ESTERO BAY PRESERVE STATE PARK
Park Chapter

BIG CYPRESS REGION

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Estero Bay Preserve State Park

Park Chapter

Unit Name: Estero Bay Preserve State Park

Planning Region: Big Cypress

County: Lee

Lease/Management Agreement Number: 4083

Central Park Theme: Home to wetlands and wildlands, the serene coastal waters and onshore habitats of Estero Bay Preserve State Park hug the edges of Florida's first aquatic preserve, creating a conjoined refuge amidst the rapid development of Southwest Florida.

Total Acreage: 11,382.81

Natural Communities	**Acres**
Basin Marsh	9
Depression Marsh	47
Dome Swamp	8
Estuarine Unconsolidated Substrate	606
Keys Tidal Rock Barren	2
Maritime Hammock	41
Mesic Flatwoods	601
Mangrove Swamp	7,669
Salt Marsh	1,951
Scrub	8
Scrubby Flatwoods	99
Shell Mound	5
Slough	6
Strand Swamp	6
Wet Flatwoods	294

Altered Land Cover	**Acres**
Developed	1
Utility Corridor	30

Acquisition: Estero Bay Preserve State Park was initially acquired on April 27, 1987, with Conservation and Recreation Lands (CARL) and Florida Forever program funds, as well as donations and eminent domain.

Resource Management Component

Hydrology

- Assess the park's hydrological restoration needs.
- Continue to pursue hydrologic studies of restoration needs within the Hendry Creek and Cow Slough watersheds.
- Restore natural hydrological condition and function to ± 500 acres of mangrove swamp, mesic flatwoods, scrubby flatwoods and wet flatwoods.
- Locate and cap the abandoned artesian well on the Zemel parcel (management zone EB-08).

Natural Communities

- Maintain ± 2,070 acres of the park within the optimum fire return interval within the planning period.

Imperiled Species

- Update baseline imperiled species occurrence inventory lists for flora and fauna.
- Survey, monitor and document gopher tortoise and Wilson's plover.
- Monitor and document nodding pinweed and Curtiss' milkweed.

Invasive and Nuisance Species

- Update the long-term invasive plant management plan for the preserve.
- Monitor ± 5,403 acres of habitat already in maintenance condition.
- Reduce or maintain cover class on ± 7,653 acres of habitat not in maintenance condition.
- Continue to trap and remove feral hogs and manage other invasive/nuisance animals as needed.

Cultural Resources

- Monitor and assess all recorded cultural resources in the preserve.
- Improve condition of nine cultural sites.
- Maintain three cultural sites in good condition.

Land Use Component

Conceptual Land Use

Parkwide

- Develop and implement an interpretive sign plan.

Winkler Point Trailhead

- Implement permit-only access system for visitor use management.
- Monitor visitor use and impacts to trail and surrounding natural resources.
- Expand perimeter fencing around trailhead.
- Install low water crossings at trailhead.
- Implement armoring and/or stabilization measures as necessary.
- Revegetate denuded and eroded segments of trail.

Estero River Scrub Trail

- Install an electric gate.
- Improve parking area drainage.
- Construct permanent restroom.
- Install low water crossings on trail.

Optimum Boundary

Numerous parcels adjacent to the preserve are identified for acquisition to further the park's original purpose of protecting water quality in Estero Bay Aquatic Preserve. A subset of these parcels are within the former Florida Forever Estero Bay BOT project boundary and would enhance ecological connectivity to surrounding conservation lands and buffer the aquatic preserve.

Although some of the identified parcels are located near Lovers Key State Park, their estuarine composition is optimally suited for the backcountry recreation of Estero Bay Preserve, rather than the beach recreation of Lovers Key.

INTRODUCTION

LOCATION AND ACQUISITION HISTORY

Estero Bay Preserve State Park is located in Lee County, between Fort Myers and Bonita Springs. Access to the park is from Winkler Road on the north end and from Broadway Avenue West at the south end. The Big Cypress Region map also reflects significant land and water resources existing near the park.

Estero Bay Preserve State Park was initially acquired on April 27, 1987, with Conservation and Recreation Lands and Florida Forever funds, as well as donations and eminent domain. Currently, the park comprises 11,382.81 acres. The Board of Trustees of the Internal Improvement Trust Fund (Trustees) hold fee simple title to the park and on January 1, 2004, the Trustees leased (Lease No. 4083) the property to the Department of Environmental Protection's (DEP) Division of Recreation and Parks (DRP) under a 50-year lease. The current lease will expire on February 21, 2046.

Estero Bay 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 park property can be made available upon request to DEP.

SECONDARY AND INCOMPATIBLE USES

In accordance with section 253.034(5), Florida Statutes (F.S.), the potential of the park 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 park'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 park.

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 park. 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 park 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

The purpose of Estero Bay Preserve State Park is to conserve and protect the unique and irreplaceable natural areas, wildlife, and significant cultural resources of Estero Bay, to improve water quality within Estero Bay, and to provide outstanding resource-based recreation opportunities for Florida's residents and visitors.

Park Significance

- The park protects several important archaeological sites associated with the Calusa people and other pre-Columbian groups. The park and adjacent areas are considered to have high potential for unrecorded sites of archaeological significance.

- Estero Bay is one of the most productive estuaries in Florida. The park's natural communities support a productive fish nursery, which, in turn, supports a significant commercial and recreational fishery. The park offers many other excellent recreational opportunities including fishing, boating, canoeing/kayaking, hiking, cycling, birding and wildlife viewing.

- After concerns were raised about declining water quality in Estero Bay, the park was established as a buffer preserve for Florida's first aquatic preserve. The park's wetlands serve as a filter for non-point source pollution from the surrounding region, thereby protecting the bay's water quality.

- The park protects more than 31 species of imperiled plants and animals, including golden leather fern, Curtiss' milkweed, Florida butterfly orchid and gopher tortoise. Additionally, the park contains important habitat for numerous resident and migratory bird species, including peregrine falcon, wood stork and tricolored heron.

- Natural communities considered rare or unique in Lee County within the park include cabbage palm hammock, coastal scrub and Keys tidal rock barren; an area of flat rocklands and eroded limestone are also present and in excellent condition.

Central Park Theme

Home to wetlands and wildlands, the serene coastal waters and onshore habitats of Estero Bay Preserve State Park hug the edges of Florida's first aquatic preserve, creating a conjoined refuge amidst the rapid development of Southwest Florida.

Internal Classification

Estero Bay 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 park is a component of the Florida Greenways and Trails System, administered by DEP's Office of Greenways and Trails.

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

PARK ACCOMPLISHMENTS

- Treated a total of 642 acres with prescribed fire in FY 2024-25.
- Improved and installed 34,081 linear feet of fire line in FY 2024-25.
- Treated 225.73 acres (treatment goal was 76.84 infested acres) of invasive plant infestations in FY 2024-25.
- Four feral hogs were removed from the park in partnership with the U.S. Department of Agriculture (USDA) in FY 2024-25.

