribution	Management Zone ID
Bowstring hemp <i>Dracaena hyacinthoides</i>	II	Single Plant or Clump	TC-01, TC-10, TC-25
		Scattered Plants or Clumps	TC-31
Pothos <i>Epipremnum pinnatum</i>	II	Scattered Plants or Clumps	TC-01
		Scattered Dense Patches	TC-22, TC-24, TC-31
Surinam cherry <i>Eugenia uniflora</i>	I	No invasive plants present	TC-15
		Single Plant or Clump	TC-01, TC-28
		Scattered Plants or Clumps	TC-07, TC-10, TC-11, TC-13, TC-25, TC-30, TC-31, TC-35
Laurel fig <i>Ficus microcarpa</i>	I	Single Plant or Clump	TC-11
		Scattered Plants or Clumps	TC-01, TC-04, TC-26
Cogon grass <i>Imperata cylindrica</i>	I	Single Plant or Clump	TC-17
		Scattered Plants or Clumps	TC-01, TC-03, TC-07, TC-08, TC-10, TC-13, TC-14, TC-22, TC-23, TC-27, TC-28, TC-29, TC-36, TC-37
		Scattered Dense Patches	TC-12, TC-15, TC-16, TC-18, TC-24, TC-25, TC-26, TC-30, TC-31, TC-34, TC-35
Life plant <i>Kalanchoe pinnata</i>	II	Scattered Plants or Clumps	TC-03
Lantana <i>Lantana camara</i>	I	Single Plant or Clump	TC-23, TC-29
		Scattered Plants or Clumps	TC-02, TC-03, TC-04, TC-06, TC-07, TC-08, TC-09, TC-10, TC-16, TC-18, TC-19, TC-21, TC-22, TC-24, TC-25, TC-26, TC-27, TC-28, TC-31, TC-32, TC-34, TC-36, TC-40
		Scattered Dense Patches	TC-40
Lead tree <i>Leucaena leucocephala</i>	II	Single Plant or Clump	TC-14
		Scattered Plants or Clumps	TC-02, TC-03, TC-06, TC-07, TC-15, TC-26, TC-27, TC-28, TC-29, TC-37
Glossy privet <i>Ligustrum lucidum</i>	I	Single Plant or Clump	TC-31
Chinese fan palm <i>Livistona chinensis</i>	II	Scattered Dense Patches	TC-31
Peruvian primrose-willow <i>Ludwigia peruviana</i>	I	Scattered Plants or Clumps	TC-01, TC-08, TC-13, TC-24, TC-29, TC-36
		Scattered Dense Patches	TC-11, TC-26, TC-28
Japanese climbing fern <i>Lygodium japonicum</i>	I	No invasive plants present	TC-01
		Single Plant or Clump	TC-22

Invasive Plant Species			
Species Name <i>Scientific Name</i> - Common Name	FISC Category	Distribution	Management Zone ID
		Scattered Plants or Clumps	TC-03, TC-08, TC-10, TC-11, TC-13, TC-14, TC-15, TC-16, TC-24, TC-25, TC-26, TC-27, TC-28, TC-29, TC-31
Old World climbing fern <i>Lygodium microphyllum</i>	I	Scattered Plants or Clumps	TC-18, TC-27, TC-29
Wild bushbean <i>Macroptilium lathyroides</i>	II	Scattered Plants or Clumps	TC-03, TC-04, TC-08, TC-09, TC-10, TC-36
Melaleuca <i>Melaleuca quinquenervia</i>	I	Single Plant or Clump	TC-02, TC-18, TC-28, TC-29, TC-30
		Scattered Plants or Clumps	TC-04, TC-07, TC-22, TC-26
Chinaberry <i>Melia azedarach</i>	II	Single Plant or Clump	TC-22, TC-27
		Scattered Plants or Clumps	TC-10, TC-23, TC-25, TC-26, TC-30
		Scattered Dense Patches	TC-31
Natal grass <i>Melinis repens</i>	I	Scattered Plants or Clumps	TC-01, TC-02, TC-04, TC-08, TC-09, TC-10, TC-11, TC-12, TC-13, TC-15, TC-16, TC-24, TC-27, TC-28, TC-30
		Scattered Dense Patches	TC-14, TC-35
Balsampear <i>Momordica charantia</i>	II	Scattered Plants or Clumps	TC-01, TC-02, TC-03, TC-07, TC-08, TC-12, TC-17, TC-36
		Scattered Dense Patches	TC-10, TC-25, TC-26, TC-27, TC-30
Tuberous sword fern <i>Nephrolepis cordifolia</i>	I	Scattered Plants or Clumps	TC-07, TC-22
		Scattered Dense Patches	TC-26, TC-27, TC-31, TC-35
Skunk vine <i>Paederia foetida</i>	I	Scattered Plants or Clumps	TC-13, TC-22, TC-23, TC-25, TC-26, TC-27, TC-30
Torpedo grass <i>Panicum repens</i>	I	Scattered Dense Patches	TC-01
Napier grass <i>Pennisetum purpureum</i>	I	No invasive plants present	TC-15
Senegal date palm <i>Phoenix reclinata</i>	II	Single Plant or Clump	TC-02
		Scattered Plants or Clumps	TC-01, TC-03, TC-07, TC-10, TC-11, TC-13, TC-22, TC-23, TC-24, TC-25, TC-26, TC-30, TC-31
		Scattered Dense Patches	TC-24
Praxelis <i>Praxelis clematidea</i>	II	Scattered Plants or Clumps	TC-01, TC-10, TC-15
		Scattered Dense Patches	TC-08
Guava <i>Psidium guajava</i>	I	Scattered Dense Patches	TC-31

Invasive Plant Species			
Species Name <i>Scientific Name</i> - Common Name	FISC Category	Distribution	Management Zone ID
Castor bean <i>Ricinus communis</i>	II	Scattered Plants or Clumps	TC-10, TC-12, TC-30
		Scattered Dense Patches	TC-23, TC-25
Browne's blechum <i>Ruellia blechum</i>	II	Scattered Dense Patches	TC-01, TC-25, TC-26, TC-31
Mexican petunia <i>Ruellia simplex</i>	I	Scattered Plants or Clumps	TC-01, TC-27
		Scattered Dense Patches	TC-25, TC-26, TC-31
Chinese tallow tree <i>Sapium sebiferum</i>	I	No invasive plants present	TC-26
Schefflera <i>Schefflera actinophylla</i>	I	Single Plant or Clump	TC-26
		Scattered Plants or Clumps	TC-01, TC-05, TC-07, TC-30
Brazilian pepper <i>Schinus terebinthifolia</i>	I	Scattered Plants or Clumps	TC-01, TC-02, TC-04, TC-06, TC-08, TC-09, TC-10, TC-11, TC-12, TC-13, TC-14, TC-15, TC-16, TC-17, TC-18, TC-19, TC-23, TC-24, TC-25, TC-26, TC-27, TC-28, TC-29, TC-30, TC-31, TC-32, TC-33, TC-34, TC-36, TC-37
		Scattered Dense Patches	TC-03, TC-07, TC-16, TC-20, TC-21, TC-22, TC-24, TC-35, TC-40
		Dominant Cover	TC-40
		Dense Monoculture	TC-05, TC-22, TC-34
Climbing cassia <i>Senna pendula</i>	I	Scattered Plants or Clumps	TC-23
Two-leaf nightshade <i>Solanum diphyllum</i>	II	Scattered Plants or Clumps	TC-27
Susumber <i>Solanum torvum</i>	II	Scattered Plants or Clumps	TC-25, TC-26
Tropical soda apple <i>Solanum viarum</i>	I	Scattered Plants or Clumps	TC-01
Wedelia <i>Sphagneticola trilobata</i>	II	Scattered Plants or Clumps	TC-21, TC-31
		Scattered Dense Patches	TC-03
West Indian dropseed <i>Sporobolus jacquemontii</i>	I	Scattered Plants or Clumps	TC-08, TC-09, TC-10, TC-11, TC-17
		Scattered Dense Patches	TC-14, TC-16, TC-18, TC-26
		Linearly Scattered	TC-13, TC-15
Queen palm <i>Syagrus romanzoffianum</i>	II	Scattered Plants or Clumps	TC-01, TC-10, TC-22, TC-31
Arrowhead vine <i>Syngonium podophyllum</i>	I	Scattered Plants or Clumps	TC-01, TC-08, TC-31

Invasive Plant Species			
Species Name <i>Scientific Name</i> - Common Name	FISC Category	Distribution	Management Zone ID
		Scattered Dense Patches	TC-03, TC-25, TC-30
Java plum <i>Syzygium cumini</i>	I	No invasives plants present	TC-13, TC-18
		Single Plant or Clump	TC-01, TC-07
Seaside mahoe <i>Thespesia populnea</i>	I	Scattered Dense Patches	TC-21, TC-40
Caesar's weed <i>Urena lobata</i>	I	Scattered Plants or Clumps	TC-01, TC-02, TC-08, TC-09, TC-15, TC-24, TC-26
		Scattered Dense Patches	TC-03, TC-07, TC-10, TC-11, TC-12, TC-13, TC-14, TC-16, TC-17, TC-22, TC-23, TC-24, TC-25, TC-27, TC-28, TC-29, TC-30, TC-31, TC-33
Guinea grass <i>Urochloa maximum</i>	II	Single Plant or Clump	TC-20
	II	Scattered Plants or Clumps	TC-01, TC-02, TC-04, TC-06, TC-08, TC-09, TC-17, TC-19, TC-21, TC-33, TC-34, TC-40
	II	Scattered Dense Patches	TC-03, TC-05, TC-07, TC-10, TC-11, TC-12, TC-13, TC-14, TC-15, TC-16, TC-18, TC-22, TC-24, TC-25, TC-27, TC-28, TC-29, TC-30, TC-31, TC-32, TC-33, TC-34, TC-35, TC-36, TC-37, TC-40
		Dominant Cover	TC-23, TC-26
Washington fan palm <i>Washington robusta</i>	II	No invasives plants present	TC-02
Elephant ear <i>Xanthosoma sagittifolium</i>	II	Scattered Plants or Clumps	TC-03, TC-07, TC-10, TC-11, TC-30
		Scattered Dense Patches	TC-25, TC-31

Invasive Plant Treatment

Objective: Update long-term invasive plant management plan for the preserve annually.