RESOURCE MANAGEMENT COMPONENT

Estero Bay Preserve State Park Management Zones		
Management Zone	**Acreage**	**Managed with Prescribed Fire**
EB-01A	111.43	No
EB-01B	587.56	No
EB-02	46.06	Yes
EB-03	68.68	Yes
EB-04	34.14	Yes
EB-05	47.53	Yes
EB-06	74.95	Yes
EB-07	81.12	Yes
EB-08	281.14	Yes
EB-09A	82.52	Yes
EB-09B	87.60	No
EB-10A	76.96	No
EB-10B	28.41	No
EB-11A	67.10	Yes
EB-11B	107.67	Yes
EB-11C	71.07	Yes
EB-11D	112.35	Yes
EB-11E	76.39	Yes
EB-12	65.74	No
EB-13	31.16	No
EB-14A	66.37	Yes
EB-14B	39.37	Yes
EB-15	94.90	Yes
EB-16A	55.89	Yes
EB-16B	78.56	Yes
EB-17A	34.56	Yes
EB-17B	69.70	No
EB-17C	41.09	No
EB-18	4.97	Yes
EB-19	5.01	Yes
EB-20	4.12	Yes
EB-21	10.77	Yes
EB-22	14.31	Yes
EB-23A	42.34	Yes
EB-23B	8.54	Yes
EB-24	103.28	Yes
EB-25	9.98	Yes
EB-26A	92.71	Yes
EB-26B	28.57	Yes
EB-26C	9.72	Yes
EB-27A	10.11	Yes

Estero Bay Preserve State Park Management Zones		
Management Zone	**Acreage**	**Managed with Prescribed Fire**
EB-27B	26.26	Yes
EB-28	88.55	Yes
EB-29	49.89	Yes
EB-30	100.73	Yes
EB-31	54.31	Yes
EB-32	9.93	Yes
EB-33	406.74	No
EB-34	10.32	Yes
EB-35	130.38	No
EB-36	301.01	No
EB-37	557.62	No
EB-38	422.01	No
EB-39	1,873.93	No
EB-40	118.45	No
EB-41	373.33	No
EB-42	707.80	No
EB-43	187.68	No
EB-44	1,045.16	No
EB-45	248.81	No
EB-46	551.28	No
EB-47	68.50	No
EB-48	527.89	No
EB-49	25.56	No
EB-50	125.44	No
EB-51	11.92	No
EB-52	322.59	No
EB-53	96.32	No

TOPOGRAPHY

Estero Bay Preserve State Park is in the Everglades District, specifically the Caloosahatchee Valley Province and the Big Cypress Province. The Caloosahatchee Valley Province is characterized by a gradual upward slope north to the Caloosahatchee River and includes all areas of the park west of Winkler Road. The Big Cypress Province is characterized by a northwest-southeast trending area that is gently tilted towards the Gulf and includes all areas of the park that lie east of Winkler Road. Within the preserve, the elevation rises slowly from the edge of the bay inward in easterly and northeasterly directions. Elevations of the preserve range from about 11.5 feet above mean sea level on Dog Key, to less than 1 foot along the bay edge of the preserve. Alterations to the topography of the preserve include wildfire plow lines, Florida Power & Light (FPL) power lines, mosquito ditches and a raised berm that at one time had been an elevated railroad line.

ESTERO BAY PRESERVE STATE PARK
Management Zones

N

0 1 2 Miles

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SOILS

There are a variety of soil types in the park. Soils range from a dry Satellite Fine Sands that support Florida rosemary (*Ceratiola ericoides*), lichen and sand live oak (*Quercus geminata*) vegetation to a wet Isles Muck that support mangroves and needle rush (*Juncus roemerianus*) vegetation. The soils are nearly level in tidal swamp depressions and sloughs. The soils map contains all soil types within the current preserve boundary and was created from USDA soils data (Henderson 1984). The appendix contains a detailed description of soils occurring in the park. Among many of the waterways, there are spoil piles that remain as the result of dredging these waterways in the 1960s. These spoil piles provide habitat for invasive plants, alterations to the natural hydrology and the spoil continues to erode into and away from the waterway. There are no known mineral resources in the preserve.

HYDROLOGY

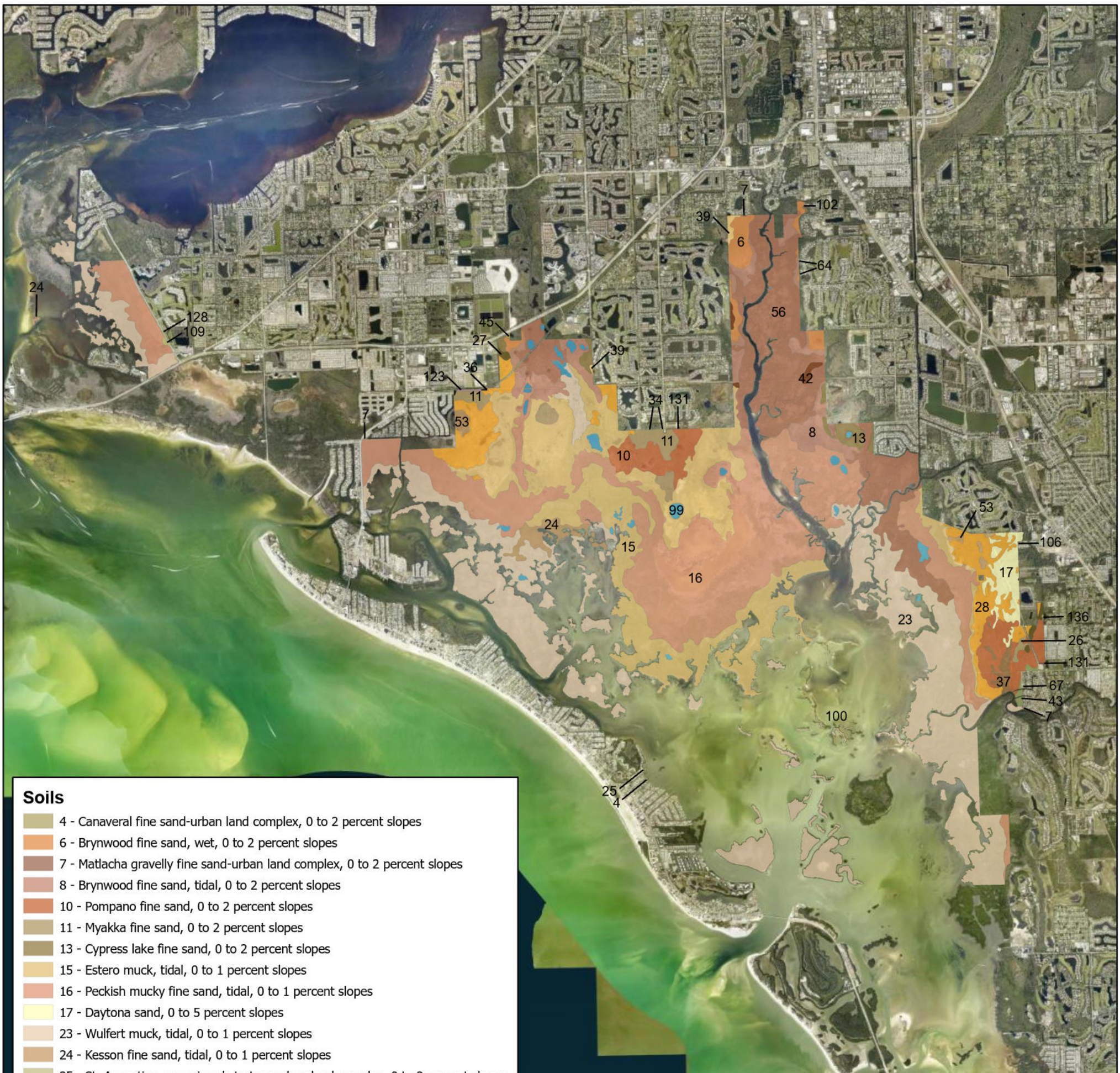
Water Quantity

Estero Bay Preserve State Park is considered part of the Big Cypress Watershed, located within the Everglades West Coast Basin. It is adjacent to the northern and a portion of the eastern shoreline of the 10,847-acre Estero Bay Aquatic Preserve. Its tributaries lie entirely within Lee County. Portions of the preserve are small islands located within the Estero Bay Aquatic Preserve. The primary purpose for acquisition of the buffer lands is to protect the bay from impacts associated with development of land surrounding the bay. Estero Bay was the state's first Aquatic Preserve, designated in 1966. The legal boundary description is referred to in section 258.39(28), F.S.

There are five tributaries that discharge directly into Estero Bay: Hendry Creek, Mullock Creek, Estero River, Spring Creek and Imperial River. The Estero and Imperial rivers are the largest freshwater contributors to the bay; however, Estero Bay is influenced more by tidal action than by tributary contributions. Historically, the Estero Bay Basin consisted of low-lying topography with slow sheet flow drifting from north to south with a shift in flow and blending of watersheds in the summer months. This allowed rainfall to provide a constant input of freshwater into the bay throughout the year. However, development within the area over the last few decades has led to modifications in natural river and groundwater flow, altering salinity levels within the bay.