Actions:

- Identify the major vectors and pathways for invasive plants at the preserve and reduce incoming propagules where possible.
- Regularly update surveys to reflect accurate infestation levels of each management zone.
- Develop an Early Detection Rapid Response protocol for new infestations.
- Develop a species-specific action plan for each management zone with a prioritization framework.
- Evaluate and update plan on an annual basis and adapt to changing conditions.

Objective: Monitor and maintain 65 gross acres of habitat already in maintenance condition as needed.

Actions:

- Survey all maintenance areas regularly for new infestations, with species' biology determining monitoring timeframe.
- Treat areas where invasive plant spread is imminent (particularly after prescribed fire, mechanical or other disturbance).
- Document treatments and update surveys in the Natural Resource Tracking System (NRTS).

Objective: Reduce or maintain coverclass on approximately 745 acres not in maintenance.

Actions:

- Survey and treat after prescribed fire for rapid spread of invasive species.
- Treat medium infestations with staff and volunteers where available.
- Reduce high infestations with additional labor sources (e.g., contract funding, strike teams) and plan for passive or active restoration.
- Document treatments and update surveys in NRTS.

Invasive and Nuisance Animal Control

Objective: Establish an Early Detection Rapid Response program for invasive and nuisance animals in the preserve.

Actions:

- Train all new staff on identifying previously known non-native species: black and white Argentine tegus, African spurred tortoises, curly-tailed lizards and feral cats.
- Stay advised on potential invaders by partnering with the Suncoast Cooperative Invasive Species Management Area and attending training and workshops.
- Develop an action plan that details the operations necessary for proper removal.

Objective: Continue to monitor and implement control measures on feral hogs to protect native species and habitats.

Actions:

- Monitor all preserve lands, especially historic hot spots (i.e., Management Zones TC-08, TC-13, TC-28 and TC-37) for fresh hog activity (e.g., rooting).
- Conduct in-house removal where feasible and contact USDA for assistance where necessary.
- Install boundary fencing where possible to reduce the influx of new invasive/nuisance animals (i.e., in Management Zones TC-33, TC-36 and TC-37).

Regular camera trapping with routine removal and the installation of fencing in areas where feral hogs are known to enter the preserve are necessary to keep the population at the preserve to a minimum. In addition, areas where lone hogs have retreated to the edges of the property in Management Zones TC-08, TC-13, TC-28 and TC-37, as well as Harbor and Mariposa keys, should be frequently monitored. Monitoring and removal of hogs from the preserve is essential to keep the population low. Continued coordination with USDA is also advised. A control program will be implemented immediately where necessary to preserve these sensitive cultural landscapes.

CULTURAL RESOURCES

The lands of Terra Ceia Preserve State Park have been utilized by humans for the rich natural resources within its boundaries for thousands of years. It is therefore rich in cultural sites, likely to span the Late Archaic prehistoric period through the early twentieth century. There are currently 79 sites protected by the preserve, the most of any unit within the Florida state park system, including a National Register nominated resource group as listed in the Florida Master Site File (FMSF).

Prehistoric and Historic Archaeological Sites

The context and extent of cultural sites within the preserve boundaries offer a glimpse into a rich repository of both prehistoric and historic cultural information. Burger (2010) reported that the sites at Terra Ceia Preserve State Park include “examples of Archaic, Transitional, Woodland, and Mississippian prehistoric eras, as well as Seminole, Territorial/early Statehood and early mid-twentieth century historic areas.” He also proposed that this wide temporal scope would support a nomination of the Terra Ceia area as a National Register Archaeological District.

In February 2010, the Florida Department of State’s Division of Historical Resources (DHR) stated that they concurred with Burger’s findings that the area around Terra Ceia was potentially eligible for listing in the National Register of Historic Places as an Archaeological District. Based on these findings, the entire area which constitutes the preserve is treated as potential for listing on the National Register of Historic Places, resulting in all work that affects both the physical and visual qualities of the district needing to be reviewed by DHR.

In terms of significance, the preserve contains the largest concentrations of recorded archaeological sites of any Florida state park and, as such, is a rare and important management unit. During the SWIM Terra Ceia Ecosystem Restoration Project, the SWFWMD took extreme care to avoid damage of any of the recorded resources near project areas and utilized the services of a professional archaeologist to guide and assist the contractors working on the project.

Upon review of FMSF records, there is still much to be learned from these sites. For example, though previous reports suggested that the Harbor Key Archaeological Complex (MA00311) dated to the Safety Harbor period, recent research (Jackson et al. 2023) supports a long-standing theory that the complex appears to have been constructed on or near the foundations of earlier inhabitants. This finding also confirmed that there is much subsurface scatter both on and adjacent to the site, although storm activity and tidal fluctuation has superficially confounded much of the seaward extent of the site.

The preserve is also rich with historic features. During the 17th and 18th centuries, the Tampa Bay area attracted Spanish-Cuban commercial fishermen. The Armed Occupation Act of 1842 resulted in the first settlements. Terra Ceia Island became a hub of trade and communications between Bradenton and Fort Brooke in Tampa during the Civil War. In 1866, the nearby city of Palmetto was founded. Most of the uplands were farmed for vegetables, citrus crops and ornamentals. Agricultural artifacts of this era have been observed in the preserve but have not been collected.

During the late 1880s, phosphate speculators purchased much of the land surrounding the preserve. Phosphate shipments from other regions became a major economic focus and an incentive for the development of processing plants, railroads and port facilities. In the early 1930s, the railroad line into Palmetto was discontinued due to storm damage. Farming and mineral processing continued, and the real estate market developed.

As mentioned in the Developed section above, the Haley House is an early 20th century historic

feature that was used until 2018 as the preserve's administrative office. The house was built in 1909 as a model home for a planned subdivision known as Terra Ceia Estates. Terra Ceia Estates was developed by a Connecticut corporation with interests in the citrus industry and tropical and subtropical fruit research. In 1919, D.G. Haley, a prominent real estate attorney in the Tampa Bay area and pioneer in commercial gladiolus farming, purchased the property. At one time, the Haley family owned most of the preserve's land. A local archaeologist, Bill Burger, also had family interest and has left an extensive collection of survey information and insights (Burger 1979, 2002, 2010).

The estate had two stocked freshwater fishponds, which now have varying degrees of salinity (DEP 2012). The house was the Haley's residence until the estate was sold in 1972 to another development company. The Haley House and outbuildings are the only remaining historic structures at the preserve and have fallen into disrepair.

Though the Haley House had been partially rehabilitated for adaptive reuse as administrative offices (i.e., installation of a new roof and stabilization measures), it was cost prohibitive to maintain after repeated failed inspections for water quality, lead paint and mold. Preserve and aquatic preserve staff were forced to relocate, and options are continuing to be researched for administrative facilities. Options for the rehabilitation of the house are being researched and are discussed in more detail in the Land Use Component.

Most of the historic sites include artifact scatter with some historic refuse. Various samples of building debris represent the American 20th century period from 1910 through the 1950s. Agricultural operations, as well as the workers' quarters and homestead sites, are some of the artifact sources.