Estero Bay was given the classification of Outstanding Florida Water on August 8, 1994, as specified in Chapter 403, F.S., and Chapter 62-302, F.A.C. This is the highest level of water quality protection that a waterbody can receive. The isolated ponds within the preserve, as well as the bay's tributaries located adjacent to the entire shoreline of the preserve are also categorized as Outstanding Florida Water. These waters are worthy of special protection because of their exceptional ecological or exceptional recreational significance. The Ten-Mile Canal and all other artificial waterbodies have not been declared Outstanding Florida Water. In addition, in February 2003, Estero Bay was designated a priority Surface Water Improvement and Management waterbody by the South Florida Water Management District (SFWMD).

The Estero Bay partially meets its Surface Water Class III status, as it has been given an overall water quality rating of "fair" due to nutrient levels. Matanzas Pass, Hurricane Bay and Hell Peckney Bay are the



Soils

- 4 - Canaveral fine sand-urban land complex, 0 to 2 percent slopes
- 6 - Brynwood fine sand, wet, 0 to 2 percent slopes
- 7 - Matlacha gravelly fine sand-urban land complex, 0 to 2 percent slopes
- 8 - Brynwood fine sand, tidal, 0 to 2 percent slopes
- 10 - Pompano fine sand, 0 to 2 percent slopes
- 11 - Myakka fine sand, 0 to 2 percent slopes
- 13 - Cypress lake fine sand, 0 to 2 percent slopes
- 15 - Estero muck, tidal, 0 to 1 percent slopes
- 16 - Peckish mucky fine sand, tidal, 0 to 1 percent slopes
- 17 - Daytona sand, 0 to 5 percent slopes
- 23 - Wulfert muck, tidal, 0 to 1 percent slopes
- 24 - Kesson fine sand, tidal, 0 to 1 percent slopes
- 25 - St. Augustine, organic substratum-urban land complex, 0 to 2 percent slopes
- 26 - Pineda-pineda, wet, fine sand, 0 to 2 percent slopes
- 27 - Pompano fine sand, frequently ponded, 0 to 1 percent slopes
- 28 - Immokalee sand, 0 to 2 percent slopes
- 34 - Malabar fine sand, 0 to 2 percent slopes
- 36 - Immokalee sand-urban land complex, 0 to 2 percent slopes
- 37 - Satellite fine sand, 0 to 2 percent slopes
- 39 - Isles fine sand, frequently ponded, 0 to 1 percent slopes
- 42 - Wabasso sand, limestone substratum, 0 to 2 percent slopes
- 43 - Smyrna fine sand, 0 to 2 percent slopes
- 45 - Copeland fine sandy loam, frequently ponded, 0 to 1 percent slopes
- 53 - Myakka fine sand, frequently ponded, 0 to 1 percent slopes
- 56 - Isles muck, tidal, 0 to 1 percent slopes
- 64 - Brynwood fine sand, wet-urban land complex, 0 to 2 percent slopes
- 67 - Smyrna fine sand-urban land complex, 0 to 2 percent slopes
- 99 - Water
- 102 - Cypress lake fine sand-urban land complex, 0 to 2 percent slopes
- 106 - Daytona sand-urban land complex, 0 to 5 percent slopes
- 109 - Estero muck, tidal-urban land complex, 0 to 1 percent slopes
- 123 - Myakka fine sand-urban land complex, 0 to 2 percent slopes
- 128 - Peckish mucky fine sand, tidal-urban land complex, 0 to 1 percent slopes
- 131 - Pompano fine sand-urban land compex, 0 to 2 percent slopes
- 136 - Valkaria fine sand-urban land complex, 0 to 2 percent slopes

ESTERO BAY PRESERVE STATE PARK
Soils

N

0 1 2 Miles

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only waters within Estero Bay to have a Class II water quality designation, as defined in Chapter 62-302, F.A.C. This classification refers to a designated use of "shellfish propagation or harvesting." These waters have degraded and are considered "closed;" therefore, no waters within Estero Bay are approved by the Florida Department of Agriculture and Consumer Services' (FDACS) Shellfish Environmental Assessment Section for shellfish propagation or harvesting. As a result of this "prohibited" classification by FDACS' Shellfish Environmental Assessment Section, these Class II waters cannot be used for shellfish harvest or propagation. All other waters in Estero Bay and the tributaries bordering the preserve are Class III waters, or waters with a designated use of "recreation and propagation and maintenance of a healthy well-balanced population of fish and wildlife."

Unlike many other estuaries that receive freshwater input from one or two major tributaries, Estero Bay receives freshwater drainage from several sources in surrounding watersheds along its northern and eastern perimeter. All these small rivers are considered first order streams, apart from the Imperial River (i.e., considered second order). These streams rise from seeps, springs and marsh headwaters and have no major confluences with other streams before they discharge into Estero Bay. The average stream length is between five and ten miles from mouth to source. The watershed's drainage area is about 293 square miles.

Cow Slough and Hendry Creek drain much of what is known as the Fort Myers peninsula, which is primarily urban, commercial and suburban lands. The upstream portion of Mullock Creek is connected to a structure called Ten-Mile Canal that receives runoff from the city of Fort Myers.

Mid-Estero Bay also receives runoff from Mullock Creek and the Estero River, as well as from residential neighborhoods, golf courses and the diminishing farm fields and light industry of relatively open lands between Fort Myers and Bonita Springs. This area is changing rapidly with the growth of Florida Gulf Coast University (FGCU) and the increasing construction of housing and retail complexes. Spring Creek and Coconut Creek (a small coastal stream) drain into the southern quarter of the bay from the older, small residential settlements of Coconut and Spring Creek and the newer, large-scale developments on both sides of the creek.

Emptying into the extreme southern end of Estero Bay, the Imperial River drainage area historically extends past the Interstate 75 corridor to drain the western portion of Corkscrew Regional Ecosystem Watershed. This area is the largest undeveloped wetland drainage of the Estero Bay Basin and is considered vital to maintaining the environmental integrity and wildlife habitat of the western Big Cypress Basin area. Studies have shown, however, that water samples from the downstream reaches of Spring Creek and the Imperial River, near unincorporated residential communities, show elevated levels of fecal coliforms and total coliforms, conditions that would indicate seepage from faulty septic fields and unmanaged domestic runoff. This type of non-point source pollution can have compounding effects over time.

Three streams—Cow Slough, No-name Slough and Hendry Creek—have most of their drainages currently protected within the present preserve. A small portion of Mullock Creek drainage within the park is also protected. The remaining three streams (i.e., Spring Creek, Estero River and Imperial River) have only their lower reaches within the current preserve boundary or fall within the Florida Forever project boundary. Indeed, the Florida Forever project boundary was chosen to encompass the non-residential or commercially developed basins of these creeks, enabling DEP to design a truly comprehensive plan for managing the whole of the Estero Bay ecosystem.

Water Quality

Multiple water features located within the preserve are on DEP's Comprehensive Verified List of Impaired Waters for Total Maximum Daily Loads for bacteria, metals and/or nutrient levels including Mullock Creek (WBID 3258C4), Estero River (Marine Segment) (WBID 3258D1), Estero Bay wetlands (WBID 3258A1) and Hendry Creek (Marine) (WBID 3258B1). Hendry Creek (Marine) has state-adopted Total Maximum Daily Loads to address bacteria and dissolved oxygen (Rule 62-304.810, F.A.C.). Some segments of all the bay's tributaries have been listed as "impaired" under the Impaired Waters Rule.

With limited staff and resources, water quality sampling and testing is not completed by the park. The park supports efforts for continued water quality monitoring by the aquatic preserve, SFWMD, Coastal and Heartland National Estuary Partnership and FGCU that will help assess water quality conditions and trends in the bay and help with management decisions regarding shellfish harvest/propagation. The park also supports water quality improvement or restoration projects that may result in improved water quality and approved shellfish harvest/propagation.

Hydrological Alterations

Multiple areas of Estero Bay Preserve State Park have areas where hydrological alterations occurred prior to state acquisition. The intent of hydrological alterations, such as drainage canals and ditches, was to manage surface water and drain it off the land for agricultural, commercial and residential development. Past hydrologic alterations of saltmarsh and mangrove swamp habitats throughout the preserve encourages encroachment by native and invasive non-native woody tree species. With heavier cover, habitat value declines for wading and ground nesting birds, rodents and the raptors that prey upon them, as well as other species that depend upon open grassy areas and the diverse fauna that thrive in the moist soils.

Around 1920, the Ten Mile Canal was constructed to drain a 70 square mile area for agricultural purposes with all the water diverted into Mullock Creek (U.S. Army Corps of Engineers 1999). This diversion had a large impact on the headwater for Hendry Creek, which currently receives a lesser amount of water than in the past because the Ten Mile Canal intercepts and diverts most of the runoff (W. Dexter Bender and Associates 1990).

Mosquito ditches have also played a part in the alteration of natural drainage patterns on the buffers. Mosquito ditching was a common practice in the 1960s and the impacts of that are still observable along the eastern side of the mangrove swamp throughout the Estero River Scrub parcel (management zones EB-44 and EB-45), Shell Point (management zone EB-33), Hendry Creek (management zones EB-41, EB-42, EB-17C and EB-17A), and management zone EB-35 east of San Carlos Boulevard. In addition, drainage canals constructed in communities along the coast have increased the flow of freshwater into Estero Bay.

Additional historical alterations of hydrological flow in Estero Bay include the construction of elevated berms that once served as railroad lines, some of which are currently being managed by FPL as utility easements. These elevated berms are located at the Estero River Scrub parcel (management zone EB-32), Hendry Creek parcels (management zones EB-16A, EB-42 and EB-17C) and the Zemel parcel (management zones EB-11D, EB-11E, EB-08, EB-38, EB-10A and EB-10B).

There are additional berms along the banks of the Estero River, one that runs the length of the shoreline of the Estero River Scrub parcel. Additional berms are located in management zones EB-20 and EB-21 along dredged canals. These provide access to the Estero River for private parcels to the east.

Coastal Erosion/Sedimentation

The expansive shoreline of the preserve along the waterways of Estero Bay experiences fluctuations in erosion and sedimentation similar to that experienced at any southwest Florida coastal location. Excessive erosion is not an issue as the park's shorelines are dominated by wide swaths of mangrove swamp. The most notable erosion event at the park followed Hurricane Ian in 2022, with numerous islands showing signs of erosion including archaeological sites with newly exposed artifacts. Hurricane Ian (2022) and hurricanes Helene and Milton (2024) also resulted in mangrove die-back in some areas of the preserve with trees toppled and other areas were heavily sedimented due to storm surge.

The shoreline along the Estero River at the Estero River Scrub parcel of the park has experienced consistent erosion over the years due to wake from recreational boaters along the Estero River. Wave attenuation and living shoreline projects may be necessary in the future to protect the uplands from continued erosion.

Monitoring and Assessment

Objective: Assess the park's hydrological restoration needs.

Action:

- Continue to cooperate with other state and federal agencies and independent researchers regarding hydrological research, assessments and monitoring programs.

DRP will continue to closely cooperate with state and federal agencies and independent researchers engaged in hydrological research and monitoring programs within the state park, and it will encourage and facilitate research in those areas.

Objective: Assess the park's hydrological restoration needs for Hendry Creek and Cow Slough watersheds.

Action:

- Continue to pursue hydrologic studies of restoration needs within the Hendry Creek and Cow Slough watersheds.

Restoring state park lands to original natural conditions often depends on returning natural hydrological processes and conditions to the park. This is done primarily by filling or plugging ditches, removing obstructions to surface water "sheet flow," installing culverts or low-water crossings on roads and installing water control structures to manage water levels.

In May 2009, a hydrological restoration study was conducted by Consul-Tech, an engineering firm located in Fort Myers, for the Mullock Creek and Estero River basins for the Estero River Scrub section of the preserve. Additional assessments of the Hendry Creek and Cow Slough areas would provide guidance on restoration activities needed in these areas to restore historic hydrological flow.

Restoration

Objective: Restore natural hydrological conditions and functions to approximately 500 acres of mangrove swamp, mesic flatwoods, scrubby flatwoods and wet flatwoods.

Actions:

- Complete a feasibility assessment for projects identified in the Consul-Tech study.
- Install two low-water crossings.
- Maintain, repair or replace culverts throughout the area.
- Stabilize the main nature trail at the slough crossing.
- Restore 6 miles of mosquito ditching.
- Install ditch blocks and dismantle portions of existing railroad grade to open gaps.
- Remove spoil berms in EB-20 and EB-21.
- Obtain necessary gopher tortoise relocation permit.

A hydrological restoration study conducted by Consul-Tech in May 2009 for the Mullock Creek and Estero Bay and River basins included recommendations to restore the historic hydrology of the Estero River Scrub parcel to the extent possible. The study recommended culvert replacement and maintenance, railroad grade removal, installation of ditch blocks, stabilization of three critical wetland crossing areas of the park and filling of mosquito ditches. The bulk of the improvements are located in the Estero River Basin and focus on reversing the adverse impact of hydrology caused by the elevated railroad berm and ditches, as well as the FPL access road, to restore sheet flow. Structural improvements are limited in the Mullock Creek Basin, which contains an upstream portion of the Mullock Creek slough. Recommendations for this area include maintenance of the existing culvert under the FPL service road to maintain swamp connectivity.

One low-water crossing was recommended along the FPL service road located at the end of Broadway Street heading west (management zone EB-24). In addition, improvements to the conveyance under the Broadway Street extension was identified through the installation of a larger culvert at the slough. Care must be taken to avoid the underground FPL line that runs parallel with the Broadway Street extension.

An additional low-water crossing is recommended by park staff on the north boundary of the Estero River Scrub parcel south of Shadow Wood Preserve Golf and Country Club (management zones EB-30, EB-29, EB-32 and EB-28). The elevated golf course has altered the hydrology on the north boundary of the park. A low water crossing should be installed to improve access to the management zones and improve the sheet flow.

The ditch blocks, lowering sections of the railroad grade and additional culvert installation and/or replacement were identified to restore the flow to the Estero River Scrub parcel. However, improvements to hydrology in the preserve may not be feasible because of permitting constraints and effects to downstream development. An assessment should be conducted to determine if any of the projects should be pursued or if offsite constraints would prevent them from being implemented. If any or all the projects are feasible, pursue funding for implementation.

While not within the project area, Consul-Tech mentions in their report the 6 miles of mosquito ditches that border the mangrove swamp and the wet flatwoods of the Estero River Scrub parcel disrupt

historical hydrology. The ditches should be filled to original grade to restore the natural tidal flow using the spoil piles from the excavated ditches to backfill them.

Objective: Protect groundwater hydrology at the Zemel parcel.

Action:

- Locate and cap the abandoned artesian well.

There are records of an artesian well on the Zemel parcel (management zone EB-08) that needs to be to be located and then capped to protect groundwater. When the well is located, park staff should seek assistance from the SFWMD to permanently cap it.

NATURAL COMMUNITIES

The park contains 15 distinct natural communities as well as two altered land cover types (see Natural Communities Map). A list of known plants and animals occurring in the park is contained in the appendix.

Mesic Flatwoods

The mesic flatwoods at Estero Bay Preserve State Park is characterized as an open canopy of widely spaced slash pine (*Pinus elliotti*) with little or no understory, and a dense low ground layer of low shrubs. Shrub species common in the mesic flatwoods at the preserve include saw palmetto (*Serenoa repens*), gallberry (*Ilex glabra*), shiny blueberry (*Vaccinium myrsinites*) and tarflower (*Bejaria racemosa*). The herbaceous layer is primarily grasses, including wiregrass (*Aristida stricta*), bottlebrush threeawn (*Aristida spiciformis*) and broomsedge (*Andropogon* spp.) with additional species including whitehead bog buttons (*Lachnocaulon anceps*), bloodroot (*Lachnanthes caroliana*), false foxglove, (*Agalinus maritima*), yellow-eyed grass (*Xyris* spp.) and gopher apple (*Licania michauxii*). The optimal fire return interval for this community is two to four years.