Cultural Sites Listed in the Florida Master Site File					
Site Name and FMSF #	Culture/Period	Description	Significance	Condition	Treatment
Harbor Key 1 MA00013	Deptford, Perico Island, Weeden Island I 180 B.C.E.–350 C.E.	Archaeological Site	NRE	F	ST
Harbor Key 2 MA00014	Weeden Island 450 C.E.–1000 C.E.	Archaeological Site	NE	F	P
Harbor Key 3 MA00015	Prehistoric-Indeterminate	Archaeological Site	NE	F	P
Hells Half Acre 1 MA00147	Perico Island, Weeden Island, Safety Harbor 500 B.C.E.– 1500 C.E.	Archaeological Site	NE	P	P
Hells Half Acre 2 MA00148	Perico Island, Weedon Island 500 B.C.E.–1000 C.E.	Archaeological Site	NE	P	P
Hells Half Acre 3 MA00149	Perico Island, Weeden Island, Safety Harbor 500 B.C.E.– 1500 C.E.	Archaeological Site	NE	G	P
NE Head MA00150	Weedon Island, Safety Harbor 500 C.E.–1500 C.E.	Archaeological Site	NE	F	P

Cultural Sites Listed in the Florida Master Site File					
Site Name and FMSF #	Culture/Period	Description	Significance	Condition	Treatment
Kersey Midden MA00151	Prehistoric/ Indeterminate	Archaeological Site	NE	G	P
Moses Hole Roadside Midden 1 MA00152	Weedon Island, Safety Harbor 500 C.E.–1500 C.E.	Archaeological Site	NE	P	P
Moses Hole Roadside Midden 2 MA00153	Prehistoric/ Indeterminate	Archaeological Site	NE	P	P
SE Head MA00154	Weedon Island, Safety Harbor, Seminole 500 C.E.–1800 C.E.	Archaeological Site	NE	F	P
Oak tree Hammock MA00155	Perico Island, Weedon Island 500 B.C.E.–800 C.E.	Archaeological Site	NE	F	P
Moses Hole Exit Canal Midden MA00156	Weedon Island, Safety Harbor, Historic 500 C.E.-1900 C.E.	Archaeological Site	NE	P	P
Campsite Midden MA00157	Prehistoric/ Indeterminate	Archaeological Site	NE	P	P
Hand axe MA00158	Prehistoric/ Indeterminate	Archaeological Site	NE	F	P
Clambar Hammock MA00159	Prehistoric/ Indeterminate	Archaeological Site	NE	P	P
Williams Bayou 2 MA00161	Prehistoric/ Indeterminate	Archaeological Site	NE	G	P
Williams Bayou 3 MA00162	Prehistoric/ Indeterminate	Archaeological Site	NE	G	P
Terra Ceia River 1 MA00163	Prehistoric/ Indeterminate	Archaeological Site	NE	G	P
Terra Ceia River 2 MA00164	Prehistoric/ Indeterminate	Archaeological Site	NE	G	P
Terra Ceia River 3 MA00165	Prehistoric/Historic/ Indeterminate	Archaeological Site	NE	F	P
Terra Ceia River 4 MA00166	Prehistoric/Historic/ Indeterminate	Archaeological Site	NE	G	P
Terra Ceia River 5 MA00167	Prehistoric/ Indeterminate	Archaeological Site	NE	G	P
Devils Elbow MA00168	American 19th century American 20th century	Archaeological Site	NE	F	P

Cultural Sites Listed in the Florida Master Site File					
Site Name and FMSF #	Culture/Period	Description	Significance	Condition	Treatment
Hells Half Acre 4 MA00172	Prehistoric/ Indeterminate	Archaeological Site	NE	G	P
Williams Bayou 4 MA00276	Prehistoric/ Indeterminate	Archaeological Site	NE	F	P
Williams Bayou 5 MA00277	Prehistoric Post 500 B.C.E.	Archaeological Site	NE	F	P
Williams Bayou 6 MA00278	Prehistoric/ Indeterminate	Archaeological Site	NE	G	P
Williams Bayou 7 MA00279	Prehistoric Pre 400 C.E.	Archaeological Site	NE	F	P
Williams Bayou 8 MA00280	Prehistoric/ Indeterminate	Archaeological Site	NE	P	P
Williams Bayou 9 MA00281	Prehistoric/ Indeterminate	Archaeological Site	NE	P	P
Abel Road 2 MA00283	Prehistoric/ Indeterminate	Archaeological Site	NE	P	P
Double Pond 8MA00284	Prehistoric/ Indeterminate	Archaeological Site	NE	P	P
Spring Pond MA00286	Prehistoric/ Indeterminate	Archaeological Site	NE	P	P
Sylvan MA00287	Manasota 350 B.C.E.–700 C.E.	Archaeological Site	NE	P	P
Chicken Snake MA00288	Prehistoric/ Indeterminate	Archaeological Site	NE	P	P
Palm MA00289	Prehistoric/ Indeterminate	Archaeological Site	NE	F	P
Alderman Bayou MA00290	Prehistoric/ Indeterminate	Archaeological Site	NE	G	P
Alderman Bayou 2 MA00291	Prehistoric/ Indeterminate	Archaeological Site	NE	F	P
Johnson Flat 1 MA00292	Prehistoric Post 500 B.C.E.	Archaeological Site	NE	F	P
Johnson Flat 2 MA00293	Perico, Weedon Island 0–800 C.E.	Archaeological Site	NE	G	P
Bigford 1 MA00294	Prehistoric/ Indeterminate	Archaeological Site	NE	G	P
Bigford 2 MA00295	Prehistoric/ Indeterminate	Archaeological Site	NE	G	P
Bishop Harbor Road MA00296	Prehistoric/ Indeterminate	Archaeological Site	NE	G	P

Cultural Sites Listed in the Florida Master Site File					
Site Name and FMSF #	Culture/Period	Description	Significance	Condition	Treatment
Frog Bank 1 MA00297	Prehistoric/ Indeterminate	Archaeological Site	NE	P	P
Frog Bank 2 MA00298	Prehistoric/ Indeterminate	Archaeological Site	NE	G	P
Frog Bank 3 MA00299	Prehistoric/ Indeterminate	Archaeological Site	NE	P	P
Big pond MA00300	Prehistoric ~1000 B.C.E.	Archaeological Site	NE	G	P
Moses Hole Road MA00301	Prehistoric/ Indeterminate	Archaeological Site	NE	P	P
Mariposa Key MA00302	Perico Island, Weeden Island, Safety Harbor, 18th and 20th century 2000 B.C.E.–1983 C.E.	Archaeological Site Historic refuse	NE	G	P
Harbor Key Archaeological Complex MA00311	Deptford, Perico Island, Weeden Island I 180 B.C.E.–350 C.E.	Archaeological Site -Resource Group	NRE	F	P
Haley House MA01241	American 20th century 1909	Historic Structure	NE	P	RH/R
SE Head 2 MA1259	Prehistoric/ Indeterminate	Archaeological Site	NE	F	P
Fred MA001260	Prehistoric/ Indeterminate	Archaeological Site	NE	P	P
Hall MA01261	American 20th century 1930s–1940s	Archaeological Site	NE	P	P
Gillette Picnic Grounds MA01262	American 20th century 1920s–1940s	Archaeological Site	NE	F	P
Highway View MA01263	Prehistoric Post 500 B.C.E.	Archaeological Site	NE	F	P
Alfonso MA01264	American 20th century 1910s–1930s	Archaeological Site	NE	F	P
Durrance MA01265	American 20th century 1920s–1940s	Archaeological Site	NE	P	P
Hornsby MA01266	American 20th century 1920s–1940s	Archaeological Site	NE	P	P
Barn MA01267	American 20th century 1920s–1940s	Archaeological Site	NE	P	P

Cultural Sites Listed in the Florida Master Site File					
Site Name and FMSF #	Culture/Period	Description	Significance	Condition	Treatment
Swamp spot MA01268	Prehistoric/ Indeterminate	Archaeological Site	NE	F	P
Taylor MA01269	Prehistoric/ Indeterminate	Archaeological Site	NE	P	N/A
Spoil MA01270	Prehistoric/ Indeterminate	Archaeological Site	NE	F	P
Haley Rental #3 MA01271	American 20th century 1910s–1940s	Archaeological Site	NE	P	P
Coot Pond MA01272	Manasota, Safety Harbor 700–1000 C.E.	Archaeological Site	NE	P	P
Sweet MA01273	Prehistoric Post 500 B.C.E.	Archaeological Site	NE	F	P
Jones Grove MA01274	Safety Harbor Post 900 B.C.E.	Archaeological Site	NE	P	P
Jones/Petty Dump MA01275	American 20th century 1910s–1950s	Archaeological Site	NE	F	P
Jones Siding MA01276	American 20th century 1910s–1950s	Archaeological Site	NE	P	P
Jones South MA01277	Prehistoric/ Indeterminate	Archaeological Site	NE	F	P
McLean/McLaughlin Packinghouses MA01278	American 20th century 1900s–1940s	Archaeological Site	NE	G	P
Haley Rental #1 MA01279	American 20th century 1910s–1950s	Archaeological Site	NE	p	P
Terra Ceia Island Farms Packing House MA01280	American 20th century 1900s–1940s	Archaeological Site	NE	P	P
Haley Rental #2 MA01281	American 20th century 1910s–1940s	Archaeological Site	NE	P	P
Abel Road West MA01282	Prehistoric/ Indeterminate American 19th century American 20th century	Archaeological Site	NE	P	P
Abel Road East MA01283	American 20th century 1920s–1940s	Archaeological Site	NE	P	P
McLaughlin's Quarters MA01285	American 19 century American 20th century 1890s–1940s	Archaeological Site	NE	P	P

Cultural Sites Listed in the Florida Master Site File					
Site Name and FMSF #	Culture/Period	Description	Significance	Condition	Treatment
Williams Dump MA01286	American 20th century 1910s–1950s	Archaeological Site	NE	P	P
Williams/Robertson Homestead MA01287	American 19 century American 20th century 1840s–1910s	Archaeological Site	NE	F	P

Significance:

NRL - National Register Listed
NRE - National Register Eligible
LS - Locally Significant
NE - Not Evaluated
NS - Not Significant

Conditions:

G - Good
F - Fair
P - Poor

Recommended Treatment:

RS - Restoration
RH - Rehabilitation
ST - Stabilization
P - Preservation
R - Removal

Condition Assessment

Objective: Monitor one resource group (MA00311) and two archaeological sites (MA00300, MA00302) annually.

Actions:

- Work with DRP's Bureau of Natural and Cultural Resources (BNCR) and DHR to create a plan for the stabilization and monitoring of the Harbor Key complex (MA00311).
- Annually monitor Big Pond and Mariposa Key for disturbance/erosion.

Objective: Monitor 19 sites that were initially described as in "excellent" condition (i.e., listed as "good" above) within two years.

Action:

- Check sites for disturbance and/or erosion.

Objective: Update condition on 23 sites that were initially described as having "minor disturbance" (i.e., listed as "fair" above) within three years.

Action:

- Check sites for disturbance and/or erosion.

Objective: Update condition on 33 sites that were initially described as "deteriorated" (i.e. listed as "poor" above) within five years.

Action:

- Check sites for disturbance and/or erosion.

Documentation of Recorded Sites

Objective: Compile reliable documentation for all recorded historic and archaeological resources.

Actions:

- Finalize the georeferenced site map (Burger 2003) to facilitate site monitoring.
- Update FMSF (with photos and/or GIS if necessary) at all monitored sites.
- Create a multi-year prioritized revisitation schedule, assigning high priority sites annually.

Preservation Measures

Objective: Stabilize one cultural resource and rehabilitate/remove one cultural resource.

Actions:

- Consult with DHR and BNCR to develop a plan for Harbor Key Complex.
- Consult with DHR and BNCR to evaluate Haley House and outbuildings for preservation and permanent use or removal.

All ground-disturbing activities within the preserve will be monitored by staff and volunteers with Archaeological Resource Management certification. All land-altering construction and development that might potentially affect a known site will be reviewed by DHR and BNCR.

SPECIAL MANAGEMENT CONSIDERATIONS

Additional Considerations

SWFWMD SWIM Program – Terra Ceia Ecosystem Restoration Project: This project was, at the time of groundbreaking, the largest coastal ecosystem restoration effort ever performed in Tampa Bay. A single- and multi-family golf-course residential subdivision (i.e., Terra Ceia Estates) was intended for the land purchased in 1995 by the SWFWMD and the State of Florida at a foreclosure auction from the Resolution Trust Corporation. Restoration of the 1,800-acre property was spearheaded by the SWFWMD's SWIM Program in cooperation with DEP.

Approximately 900 acres of the original purchase contained various naturally occurring estuarine habitats. The remaining 900 acres had undergone severe impacts from various anthropogenic activities such as dredging and filling wetlands, ditching, diking and other agricultural activities. The dredge and fill activities included the creation of finger-fills in Bishop Harbor, residential intertidal canals dredged in uplands and excavation of a matrix of agricultural drainage ditches. Abandoned agriculture lands were rapidly covered with non-native vegetation. Forests of Australian pine and Brazilian pepper with meadows of cogon grass and Guinea grass infested the landscape. Feral hogs also became widespread throughout the site. Isolated relic wetland and upland habitats were scattered throughout. Agricultural areas were ringed by large berms that destroyed natural hydrologic function. Decades of illegal dumping resulted in tons of debris strewn throughout the tract.

Since 2002, 618 acres of coastal habitats have been restored through the implementation of the SWFWMD's SWIM Terra Ceia Ecosystem Restoration Project. Due to the complexity and scale of the project, extensive planning was required prior to the work. Funding for the project was secured over multiple fiscal years and included grants from several entities.

Work began with surveys, including mapping of the distribution of native versus non-native habitats,

topographic and bathymetric surveys, archaeological surveys, geotechnical surveys, water well surveys, mapping of distribution of illegal dumping, three years of monthly monitoring of surficial (ground) water levels and salinities via 15 piezometers scattered over the site and 19 months of stream flow and water quality monitoring of Frog Creek. After consideration of all the variables, a restoration plan was developed to retain and enhance intact native habitats, restore lost and degraded habitats and restore ecological functions and processes throughout the site. The plan provided for the re-establishment of a mosaic of native habitats that historically existed onsite or normally found in undisturbed Tampa Bay coastal areas. Typical DFC of upland communities included mesic flatwoods and hammocks. The plan carefully preserved sites of cultural significance. Private contractors and the SWFWMD provided project construction.

To accomplish the upland restoration and improvement objectives, the SWFWMD's SWIM Program took a multi-year, phased approach (see the SWIM Restoration Summary table below). Phases 1 and 2 began in 2002 and were completed in 2005. The scope of these phases included mechanically clearing and grubbing invasive vegetation, installation of 12 to 18 inches of off-site mulch and planting South Florida slash pine, saw palmetto and beautyberry. These initial phases also included three years of follow-up chemical treatments for invasive plant control.

Phase 3 included mechanical treatment of invasive vegetation, selective planting of South Florida slash pine, saw palmetto and beautyberry and three years of invasive maintenance. For this phase, the scope of chemical maintenance was expanded to the entire project area because the new maintenance criteria for this phase took four years to complete.

The procedures for Phase 4 were similar to Phase 3; however, this phase did not include the installation of supplemental native plantings. Phase 4 also included breaching the perimeter berm in five selected locations to facilitate sheet flow.

Phase 5 involved the re-treatment of the areas included in Phases 1 and 2. These first two phases were not successful in controlling invasive plants or establishing native plants. The first wetland creation and enhancement phase was planned for fallow agricultural areas. Eleven tidal and five freshwater wetlands were excavated. The freshwater wetlands varied from ephemeral to permanent pool habitats, whereas estuarine habitats included tidal channels and lagoons, deeper "holes" for refugia, hard bottom, islands and low and high marsh intertidal platforms with transitional zones grading to upland habitats. Emphasis was placed on the creation of as much low salinity, oligohaline, fish nursery habitats as possible. The project's design incorporated liberal amounts of high marsh and transitional zones, in anticipation of rising sea levels, thereby giving the wetland an opportunity to migrate upslope over time. Of the 600,000 cubic yards of fill excavated, some was used to fill or block historical agricultural ditches found in Management Zones TC-15, TC-32 and TC-33. As with the upland phases, this phase also included three years of follow-up invasive control maintenance.

Phase 6 consisted of 13 different upland areas for a total of 159 acres. The scope of work for this phase was similar to phases 3 and 4 (i.e., mechanical treatment, native plantings and three years of invasive maintenance).

Phase 7 focused on the continued chemical treatment on 13 different upland areas for a total of 387 acres. The procedures for Phase 7 were similar to Phase 6; however this phase also did not include the installation of supplemental native plantings. Phase 7 also included mechanical grubbing of 1 acre of monoculture Brazilian pepper.

Surface Water Improvement and Management Restoration Summary					
Upland Phase	Begin/End	Management Zones	Acres	Treatment	Maintenance Notes
1 and 2	2002–2005	TC-12, TC-32, TC-33, TC-36	149	Clearing and grubbing, 12-18 inches of mulch and native planting	3 years of limited chemical treatment for invasive plant maintenance
3	2005–2009	TC-16, TC-18, TC-28, TC-29	294	Mechanical treatment and native planting	3 years of holistic chemical treatment for invasive plant maintenance
4	2006–2009	TC-18, TC-28, TC-29	132	Mechanical treatment and without native planting	3 years of chemical treatment for invasive plant maintenance; breached perimeter berm to re-establish some sheet flow
5	2009–2011	TC-12, TC-32, TC-33, TC-36	151	Selective chemical treatment and mechanical mowing	Re-treatment of Phases 1 and 2; 3 years of chemical treatment for invasive plant maintenance
6	2011–2014	TC-06, TC-07, TC-08, TC-22, TC-26, TC-27, TC-34, TC-35	159	Mechanical treatment and native planting	3 years of chemical treatment for invasive plant maintenance
7	2014–2017	TC-02, TC-03, TC-04, TC-10, TC-11, TC-13, TC-14, TC-15, TC-16, TC-18, TC-27, TC-28, TC-29, TC-30,	387	Selective chemical treatment and mechanical mowing	3 years of chemical treatment for invasive plant maintenance

		TC-31			
Wetland Phase	Begin/End	Management Zones	Acres	Treatment	Maintenance Zones
1	2006–2010	TC-07, TC-08, TC-09, TC-10, TC-15, TC-16, TC-17, TC-24, TC-33, TC-34, TC-35, TC-36	117	Excavation, creating 11 saltwater and five freshwater wetlands; filled/blocked ditches in Management Zones TC-15, TC-32 and TC-33	3 years of chemical treatment for invasive plant maintenance

Arthropod Control Plan

Mosquito control plans (i.e., Arthropod Control Plans) are typically proposed by county mosquito control districts when they desire to treat on public lands that are protected by section 388.4111, F.S. The current plan for Terra Ceia Preserve State Park was finalized in 2020 and is available in DRP’s Southwest District Arthropod Control Plan Appendix. Mosquito control plans temporarily may be set aside under declared threats to public or animal health, or during a declared state of emergency.

See the Florida State Park System – Statewide Philosophy and Framework for additional information.