This natural community comprises approximately 600 acres of the preserve and is currently in good condition. Imperiled plant species found in the mesic flatwoods include state-threatened pine lily (*Lilium catesbaei*), state-threatened northern needleleaf (*Tillandsia balbisiana*) and state-endangered cardinal air plant (*Tillandsia fasciculata*), and imperiled animal species include the state-threatened gopher tortoise (*Gopherus polyphemus*). Previous fire suppression from multiple areas of mesic flatwoods has resulted in greater coverage of saw palmetto than desired. Mechanical treatment may be needed in select areas to reduce heavy fuel loading to minimize pine mortality from follow-up prescribed fire.

Hydrological alterations have impacted this community including at the Estero River Scrub parcel where an existing elevated railroad bed has blocked historic sheet flow into the mesic flatwoods. Invasive plant species are a prevalent issue in areas where fire has been suppressed at the park. Species commonly found in the mesic flatwoods including melaleuca (*Melaleuca quinquenervia*), Brazilian pepper (*Schinus terebinthfolia*), earleaf acacia (*Acacia auriculiformis*) and downy rose myrtle (*Rhodomyrtus tormentosa*). Another factor impacting mesic flatwoods at Estero Bay Preserve State Park is feral hogs (*Sus scrofa*) with evidence of rooting throughout this community. Feral hogs can negatively impact rare plant species such as the pine lily due to the rooting behavior. Aggressive trapping efforts are ongoing in this community at the preserve.

BM
UC
WF
DM
SAM
MS
EUS
KTRB
SC
SCF
MF
STS
DS
DV
SLO
SHM
MAH

Natural Communities (in Acres)

- BM - Basin Marsh 8.66
- DM - Depression Marsh 47.06
- DS - Dome Swamp 7.53
- DV - Developed 0.67
- EUS - Estuarine Unconsolidated Substrate 606.34
- KTRB - Keys Tidal Rock Barren 1.65
- MAH - Maritime Hammock 41.27
- MF - Mesic Flatwoods 601.26
- MS - Mangrove Swamp 7668.63
- SAM - Salt Marsh 1951.30
- SC - Scrub 7.93
- SCF - Scrubby Flatwoods 99.30
- SHM - Shell Mound 5.47
- SLO - Slough 5.7
- STS - Strand Swamp 5.83
- UC - Utility Corridor 30.63
- WF - Wet Flatwoods 293.58

ESTERO BAY PRESERVE STATE PARK
Natural Communities - Existing Conditions

N

Miles

0 1 2

Management of mesic flatwoods at Estero Bay Preserve State Park largely focuses on rare plant surveys, invasive plant surveys and treatment efforts, feral hog removal and prescribed fire. DRP staff will continue periodic surveys for rare plants and invasive plant infestations to catch new infestations early. Invasive animal removal work should continue to reduce damage to this community from rooting. In the Estero Scrub parcel, replacement or upgrade of the culverts within the elevated FPL-maintained railroad bed that bisects the flatwoods and cypress communities will improve sheet flow to both. Prescribed fire with an emphasis on growing season burns should continue within the recommended fire return interval of two to four years. Mechanical treatment through roller-drum chopping or mowing should be considered for areas where reduction of saw palmetto and overgrown shrub density is necessary to improve biodiversity.

Scrub

Small pockets of scrub occupy approximately 8 acres of Estero Bay Preserve State Park. The preserve's scrub community is totally encompassed within the larger scrubby flatwoods habitat. Typical plants include sand live oak, myrtle oak (*Quercus myrtifolia*), Chapman's oak (*Quercus chapmanii*), tarflower (*Bejaria racemosa*), saw palmetto, Florida rosemary and prickly-pear cactus (*Opuntia humifusa*). There are scattered openings in the canopy with bare patches of sand that support many imperiled or endemic plant species; these species are regularly flowering and replenishing their seed banks. Imperiled plant species found in the scrub at the preserve include Curtiss' milkweed (*Asclepias curtissii*). Several species of vertebrates, invertebrates and amphibians, such as oak toad (*Anaxyrus quercicus*) and gopher tortoise inhabit these areas. Scrub is a pyric community with an optimal fire return interval of five to 20 years depending on site conditions and burn objectives.

This community is in fair condition due to the absence of fire. Scrub has a longer fire return interval and can burn catastrophically in dry conditions. The scrub pockets within the scrubby and mesic flatwoods complicate fire management. Due to the area's small size, it is typically burned with the surrounding flatwoods; however, a section on the northeast side of the Estero River Scrub parcel is surrounded by urban residential development. Managing fire to consume the scrub without damaging nearby pine trees is a challenge for the preserve.

Management of scrub at Estero Bay Preserve State Park largely focuses on rare plant surveys, feral hog removal, prescribed fire, imperiled species surveys and invasive plant surveys and treatment efforts. DRP staff will continue periodic surveys for rare plants and invasive plant infestations to catch new infestations early. The park will complete prescribed burns on a five to 15 year rotation and mechanically treat those areas with dense overgrown vegetation as needed.

Scrubby Flatwoods

Estero Bay Preserve State Park has approximately 99 acres of scrubby flatwoods that is typically located adjacent to scrub and mesic flatwoods habitat. Typical plants in scrubby flatwoods include slash pine, sand live oak, myrtle oak, Chapman's oak, saw palmetto, coastal plain staggerbush (*Lyonia fruticosa*), tarflower, shiny blueberry and wiregrass. Scrubby flatwoods are similar in community structure to the mesic flatwoods but are better drained, which allows oaks to proliferate. Occasional lightning-induced wildfires have occurred within portions of this community at the preserve.

This community is in good condition. Imperiled species include gopher tortoise and eastern indigo snake (*Drymarchon couperi*). Florida scrub-jay (*Aphelocoma coerulescens*) have been absent from the scrubby flatwoods since the 1990s.

Management of scrubby flatwoods at Estero Bay Preserve State Park largely focuses on rare plant surveys, feral hog removal, prescribed fire, imperiled species surveys and invasive plant surveys and treatment efforts. Prescribed fire must be used for management on the appropriate fire return interval for this type of flatwoods, with mechanical treatment introduced as needed to reduce fuel loads.

Shell Mound

The shell mound communities at Estero Bay Preserve State Park are identified as areas of elevated topography composed entirely of shells (clams, oysters, whelks) previously discarded by generations of Native Americans. Shell mound occupies over 5 acres at multiple management areas in the park. Dog Key and Julies Island contain the vast majority of the accumulated shell midden material, and both are state listed archaeological sites. The community supports a diverse tropical hardwood vegetation including white stopper (*Eugenia axillaris*), false mastic (*Sideroxylon foetidissimum*), soapberry (*Sapindus saponaria*), wild lime (*Zanthoxylum fagara*), saffron plum (*Sideroxylon celastrinum*), Florida swamp privet (*Forestiera segregata*), strangler fig (*Ficus aurea*) and gumbo limbo (*Bursera simaruba*).
The mounds are in fair condition due to unauthorized human activity. These sites have experienced damage from artifact-seekers, unauthorized campers and erosion. Invasive plant control efforts have been successfully performed on the islands to treat Brazilian pepper, Portia tree (*Thespesia populnea*), seaside mahoe (*Talapariti tiliaceum)*, bowstring hemp (*Sansevieria hyacynthoides*), beach naupaka (*Scaevola taccada*) and life plant (*Kalanchoe pinnata*).

Management of shell mounds at Estero Bay Preserve State Park largely focuses on rare plant surveys, invasive plant surveys and treatment efforts, feral hog removal efforts and protection from looting and erosion impacts. DRP staff will continue periodic surveys for rare plants and invasive plant infestations to catch new infestations early. Invasive plant treatment efforts should avoid subsurface disturbances. In addition, staff will visit the shell mounds as frequently as possible to monitor vandalism and deter visitors from physically disturbing these sites.