LAND USE COMPONENT

VISITATION

The 1,948 acres of Terra Ceia Preserve State Park represent 13 distinct natural community types that serve as an important buffer to the surrounding aquatic preserve and Tampa Bay estuary. The SWFWMD's SWIM Terra Ceia Ecosystem Restoration Project is one of the largest restoration projects implemented in Tampa Bay. Though the primary focus at the preserve is currently the continuation of these restoration efforts, a shared-use trail and some interpretive features have been developed for visitor enjoyment. Along with land-based recreational and interpretive opportunities, the winding waterways and mangrove islands surrounding the preserve also support water-based recreation activities. From the preserve's paddling launches and boat ramp, visitors can paddle the Manatee County Blueway Trail, and boats can navigate into Tampa Bay. The Terra Ceia Aquatic Preserve and Tampa Bay ecosystem facilitate excellent wildlife viewing along the hiking and paddling trails. Saltwater and freshwater fishing are also possible in Terra Ceia Bay.

Trends

Visitation at Terra Ceia Preserve State Park is estimated based on wildlife cameras and occasional staff observations since there is no formal entrance or any honor boxes. Given the limited number of recreational facilities within the preserve, attendance is almost exclusively represented by trail users and those seeking watercraft access into Tampa Bay. Similar to other trail-focused parks in Florida, Terra Ceia Preserve records higher attendance in the cooler months and lower attendance in the summer.

Economic Impact

Attendance over the 10-year period from FY 2015-16 through FY 2024-25 totaled 575,708 visitors. By DRP estimates, the visitors contributed \$62,455,087 in direct economic impact. Visitor spending supported a cumulative total of approximately 907 one year job equivalents over the 10 year period (DEP 2015–2025).

EXISTING FACILITIES AND INFRASTRUCTURE

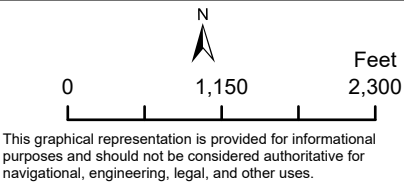
Due to the abundance of surrounding wetlands, recreational facilities are dispersed across Terra Ceia Preserve State Park and disjunct from one another such that internal connectivity is not currently feasible. In the northeast corner of the preserve is the Bishop Harbor Boat Ramp which provides a modestly improved boat ramp and parking area.

To the south side of Bishop Harbor Road, east of the boat ramp, is an access point to series of management roads through upland area of mesic hammock. Farther south along Bishop Harbor Road is the unimproved Frog Creek Trailhead, providing access to Frog Creek Trail, which extends along the namesake Frog Creek. On the western side of the preserve, the unimproved Hightower Trailhead provides access to the Pine Flatwood Loops, Salt Flat Spur and Western Hammock Loop. The westernmost recreational access point is an earthen paddling launch and unimproved parking area on the north side of Stotz Road.

Support facilities are separated from the recreational features of the preserve, located just south of Interstate 275 in the Haley House Administration Area. The support area contains the Haley House, a nursery to support ongoing restoration work, storage structures and an unimproved parking area.



TERRA CEIA PRESERVE STATE PARK
Existing Facilities



This graphical representation is provided for informational purposes and should not be considered authoritative for navigational, engineering, legal, and other uses.

Multiple temporary mobile structures are located within this operational support area including a travel trailer with the only restroom located within the preserve and an office.

Facilities Inventory

<i>Bishop Harbor Boat Ramp</i>	
Boat Ramp	1
Parking Area (approximately eight spaces)	1
Interpretive Panel	1
<i>Frog Creek Trailhead</i>	
Unimproved Parking Area (approximately five spaces)	1
Blackwater Hiking Trail (mileage)	<1
Interpretive Kiosk (to be constructed)	1
<i>Haley House Administration Area</i>	
Haley House	1
Unimproved Parking Area (approximately 10 spaces)	1
Nursery	1
Storage Structures	3
Temporary Administration Shed	1
<i>Hightower Trailhead</i>	
Unimproved Parking Area (approximately 10 spaces)	1
Interpretive Panel	1
Pine Flatwood Loops (mileage)	3.1
Salt Flat Spur (mileage)	3.2
Western Hammock Loop (mileage)	2.7
<i>Stotz Road Paddling Launch</i>	
Earthen Paddling Launch	1
Unimproved Parking Area (approximately four spaces)	1

CONCEPTUAL LAND USE PLAN

Parkwide

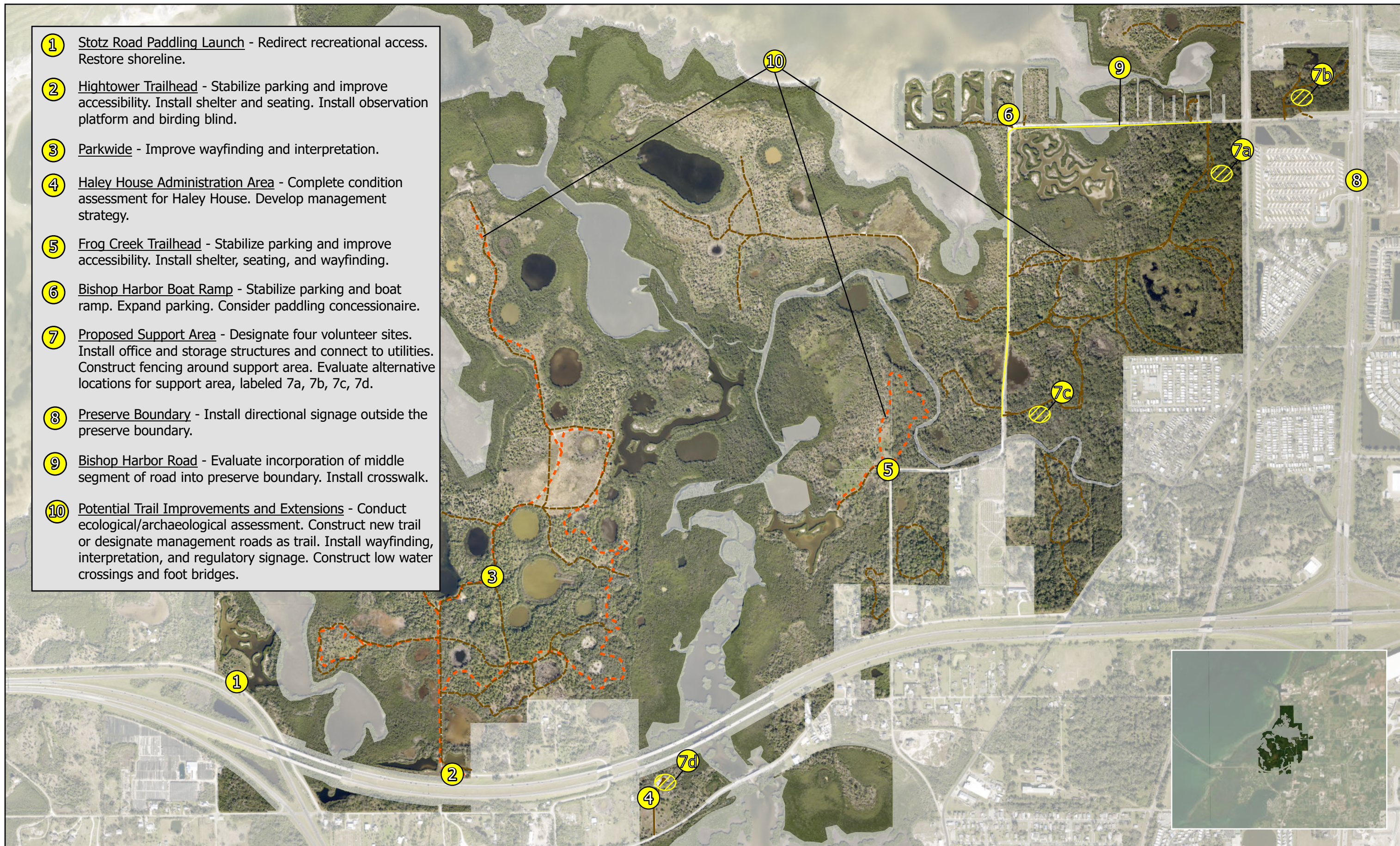
Objective: Update and improve interpretation and signage.

Actions:

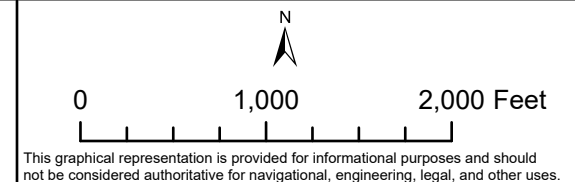
- Provide wayfinding.
- Interpret sensitive aquatic resources.
- Interpret best practices for visitor-wildlife encounters.

Terra Ceia Preserve State Park provides informative paneling at the trailheads and boat ramp to enhance the visitor experience. Comprehensive interpretive planning is recommended to determine the most effective way to connect visitors to the meaningful and relevant themes in multiple areas of the preserve, including the extensive wetlands, ongoing restoration areas, relict natural communities, adjacent aquatic preserves and the numerous cultural sites surrounding the preserve. The type, design, quantity and placement of interpretive elements to deepen understanding will be specified during this additional planning process.

- ① Stotz Road Paddling Launch - Redirect recreational access. Restore shoreline.
- ② Hightower Trailhead - Stabilize parking and improve accessibility. Install shelter and seating. Install observation platform and birding blind.
- ③ Parkwide - Improve wayfinding and interpretation.
- ④ Haley House Administration Area - Complete condition assessment for Haley House. Develop management strategy.
- ⑤ Frog Creek Trailhead - Stabilize parking and improve accessibility. Install shelter, seating, and wayfinding.
- ⑥ Bishop Harbor Boat Ramp - Stabilize parking and boat ramp. Expand parking. Consider paddling concessionaire.
- ⑦ Proposed Support Area - Designate four volunteer sites. Install office and storage structures and connect to utilities. Construct fencing around support area. Evaluate alternative locations for support area, labeled 7a, 7b, 7c, 7d.
- ⑧ Preserve Boundary - Install directional signage outside the preserve boundary.
- ⑨ Bishop Harbor Road - Evaluate incorporation of middle segment of road into preserve boundary. Install crosswalk.
- ⑩ Potential Trail Improvements and Extensions - Conduct ecological/archaeological assessment. Construct new trail or designate management roads as trail. Install wayfinding, interpretation, and regulatory signage. Construct low water crossings and foot bridges.



TERRA CEIA PRESERVE STATE PARK
Conceptual Land Use Plan



Signage with a map of the Bishop Harbor and Terra Ceia paddling trail segments within the Manatee County Blueway System should be provided at designated paddling launches within the preserve boundary. Signage should also inform visitors that trail markers along the blueway system may no longer be installed; therefore, utilizing the Paddle Manatee Guide maps, as well as GPS, is recommended. The preserve should also improve signage at the boat ramp to educate the public about shallow watercraft warnings, vessel restrictions, seagrass protection, no/slow wake zones, guidance for responding to bird entanglements and other site-specific educational outreach.

Bishop Harbor Road

Objective: Improve resource protection, security and preserve continuity along the road corridor.

Actions:

- Consult with Manatee County to evaluate incorporation of the middle segment of Bishop Harbor Road into the preserve boundary.
- Contingent upon road incorporation, install preserve gates.
- Install a crosswalk over Bishop Harbor Road.

Potential Access Modifications

Bishop Harbor Road bisects the east-central portion of the preserve such that through traffic is constant and the boat ramp is subject to non-recreational use. From the western side of the railroad to the north side of the bridge across Frog Creek, the BOT and SWFWMD own the adjacent parcels along Bishop Harbor Road, except for a 0.21-acre undeveloped private inholding adjacent to the tracks. This parcel is within the preserve optimum boundary; see the Optimum Boundary section below for additional details. Thorough evaluation of impediments to traffic patterns and access to private lands along this corridor must be conducted prior to any action.

This segment of Bishop Harbor Road could be incorporated within the preserve boundary enabling controlled access from the west side of the railroad to the north side of Frog Creek. Although obtaining management of this road may pose a maintenance burden for DRP, benefits include enhanced natural and cultural resource protection, sense of arrival, visitor safety and security of preserve infrastructure.

The southern segment of Bishop Harbor Road, on the south side of the Frog Creek Bridge, provides access to several private parcels. Therefore, retaining the road to public access south of Frog Creek to 79th Street East would be necessary.

Frog Creek Trailhead

As the Frog Creek Trailhead is located along the roadside south of the Frog Creek Bridge, this trailhead would not be situated behind the proposed preserve gate. With the extension of the hiking trail network and construction of new trailheads that would link to this portion of the preserve, the existing trailhead south of the proposed gate may be closed and access to the same trail would be achieved from an alternative entry point to the north.

Bishop Harbor Road Crosswalk

To connect upland areas to both the east and west sides of Bishop Harbor Road (i.e., acreage traversed by Frog Creek Trail), a crosswalk is necessary. The crosswalk would extend over the road within the portion proposed to be incorporated into the preserve. Design elements of such a crossing will include road striping, pedestrian signage and minor traffic calming measures (e.g., speed reduction, speed bumps, rumble strips, etc.).

Parkwide Trail System

Frog Creek Trailhead

Objective: Improve visitor services.

Actions:

- Stabilize the parking area and provide one ADA-compliant parking space.
- Install shelter and seating.
- Install directional signage along the trail.

Currently, this trailhead consists only of an unimproved parking area and basic a single-panel kiosk. To improve site aesthetics and accessibility, the parking area should be stabilized and provide one parking space compliant with ADA standards. Trailhead amenities should include one shelter with fixed seating to provide shelter and relief along the trail. Directional and interpretive signage should also be installed along the hiking trail at strategic locations to improve visitor wayfinding and knowledge of the surrounding wetland and riverine habitats, as well as upland restoration areas.

Alternatively, if access to the Frog Creek Trail is achieved from a potential trailhead located northeast of the current roadside trailhead location, then improvements may not be indicated, and this existing trailhead would be closed to consolidate access points.

Hightower Trailhead

Objective: Improve visitor and operational services.

Actions:

- Stabilize the parking area and provide one ADA-compliant parking space.
- Install shelter and seating.
- Install an observation platform and birding blind.
- Consider providing a residence near the trail system.
- Remove the powerline along Hightower Road.

Similar to the Frog Creek Trailhead, the Hightower Trailhead has one interpretive panel with a trail map and an unimproved parking area. To ease visitor access and improve this trailhead's appearance, the parking area should be stabilized and one ADA-compliant parking space should be provided. Trailhead amenities should include one shelter with fixed seating to provide relief for visitors hiking the extensive, weather-exposed trail system. Previous planning efforts recommended the installation of an observation platform adjacent to the salt flats and a birding blind adjacent to the karst ponds. The installation of these structures would provide visitors with destination sites that offer views of the expansive marsh landscapes and abundant wildlife.

Terra Ceia Preserve State Park currently lacks staff residences. A residence should be considered near this hiking trail system to enhance staff oversight and management of this area.

An inactive powerline is located along Hightower Road near the trailhead entrance. It is no longer in use or needed for preserve operations and should be removed.

Potential Trail Improvements and Extensions

Objective: Improve and extend trail network.

Actions:

- Conduct assessment of ecological and archaeological sensitivities.
- Construct new trail and/or designate existing management roads as trail.
- Install wayfinding and interpretation.
- Construct low water crossings.
- Construct footbridges over Frog Creek and Terra Ceia River.
- Construct crosswalk over Bishop Harbor Road.

Frog Creek Trail

In Management Zones TC-26, TC-27, TC-28 and TC-29, the trail system may be extended northwest of Frog Creek toward Tuberculosis Bay and the southern shore of Bishop Harbor to provide hiking access to a SWFWMD SWIM Program restoration area with intact salt marsh and pockets of maritime hammock. This portion of the preserve contains relict natural communities present before the parkwide disturbances. A gate along Bishop Harbor Road, north of Frog Creek and south of the boat ramp, provides the nearest point of access to this area. Benefits of trail extensions will include connectivity between areas of the preserve, greater mileage to maximize the hiking experience and traversing a greater diversity of landscapes for interpretation. Given the number of wetlands surrounding the trail, low water crossings and/or footbridge structures may be necessary and trails may be opened/closed seasonally to avoid erosion and unsafe conditions during flooding.

A footbridge could be considered between Management Zones TC-26 and TC-27 or TC-28 to TC-26. Currently Frog Creek separates the Frog Creek Trail from the northern extension areas. Careful planning of trails should include identifying and avoiding the locations of shell mounds or other cultural sites.

To safely access the remainder of the preserve to the east of Bishop Harbor Road, a crosswalk is necessary.

Salt Flat Spur Trail

In Management Zones TC-18 and TC-19, to feasibly connect the two primary trailheads in the preserve (i.e., Hightower and Frog Creek trailheads), a footbridge over the Terra Ceia River (where the river takes the form of a narrow bayou) is necessary. For feasibility, bridging the narrowest segment of the river between Management Zones TC-18 and TC-28 is recommended.

Hammock Trail

In Management Zones TC-31, TC-32 and TC-33, south and east of Bishop Harbor Road, a circuit of existing management road traverses the largest area of mesic and hydric hammocks. No wayfinding or interpretation is distributed along the trail. A trailhead could be developed in conjunction with the proposed operational support facility in the north central portion of Management Zone TC-33.

To safely access the remainder of the preserve to the west of Bishop Harbor Road, a crosswalk is necessary.

Footbridges

Up to three footbridges are proposed for creek and river crossings along the hiking trail network. These footbridges would create a cohesive trail system across an otherwise disjunct landscape. If a footbridge

is constructed between Management Zone TC-18 to Management Zone TC-28 to connect to the Salt Flat Spur Trail and Frog Creek Trail, a footbridge over Management Zones TC-26 to TC-27 or Management Zones TC-28 to TC-26 will be necessary.

Proposed footbridges across Frog Creek and Terra Ceia River must be constructed with consideration of federal and/or state navigational requirements. Though not included in the list of federally navigable waters, designation of state navigable waters is indicated. As these waters are shallow and highly subject to tidal fluctuation, navigation is limited to paddlecraft and small, shallow-draft motorized vessels. Designing the footbridges with adequate clearance for such navigation is feasible, however, would increase costs and permitting complexity.

Types of Trail Use

Moderate demand for equestrian riding and cycling has been noted. After trail improvements and extensions are complete, access to equestrians and cyclists may be considered, taking into account risks of erosion and natural and cultural resource sensitivities.