Wet Flatwoods

The wet flatwoods at Estero Bay Preserve State Park comprise approximately 294 acres. The wet flatwoods at the preserve occur in the ecotones between mesic flatwoods and salt marsh, and due to hydrologic alterations and fire exclusion, can be difficult to distinguish from mesic flatwoods. Most of the northern parcels, including the Winkler tract, have wet flatwoods. Many of these areas at the preserve also contain the highest density of invasive non-native melaleuca plants. Common species within the wet flatwoods include slash pine, cabbage palms, saw palmetto, gallberry, wax myrtle (*Morella cerifera*), wiregrass and hydrophytic species such as toothache grass (*Ctenium aromaticum*), Canada spikerush (*Eleocharis geniculate),* yellow-eyed grass, Carolina redroot (*Lachnanthes carolina*) and beaksedges (*Rhynchospora chapmanii* and *latifolia*). The optimal fire return interval for this community is one to three years. Shrubs dominate where fire has been excluded for long periods, and/or hydrology has been altered.

The wet flatwoods at the preserve are in fair condition due to heavy melaleuca invasions and feral hog activity. After several invasive plant treatment projects within the Estero River Scrub and Winkler point parcels, melaleuca has been considerably reduced throughout the preserve. At Winkler Point, the remnants of melaleuca infestations is still evident from the snags still standing throughout. Winkler Point previously did not have a fire history due to the density of melaleuca on site, and fire was only recently introduced in 2025. These areas will continue to be treated for invasive vegetation with follow-up prescribed fire introduction to augment restoration efforts and return this community to its optimal fire return interval.

Management of wet flatwoods at Estero Bay Preserve State Park largely focuses on rare plant surveys, invasive plant surveys and treatment efforts, hydrologic preservation, feral hog removal, and prescribed fire. DRP staff will continue periodic surveys for rare plants and invasive plant infestations to catch new infestations early. Wet flatwoods are relatively resilient to canopy damage but recover poorly when the ground cover or hydrology has been disturbed.

Basin Marsh

There are approximately 9 acres of basin marsh in the north central section of Estero Bay Preserve State Park, west of Hendry Creek. Only a small portion of the larger marsh falls within the park boundary, which complicates both management and the application of prescribed fire. In addition, hydrological alterations have occurred since 2017 on adjacent privately owned portions of the marsh including installation of an elevated berm with ditches flanking or encroaching into the park boundary. Dominant vegetation includes maidencane (*Panicum hemitomon*), Jamaican swamp sawgrass (*Cladium jamaicense*) and coastalplain willow (*Salix caroliniana*). The optimal fire return interval for this community is two to 10 years depending on fire frequency of adjacent communities.

The basin marsh is in poor condition due to the hydrological alterations and lack of prescribed fire resulting in woody vegetation encroachment, including invasive species such as melaleuca, Brazilian pepper and earleaf acacia. Introduction of prescribed fire in this location is further complicated by the location of the park boundary within the marsh itself as well as adjacent flatwoods that have no burn history due to access limitations.

Management of the basin marsh at Estero Bay Preserve State Park largely focuses on invasive plant surveys and treatment efforts.

Depression Marsh

Depression marshes at Estero Bay Preserve State Park are associated with and grade into wet flatwoods and mesic flatwoods. There are approximately 47 acres of depression marsh scattered throughout the preserve. Dominant vegetation within the depression marshes includes Jamaica swamp sawgrass, common reed (*Phragmites australis*), pickerelweed (*Pontederia cordata*), duck potato (*Sagittartia latifolia*) and coastal plain willow (*Salix carolina*), with the outer drier areas containing sand cordgrass (*Spartina bakeri*) and herbaceous vegetation such as Carolina redroot, longleaf threeawn (*Aristida palustris*), beaksedges, yellow-eyed grass and myrtleleaf St. John's wort (*Hypericum myrtifolium*). The optimal fire return interval for this community is two to 10 years depending on fire frequency of adjacent communities. The depression marshes at the park are in good condition.

Management of depression marshes at Estero Bay Preserve State Park largely focuses on invasive plant surveys and treatment efforts, prescribed fire and feral hog removal. DRP staff will continue periodic surveys for rare plants and invasive plant infestations to catch new infestations early. DRP will continue to burn the depression marshes and the adjacent upland communities within the preserve.

Dome Swamp

The dome swamp at Estero Bay Preserve State Park covers approximately 8 acres and is located on the Estero River Scrub parcel. The dome swamp is mostly comprised of pond cypress (*Taxodium ascendens*), trees with other subcanopy species including red maple (*Acer rubrum*), dahoon holly (*Ilex cassine*), swamp bay and sweetbay (*Magnolia viginiana*). It has a diverse assemblage of ferns including giant leather fern (*Acrostichum danaeifolium*), swamp fern (*Blechnum serrulatum)*, golden polypody (*Phlebodium aureum)* and shoestring fern (*Vittaria lineata*). The dome swamp also provides habitat for several species of imperiled plants including golden leather fern (*Acrostichum aureum)*, northern needleleaf, cardinal airplant, twisted airplant (*Tillandsia flexuosa)* and giant airplant (*Tillandsia utriculata)*. Dome swamps require periodic fire to maintain the dominant cypress canopy and prevent other hardwoods and peat from accumulating within. The fire return interval varies with the adjacent fire-type communities, typically three to five years for the adjacent mesic flatwoods at the preserve, with the deep interior of the dome swamp having a fire return interval of more than 150 years.
The dome swamp at the preserve is in good condition. This community is adjacent to the strand swamp and most likely shared hydrological attributes prior to the elevated railroad grade, which bisects the communities and has altered hydrological flow through the area. Plantings of red maples and buttonbush (*Cephalanthus occidentalis*) occurred within the dome swamp in the 1990s. The dome swamp receives periodic fire with prescribed burns in the adjacent mesic flatwoods.

Management of dome swamps at Estero Bay Preserve State Park largely focuses on invasive plant surveys and treatment efforts and prescribed fire. DRP staff will continue periodic surveys for rare plants and invasive plant infestations to catch new infestations early. Maintaining the appropriate hydrology and fire frequency is critical for preserving the structure and species composition of the dome swamp community. DRP will continue to burn dome swamps on the same frequency as the adjacent fire-type community, allowing fires to burn across ecotones and extinguish naturally. Fires should be conducted under prescribed conditions to avoid destructive peat fires.

Keys Tidal Rock Barren

The keys tidal rock barren at Estero Bay Preserve State Park is an approximately 2-acre community located at the Estero River Scrub parcel, adjacent to exposed salt flats and mangrove swamp communities. It is comprised of a flat rockland with exposed and eroded limestone that occurs above the daily tide range and is sparsely vegetated with stunted black mangrove (*Avicennia germinans*) and shoreline seapurslane (*Sesuvium portulacastrum*). It is inundated by saltwater only during the extreme spring high tides. Other species found within the keys tidal rock barren at the preserve include bushy seaside oxeye (*Borrichia frutescens*), perennial glasswort (*Salicornia ambigua*), saltwort (*Batis maritima*), saltgrass (*Distichlis spicata*) and seashore dropseed (*Sporobolus virginicus*). Mangroves including buttonwood (*Conocarpus erectus*), red mangrove (*Rhizophora mangle*), black mangrove and white mangrove (*Laguncularia racemosa*) are the dominant woody species.

The keys tidal rock barren at the preserve is in excellent condition. Although the Florida Natural Areas Inventory (FNAI) identifies this community only along the rocky coastlines in the Florida Keys, an accredited state biologist, Dr. Bobby Hattaway, declared the community as keys tidal rock barren when employed with DRP.

Management of keys tidal rock barren at Estero Bay Preserve State Park largely focuses on invasive plant surveys and treatment efforts, and feral hog removal. DRP staff will continue periodic surveys for rare plants and invasive plant infestations to catch new infestations early. Vehicles are not permitted to drive on this feature, and such exclusion should be continued.