Bishop Harbor Boat Ramp

Objective: Improve the boat ramp and parking area.

Actions:

- Stabilize the parking area and boat ramp.
- Maximize efficiency of the parking area to support sustainable visitor use patterns.
- Consider providing a self-serve paddlecraft rental kiosk.
- Improve natural communities adjacent to boat ramp.

The earthen Bishop Harbor Boat Ramp and adjacent parking area are eroded and prone to flooding from continuous use. Although the boat ramp was recently stabilized with pervious materials, during high tide events the water is level with Bishop Harbor Road such that the surface materials are prone to inundation and erosion.

Proposed improvements and modifications are contemplated for multiple purposes, including facilitation of water access/recreational paddling and boating that is proportionate to resource sensitivities along the waterways (e.g., seagrass beds).

As the boat ramp is both a recreational and operational asset, considerations for improvements and design elements are listed below.

Recreational Needs

Although the Terra Ceia Preserve Boat Ramp is popular, five public boat ramps exist along the approximately 15-mile road corridor between the Manatee River and Cockroach Bay. Tidal conditions and constrained mangrove passages naturally limit navigability by mid- to large-sized vessels. Ecological and archaeological sensitivities, submerged and within the intertidal zones, further indicate the need for limited boating access. Waterways optimally suited for larger vessels and more frequent traffic are accessible within the vicinity, such that the preserve boat ramp may be modified with improvements to support low-impact paddling and skiff usage.

The boat ramp is the closest water access point to the Skyway Bridge and heavily utilized by local fishermen, therefore, a visitor survey may need to be conducted to ensure best use of the facility.

Operational Needs

Given that the boat ramp is the closest point of water access to the Skyway Fishing Pier State Park and serves as the main operational access point for DRP staff monitoring the remote islands and aquatic features of Terra Ceia Preserve, improvements are necessary. The boat ramp and parking area should be stabilized with native, pervious materials such as oyster shells to improve the functionality and appearance of the facilities.

Parking Expansion

During summer months, the boat ramp often reaches capacity. If improvements are implemented, boating use would be projected to increase. Along with stabilizing the parking area, maximizing the parking area to provide up to 13 delineated trailer parking spaces is recommended. Current and increased capacity estimates should be based on vehicles and towed trailers that are proportionate to the small watercraft that can most sustainably navigate the associated waters.

Improvement plans should also consider revegetation strategies and the feasibility of a living shoreline to help prevent erosion. Given the spatial constraints in this area, parking may need to be provided outside of the developed footprint. Possible impacts to wildlife and submerged communities will be mitigated.

Paddlecraft Kiosk

The opportunity for a self-serve paddlecraft rental kiosk is considered feasible at the preserve boat ramp. The boat ramp area consists of sufficient upland space to accommodate this potential amenity. If spatial constraints become a limiting factor, no alternative sites are currently considered feasible as resource restoration and landscape aesthetics are the priority.

Access Implications

The boat ramp was established many years prior to state conservation acquisition such that traditional community use of the site is well established. Open access, however, has resulted in overuse and decline of site conditions. Accordingly, infrastructural investments are contingent upon release of Bishop Harbor Road to DRP for management as part of the preserve with controlled access behind preserve gates. Recognizing the history of traditional use, such changes would be evaluated through an intergovernmental and community engagement process.

In the interest of natural and cultural resource protection, where dredging has historically occurred through the waterways of this site, future such disturbance of submerged bottom should be minimized or altogether avoided. Limiting use of the boat ramp to shallow-draft watercraft is anticipated to reduce such dredging need.

Haley House Administration Area

Objective: Determine feasibility of restoring the Haley House.

Actions:

- Determine the cost of restoring the Haley House to adaptively reuse for administrative office space and/or staff residences.
- Coordinate with DHR to complete a condition assessment.
- Consult with BNCR and DHR to develop an appropriate management strategy for the Haley House.
- If deconstructing the Haley House is indicated, coordinate with DHR for documentation.

The distinctive historic structure of Terra Ceia Preserve, the Haley House, is associated with 1900s agriculture and real estate land development interests prior to state acquisition. The house is

considered a local landmark and has been eligible for listing in the National Register of Historic Places because it is a remaining example of the real estate boom and large-scale farming in the early 1900s. Associated with T. Ralph Robinson, whose research contributed to the development of disease-resistant citrus fruits, it is an example of typical architecture during early 20th century rural and suburban development.

For several years, the house was utilized as an administration office for preserve and aquatic preserve staff. There have been numerous attempts to rehabilitate the interior and exterior of the house to keep the structure in good condition, including the installation of a new roof and stabilization measures.

Potential Alternative Reuses

If the structure is restorable, administrative office space will be provided. If administrative office space is sufficient, then adaptive reuse of this building to supply residences for DRP staff and the Florida Conservation Corps invasives team could be considered.

Alternatively, the Haley House could be opened to visitors as an interpretive museum, dedicated to the abundance of cultural sites within and near the preserve and regional history of agricultural and coastal economies. If restored and utilized for public interpretive access, the Haley House could be featured as a historic site along the local Heritage Trail.

Management Strategy

DRP will coordinate with DHR to complete a condition assessment for this condemned structure and determine the feasibility of restoration and adaptive reuse or deconstruction. If the structure is restored and repurposed, it will require daily inspections and use. See the Cultural Resources section of the Resource Management Component for additional details.

Stotz Road Paddling Launch

Objective: Redirect recreational access.

Actions:

- Discontinue use of Williams Bayou access path and roadside parking.
- Restore eroded shoreline.

Located along a secluded mangrove shoreline near the north side of Interstate 275, the Stotz Road Paddling Launch is an undesignated access point used for shoreline fishing. Lack of parking, increased erosion, tightly constrained and slippery pathways, littering, recurring mangrove trimming and proximity to cultural sites indicate unsustainability of this site. Given longstanding traditional use, formalization of parking and stabilization of the access paths with native, pervious materials to improve drainage and control erosion has been considered, however, persistent management challenges and safety concerns outweigh the benefits of continued use such that closure is necessary. Alternative water access for paddling is available at the Bishop Harbor Boat Ramp, located 3 miles northeast. Although the boat ramp provides direct access to Bishop Harbor, rather than the access to Williams Bayou provided by the Stotz Road Paddling Launch, all bay and bayou features of the Terra Ceia area are comparably accessible from the boat ramp.

Proposed Support Area

Objective: Improve operational support infrastructure.

Actions:

- Designate four volunteer sites.
- Install mobile office and storage structures.
- Connect all new structures to the municipal sewage system.
- Construct perimeter fencing around the support area.
- Evaluate and implement alternative support area and native plant nursery locations.

Existing operational support infrastructure in the preserve is lacking since the historic Haley House became uninhabitable. Staff presently rely on two mobile buildings for temporary administrative space. Minimal square footage and absence of basic amenities make for challenging operational conditions such that priority should be given to installing a new administration office and providing volunteer campsites to supplement staffing. Given the emphasis of the preserve on wetland and aquatic habitat protection, it is also essential to connect any new structures and campsites to the municipal sewage system. The administration office should be mobile and relocatable before storm events to prevent flood damage. Storage structures should be provided as needed when the new operational support area is constructed. In conjunction with relocating administrative and equipment/materials storage spaces, the native plant nursery of the preserve must be continued. This nursery serves several surrounding units with native plants and is a vital function for the ongoing restoration efforts in the preserve and other park units in the vicinity.

The current configuration of the preserve requires staff to drive equipment along local roads, posing efficiency and safety concerns. Accordingly, priority criteria for the new support area must include geographic centrality to the uplands of the preserve. Spatial constraints, disjunct functions, lack of climate control and vulnerability to storm events are all limiting factors for current preserve operations. Multiple viable options for operational support space are listed below.

North of Frog Creek (Management Zone TC-31)

Previous planning efforts proposed to relocate the current operational support structures and native plant nursery to a new location on the east side of Bishop Harbor Road, north of Frog Creek, along the existing service road, within a small pocket of altered landcover surrounded by mesic hammock. Although this provides staff with a more central location to conduct resource management activities throughout the preserve, the proximity to the creek presents a flooding concern. Additionally, mesic hammock, hydric hammock and shell mounds along the bank of Frog Creek must be avoided.

This site is already equipped with an active powerline and intermittently dry potable water well. Road construction would be necessary to access the support area, and this would cause a hydrological impediment to the creek and nearby wetlands. Considering the proximity of the majority of the preserve to highly trafficked roads, this uniquely quieter location could alternatively become a destination along the expanded trail system.

North of Bishop Harbor Road (Management Zone TC-36)

Another location is considered in the northeastern entrance to the preserve, north of Bishop Harbor Road and west of U.S. Highway 41, in Management Zone TC-36. Electricity and sewer connection are available given the adjacency of the highway. Portions of this management zone closer to the highway are higher and pose less of a flood hazard, compared to the rest of the preserve. Although, the parcel does contain some wetlands, and low water crossings would be necessary for sections of the service

road. Permitting could be a concern depending on where a specific location is chosen. Additionally, preserve staff will still need to utilize sections of Bishop Harbor Road to access the rest of the preserve unless part of the road is incorporated into the preserve boundary.

If this location is decided, given the proximity of the proposed location to U.S. Highway 41 and external development, preserve staff should consider installing fencing around the proposed support area to protect preserve equipment and personnel.