Mangrove Swamp

Mangrove swamp communities at Estero Bay Preserve State Park are either fringes or dense forests located along relatively flat, low wave energy, marine and estuarine shorelines. Mangrove swamp is the largest natural community covering 7,669 acres at the preserve. Dominant overstory includes red mangrove, black mangrove, white mangrove and buttonwood in mixed stands or in differentiated, monospecific zones based on degrees of tidal influence, salinity levels and type of substrate. Soils found in mangrove swamps at Estero Bay Preserve State Park are typically anaerobic and saturated with brackish water at all times, becoming inundated at high tide. Red mangroves dominate the deepest water, followed by black mangroves in the intermediate zone and white mangroves and buttonwood trees in the highest, least tidally influenced zone. Mangroves at Estero Bay usually occur with little to no understory in the lower tidal zones; however, in upper tidal reaches, may have a shrub groundcover including seaside oxeye, gray nicker (*Guilandina bonduc*), coinvine (*Dalbergia ecastaphyllum*) and herbaceous species such as saltwort, perennial glasswort and giant leather fern. Mangrove swamps provide important habitat for birds, juvenile fish and crustaceans, and play an important role in the cycling of nutrients and breakdown of detritus.

The mangrove swamp at Estero Bay Preserve State Park is in good condition. At the Estero River Scrub parcel, mosquito ditches are present on a north-south line bordering the mangrove swamp community to the west and the flatwoods swamp to the east. Invasive plants such as Brazilian pepper and Australian pine (*Causarina equisetifolia*) typically invade the upland edges of the mangrove swamps throughout the preserve and can be found on the spoil piles left behind from the ditching. Mangrove swamps are expanding into other areas of the park, such as the salt marsh community. Some mangrove die-off is visible from aerial photography, with around 6 acres of mangroves dying in the interior of Goombs Island southwest of Mound Key in management zone EB-52. From aerial interpretation, mangroves appeared to be stressed and browning in 2007 with the canopy gone by 2013. It is not clear what species or group of species was affected by the mortality event, nor the cause.

Management of mangrove swamps at Estero Bay Preserve State Park largely focuses on invasive plant surveys and treatment efforts, and hydrological restoration efforts. DRP staff will continue periodic surveys for invasive plant infestations to catch new infestations early, as well as investigate areas of mangrove die-off and coordinate with partner agencies or researchers to determine the cause and potential solutions. Hydrologic restoration should be pursued at the preserve to backfill ditches where it is feasible to help protect this natural community and restore natural hydrology. Recommendations from the Consul-Tech study (2009) include backfilling the ditches, preferably using hydro blasting technique to minimize impacts to surrounding areas. Prescribed fire should be allowed to push into the landward edge of mangrove swamp to control encroachment of mangroves into the adjacent salt marsh community.

Salt Marsh

The salt marsh community at Estero Bay Preserve State Park is the second largest of the preserve's natural communities and comprises approximately 1,951 acres. Dominant plant species include black needle rush (*Juncus roemerianus*), saltmarsh cordgrass (*Spartina alterniflora*), sea oxeye daisy, bulrushes (*Scirpus sp*.), Florida seashore dropseed, saltwort, glasswort and seablight (*Suaeda linearis*). A landward border of salt-tolerant shrubs including groundsel tree (*Baccharis halimifolia*) and Christmas berry (*Lycium carolinianum*) exist. Salt flats at the park include areas of the marsh that are at slightly higher elevations and flooded only by storms and extreme high tides. This isolates them from sources of freshwater, and they become very saline and desiccated due to constant evaporation. Species that can tolerate extreme salinity dominate the groundcover including saltwort, annual glasswort (*Salicornia bigelovii*), perennial glasswort and short grasses, such as saltgrass, seashore paspalum (*Paspalum vaginatum*) and keygrass (*Distichlis littoralis*). Imperiled species found in the salt marsh community include golden leather fern and nesting shorebird species such as Wilson's plover (*Charadrius wilsonia*). Salt marsh is considered a fire type natural community; however, the optimal fire return intervals have been disputed over the years. The latest research compiled by the Illinois Natural history Survey 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 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 minimizing catastrophic fires, as well as help control hardwood encroachment, particularly mangroves and buttonwood, before they become too tall to be affected by fire. Salt marshes at Estero Bay Preserve State Park are managed with prescribed fire and are typically burned with the adjacent upland habitat.

Salt marshes at Estero Bay Preserve State Park are in good condition. Salt marshes are extremely important because of their ability to attenuate stormwater and their pollutant filtering actions. Invasive plants that can tolerate higher salinities, such as melaleuca and Brazilian pepper, have infested large expanses of salt marsh at the preserve. Extensive invasive plant control efforts were undertaken in 2015 with funding from DRP and the Florida Fish and Wildlife Conservation Commission (FWC) to hydro-ax a 20-acre area of salt marsh that had become a monoculture of melaleuca. Additional invasive plant treatment efforts have occurred throughout the preserve with funds from FWC and DRP to tackle the melaleuca.

Another factor impacting the marsh is tire ruts from past unauthorized all-terrain vehicle access, and more recently, electric bicycle usage on the flats. Tire ruts left in the salt flats can take years to recover. The salt marsh and flat have also sustained feral hog damage, which includes sub-surface ground disturbance from rooting. This is particularly evident at the Winkler point parcel. Feral hog removal efforts are on-going throughout the salt marsh.

Management of salt marsh at Estero Bay Preserve State Park largely focuses on invasive plant survey and treatment efforts, feral hog removal efforts and prescribed fire. DRP staff will continue periodic surveys for rare plant species and invasive plant infestations to catch new infestations early. Prescribed fire should be applied sporadically and with adjacent pyric communities as conditions allow. Prescribed fire should be allowed to push towards the landward edge of mangrove swamp to control encroachment of mangroves into the adjacent salt marsh community. Mapped aerial data shows the decline in salt marsh and expansion of mangrove swamp throughout the preserve. Additionally, the salt flats should continue

to be monitored for ground nesting birds, such as Wilson's plovers. Disturbance to vegetation and hydrology should be prevented by minimizing vehicle use in the salt marsh and salt flats.

Slough

The slough at Estero Bay Preserve State Park includes 6 acres at the Estero River Scrub parcel that drains from a broad area of depression marshes and dome swamp into the Estero River. The slough is slightly lower in elevation than the adjacent mesic and scrubby flatwoods and is shrubby with a groundcover of herbaceous wetland vegetation and ferns. Common plants include wax myrtle, gallberry, dahoon holly, buttonbush, Jamaican swamp sawgrass, fragrant flatsedge (*Cyperus odoratus*) and swamp fern. Melaleuca, downy rose-myrtle, Brazilian pepper and small leaf climbing fern (*Lygodium microphyllum*) are invasive plants that require maintenance treatment in the slough.

The slough is in good condition due to invasive plant treatment efforts, and prescribed fire, which has been allowed to burn into the flatwoods/slough ecotone reducing shrub encroachment on the upper edges of the slough. In addition, hydrological improvement projects to maintain proper flow and surface water connectivity, including the installation of a low-water crossing where a fire break/service road crosses the slough, and replacement of an undersized culvert with a larger one, where the extension of Broadway Street crosses the slough.

Management of slough at Estero Bay Preserve State Park largely focuses on invasive plant surveys and treatment efforts, feral hog removal efforts, hydrological improvements and prescribed fire. DRP staff will continue periodic surveys for invasive plant infestations to catch new infestations early. Prescribed fire should continue to be allowed to push towards the edge of the ecotone to reduce shrubby hardwood encroachment along the edge of the slough. DRP will pursue funding to continue to improve and restore hydrology of the slough through a low-water crossing and culvert replacement projects.

Strand Swamp

The strand swamp at Estero Bay Preserve State Park includes almost 6 acres located at the Estero River Scrub Parcel located downstream from an impacted cypress slough system originating from Mullock Creek, which has experienced hydrological alteration from infrastructure development outside of the preserve. The strand swamp at the preserve is characterized by shallow, forested, elongated depressions dominated by bald cypress (*Taxodium distichum*) and pond cypress. Typical understory plants include red maple, leather fern, Jamaican swamp sawgrass, strangler fig, wax myrtle, buttonbush, pond apple and coastal plain willow. Imperiled plant species include a variety of bromeliads including those also found in the dome swamp at the preserve. The normal hydroperiod of the strand swamp ranges from 100 to 300 days and the water is deepest and remains longest near the center of the strand. The strand swamp is not a fire-type community, but it should be allowed to burn with adjacent fire-type communities to reduce hardwood encroachment and peat accumulation.