South and East of Bishop Harbor Road (Management Zone TC-33)

Although this location is more central to the uplands of the preserve, portions of this management zone are seasonally flooded. Considering the slope of the railroad tracks to the east, during periods of heavy rain, sheet flow toward this site may be abundant. Wetlands to the west also present a flooding concern. The SWFWMD's SWIM restoration project has also partially restored some of this wetland habitat (i.e., northern half of Management Zone TC-32), and disturbance should be avoided.

An existing electrical line is available to the west side of the railroad; however, no water utilities (i.e., well or lines) are currently extended to this location.

Oversight of this portion of the preserve is necessary as trespassing and encroachment from adjacent non-conservation land uses have been repeatedly observed. Additional staff presence could deter and support management of future unauthorized entry and dumping.

Currently, some visitors hike along the service roads east of Bishop Harbor Road from Frog Creek to Bishop Harbor. If a trail is formalized at this location, it could connect to the Frog Creek Trailhead on the western side of the road, utilizing the proposed crosswalk. This operational support area site could serve as the primary location for administrative and visitor interactions, although preserve staff may not be routinely present. This interaction could be via a compact ranger station and/or trailhead with kiosks.

Haley House

The Haley House is located on a parcel that is disjunct from the majority of the preserve acreage. Recognizing its structural condition and remoteness from natural communities restoration and visitor access trailheads, alternative options for an operational facility will be considered. Solutions to these challenges, however, may be plausible.

Adaptive Reuse

In accordance with section 267.061(2)(d) through (e), F.S., prior to constructing new buildings, preference will be given to utilizing historic properties when determined feasible and prudent compared with available alternatives. Coordination between DRP and DHR will determine whether the cost of rehabilitation and ongoing maintenance exceeds that of new construction. If the cost of rehabilitation and ongoing maintenance exceeds that of new construction, then alternative locations for administrative space may be recommended.

Bridge Connection Concept

If the Haley House is deemed structurally restorable and can be adaptively reused, then connectivity to the majority preserve acreage to the north should be evaluated to facilitate efficient and safe management and recreation access. Such access would require a light vehicular bridge, capable of supporting natural resource management operations, extending under Interstate 275. To bypass an extensive area of mangrove swamp for an upland point of connection, additional acreage must be acquired (see Optimum Boundary section). Anticipated barriers to implementation include interagency permitting (e.g., U.S. Department of Transportation, Florida Department of Transportation) and significant engineering costs.

This alternative entails utilizing the Haley House parcel as the primary location for both preserve administration and visitor access. Visitor services would include stabilized parking, restroom access and trailhead amenities at the southern terminus of the proposed northbound preserve access bridge.

Preserve Boundary

Objective: Improve directional signage outside of the preserve boundary.

Action:

- Consult with the Florida Department of Transportation and Manatee County to install road signage.

There is no signage along local roads or U.S. Highway 41 directing the public to Terra Ceia Preserve State Park. To be listed as a site on the Great Florida Birding and Wildlife Trail, road signage outside of the preserve boundary is necessary. A preserve boundary sign has been installed on the northern segment of Bishop Harbor Road, adjacent to U.S. Highway 41; however, additional signage along adjacent local roads is necessary to direct visitors. DRP should consult with the Florida Department of Transportation and Manatee County to provide necessary directional signage.

VISITOR USE MANAGEMENT

Parkwide Trail System

Objective: Prevent future ecological damage.

Actions:

- Install regulatory signage.
- Install pedestrian gates for unauthorized vehicle exclusion.

Dirt and electric bikes have repeatedly caused damage along the preserve trails. Currently the trails within the preserve are specifically designated for hiking, and no biking or off-road vehicles are allowed. Off-road vehicles disturb sensitive wetland areas and accelerate soil erosion and rutting by destroying vegetation and compacting soil.

Preserve staff have repeatedly observed duck hunting along the Hightower Trail System. Hunting, trapping and/or the pursuit of wildlife is prohibited on all state park property, except in reserves, pursuant to Rule 62D-2.014(10), F.A.C.

Regulatory signage clearly stating the rules against bicycling, off-road vehicle usage and hunting will be installed at strategic locations. Narrow access, pedestrian walk-through fencing/stiles (similar to those at Charlotte Harbor Preserve State Park) should be installed at each trailhead to preclude motorized vehicle access. Where a gate, fence or pedestrian walkthrough already exists, modifications such as a narrower access path may limit unauthorized entry. Fencing around the preserve boundary, where appropriate, will be maintained.

Cultural Sites

Objective: Actively and passively interpret cultural resource protection.

Actions:

- Prevent prohibited activities on preserve property.
- Design and implement public outreach programs.
- Install regulatory signage.

Cultural sites within Terra Ceia Preserve State Park and nearby Cockroach Bay Preserve State Park frequently experience looting and vandalism. Metal detecting, digging and removing artifacts from sites are prohibited activities within state parks and compromise the integrity of the archaeological record. DRP staff should implement preventive measures to protect cultural sites within the preserve boundary. Outreach programs and interpretation will help educate the public about the protection of sites on state park property and encourage reporting if visitors suspect suspicious activities (e.g., digging, dumping, etc.). Noticeable regulatory signage should be maintained and replaced when necessary.

OPTIMUM BOUNDARY

Terra Ceia Preserve State Park is encompassed by the Terra Ceia Aquatic Preserve and surrounded by the 4,724-acre Terra Ceia Florida Forever Project. Several conservation areas are also established adjacent to the preserve including Madira Bickel Mound State Archaeological Site and several local and privately owned preserves.

Approximately 2,900 acres of the land identified for potential acquisition are essential remaining parcels in the Terra Ceia Florida Forever Project. Other parcels identified for the preserve's optimum boundary would connect a disjunct area of the current preserve property and improve land management.

Before management as a state park preserve, Terra Ceia was classified as a buffer preserve. The purpose of strategically acquiring this land was to improve water quality protection by creating a discharge area for nearby stormwater and agricultural runoff. Any parcels that are acquired will be restored to natural conditions to prevent further development along the bay and preserve coastal estuarine habitat.

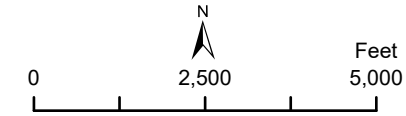
The identified optimum boundary parcels south of Interstate 275 and abutting Tampa Bay include Paradise Island, Skeet Key, Eds Key, Sisters keys, Knott-Cowen Tract and Rattlesnake Key. The submerged lands surrounding Terra Ceia Bay and Miguel Bay are dotted with extensive seagrass beds and are valuable for manatee migration and feeding grounds according to FWC's Florida Marine Research Institute Technical Report.

According to the Tampa Bay Estuary Program, since the 1900s, nearly half of the mangrove swamps that once fringed Tampa Bay have been replaced by development and seawalls. This area is one of the last spans of undeveloped shoreline in this region making acquisition crucial to prevent future habitat fragmentation, wildlife displacement and disruption to migration patterns for several species.

Mangrove forests are abundant on these optimum boundary parcels. Mangroves act as natural barriers and buffer inland development from storm surge and stabilize shoreline sediments preventing shoreline erosion. Mangrove trees, marsh grasses and salt barrens are all present on Rattlesnake Key and on some surrounding islands, and all these communities provide significant shelter and foraging habitat for bird rookeries and fish species.



TERRA CEIA PRESERVE STATE PARK
Optimum Boundary



This graphical representation is provided for informational purposes and should not be considered authoritative for navigational, engineering, legal, and other uses.

Tampa Bay is home to thousands of colonial waterbirds, and the shallow sections of the bay support the habitats mentioned above, including oyster beds, mudflats, seagrass meadows and mangrove forests. Adjacent to Rattlesnake Key is the Nina Griffith Washburn Sanctuary, a protected nesting site in the Audubon Florida Coastal Islands Sanctuaries System. Conservation of these uplands in the Lower Tampa Bay fosters habitat connectivity with the adjacent Terra Ceia Aquatic Preserve and Washburn Sanctuary. Moreover, acquisition of these parcels will preserve the viewshed and wildlife abundance along local paddling trails.

Several of the optimum boundary parcels also have recorded cultural resources, and additional surveys could identify additional sites if these parcels are preserved. These parcels should be acquired to protect these sites from human disturbance and/or destruction.

Two large tracts on the northern end of Snead Island and the two islands to the north (i.e., Little Bird Key) are also identified in the preserve's optimum boundary. Most of the property identified as optimum boundary on Snead Island is managed by Manatee County as part of Emerson Point Preserve. The other optimum boundary parcels to the northeast are not conserved and are privately owned with dense development abutting the parcels.

Several parcels proposed for acquisition are bordered by Interstate 275 and have residential developments. These parcels will help buffer existing preserve resources and protect the Terra Ceia Bay watershed.

A 0.21-acre inholding to the north of Bishop Harbor Road and to the west of the railroad tracks is a part of the Terra Ceia Florida Forever Project and recommended for acquisition. This parcel contains a canal, similar to the adjacent parcels, but is occluded by dense vegetation and sedimentation such that it is no longer navigable. Unless this parcel is acquired, public access must be maintained; if DRP manages a segment of Bishop Harbor Road, management authority will begin west of this parcel.

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