The strand swamp community at the preserve is in fair condition. This community was heavily invaded with melaleuca before receiving extensive invasive plant removal work. Vigilant invasive plant maintenance needs to continue, as well as searching out small populations of the small leaf climbing fern that continues to persist within this community. The hydrology of the strand swamp has been altered by residential developments to the north and east, and the elevated FPL-maintained railroad bed that crosses through the preserve.

Management of the strand swamp at Estero Bay Preserve State Park largely focuses on invasive plant surveys and treatment efforts, hydrological restoration and prescribed fire. DRP staff will continue periodic surveys for rare plants and invasive plant infestations to catch new infestations early. DRP will continue to burn the strand swamp on the same frequency as the adjacent fire-type community, allowing fires to burn across ecotones and extinguish naturally. Fires should be conducted under prescribed conditions to avoid destructive peat fires. DRP will pursue funding for hydrological improvements of the culverts under the railroad berm as identified in the 2009 Consul-Tech study.

Estuarine Unconsolidated Substrate

Estuarine unconsolidated substrate at Estero Bay Preserve State Park encompasses approximately 606 acres at the preserve and typically grades into salt marsh and mangrove swamp communities. The estuarine unconsolidated substrate is characterized by unvegetated, mineral-based estuarine communities that typically fall in subtidal, intertidal, and supratidal locations typically adjacent to mangrove swamps or saltmarshes. In most areas, the estuarine unconsolidated substrate encompasses mud flats, tidal creeks and shallow canals within the larger mangrove swamp communities. These areas provide habitat for fiddler crabs (*Uca spp.*), marsh crabs and other crustaceans and mollusks. At low tides, the exposed tidal mud flats provide a feeding ground for wading bird species. Mud flats are also important feeding grounds for many bottom feeding fish, such as red drum (*Sciaenops ocellatus*) and Gulf flounder (*Paralichthys albigutta*), and may also be important to the federally threatened smalltooth sawfish (*Pristis pectinata*), which frequents shallow waterways. Management of these areas at the preserve largely focuses on protection from outside impacts including vehicular ruts on higher tidal elevations and propellor scars on submerged locations.

Altered Land Cover Types

Developed

Developed areas within the preserve consist of natural communities that have been replaced or nearly replaced by structures of permanently cleared areas. Developed areas at Estero Bay Preserve State Park include a trailhead parking area, restroom, and pavilion structure at the Estero River Scrub parcel.

Management of developed areas largely focuses on invasive plant surveys and treatment efforts. DRP staff will continue periodic surveys for rare plants and invasive plant infestations to catch new infestations early. Other management measures include ensuring that vegetation around developed areas follows wildland urban interface protocols for structure protection during prescribed fire management in adjacent natural areas. The developed areas within the park will be managed to minimize the effect on adjacent natural areas. This includes proper stormwater management and following development guidelines that are compatible with prescribed fire management in adjacent natural areas.

Utility Corridor

Utility corridors at Estero Bay Preserve State Park include easements where powerlines and water mains are located on the park. The rights-of-way are generally maintained once each year by the utility company and invasive plants often have greater than 50 percent coverage.

There are several utility or former railroad corridors that cross through sections of the preserve. All have altered natural water flow-ways to some degree and are likely sources for the introduction of invasive plant species into adjacent natural areas through mowing and other maintenance activities. Removal of sections of the historic railroad berm where it is not used by FPL for transmission lines is recommended in the 2009 Consul-Tech study. Partial removal will allow flow from the culverts existing to continue west and restore sheet flow over the western area instead of being captured by the roadside ditch and routed north. It could be an economical but effective alternative to complete removal of the railroad grade and filling the ditches. The utility corridors are maintained by FPL and are used by park staff as service roads for vehicular access to remote sections of the park.

Management of utility corridors largely focuses on invasive plant surveys and treatment efforts. The preserve will continue working with the utility companies to devise improvement and restoration work on the corridors so that the corridors fit in more naturally with each community they transect. Improvement and restoration plans are needed for all utility corridors and should be completed over the 10-year planning period. DRP will pursue funding for projects recommended by the 2009 Consul-Tech hydrology study.

Prescribed Fire

Objective: Maintain 2,070 acres of the park within the optimum fire return interval within 10 years.

Actions:

- Update annual prescribed fire plan.
- Conduct prescribed fire on 365 acres annually.

The table below lists all fire-dependent natural communities found within the park, 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)**
Wet Flatwoods	201	2–4
Mesic Flatwoods	604	2–4
Scrub	8	5–15
Scrubby Flatwoods	99	6–15
Depression Marsh	45	2–10
Salt Marsh	2,315	5–10
Annual Target Acreage	365–744	

The landscapes at Estero Bay Preserve State Park are dominated by natural communities that require fire to maintain their ecological integrity, making prescribed fire the preserve's most important resource management tool. There are 3,272 acres of fire adapted natural communities at Estero Bay Preserve State Park, with the greatest acreages represented by mesic flatwoods and salt marsh. The park is partitioned into 68 management zones, including 31 management zones with pyric natural communities designated as burn zones. Prescribed fire is planned for each burn zone at the appropriate intervals, and the plan is reviewed and updated annually. To provide adaptive responses to changing

conditions, fire management requires careful planning based on annual specific burn objectives. Each annual burn plan is developed to support and implement the broader objectives and actions outlined in this 10-year management plan.

The acreage in the Prescribed Fire Management table above reflects the natural community acreage that is available for prescribed fire and not the total acreage of each community in the preserve. This discrepancy in acreage is caused by a reduction of available salt marsh and mesic flatwoods that can be safely burned. In many cases these communities are in isolated pockets that are currently inaccessible, or logistically, a prescribed fire would not remain within the preserve because of contiguous off-site natural community fuels with no natural firebreaks. In some situations, the creation of manmade firebreaks is infeasible and would cause too much harm to wetlands or other resources.

Fire-dependent natural communities at Estero Bay Preserve State Park include mesic flatwoods, wet flatwoods, scrubby flatwoods, scrub, depression marshes and salt marshes. Based on the fire return intervals and acreage figures for the natural communities within the preserve, optimally at least 406 acres should be burned each year to maintain the natural communities within their target fire return intervals. Preserve staffing, funding, equipment, fuel loads and weather conditions will influence the ability of the preserve to keep natural communities within their optimal fire return intervals. Additional challenges associated with the implementation of fire in many areas throughout the preserve include numerous nearby smoke sensitive areas, such as airports, hospitals, schools and major roadways which limit the wind direction in which prescribed fire can be implemented.

An additional compounding factor to maintaining fire return intervals is the westerly sea breeze that develops at varying times during the day throughout the winter months, which makes smoke management particularly difficult. Wind shifts are common during the daily convergence of sea breeze and land breeze. Further complicating the prescribed fire program at the preserve is the network of wetlands adjacent to the flatwoods that can limit all-weather access. Heavy rains can make many fire lines impassable in the wet flatwoods and in natural drainage areas. DRP has placed a high priority on improving the system of fire lines including the addition of low water crossings where necessary.

Fire season and fire return intervals are critical components of a fire regime. In most cases, the goal is for fires to be conducted during the natural lightning season. However, dormant season fires are favorable for initial fuel reduction, when values at risk require highly specific wind directions, and as a last resort to prevent a zone from going into backlog status. Due to the effects of the sea breeze in the winter months, windows in which the preserve can burn an area have been significantly reduced. Excessive fuel loading in areas with little to no burn history coupled with wind direction limitations add significant complications. Fire managers need to remain flexible and vigilant, with the goal of not missing opportunities to burn in areas with constraining factors.

Application of prescribed fire within the salt marsh at the preserve is a priority to reduce mosquito populations and reduce the need for mosquito control treatment. DRP is coordinating with Lee County Mosquito Control District to assist in this effort. DRP is also focusing efforts on the treatment of invasive melaleuca in the salt marsh in advance of prescribed fire to reduce the seed source for new infestations. Earleaf acacia infestations also need to be monitored as dense infestations greatly prohibit the effectiveness of prescribed fire.

There are approximately 14 miles of existing fire lines throughout the preserve including perimeter or boundary lines. Interior fire lines and boundary lines are maintained year-round to not only ensure another level of fire containment within the preserve, but to provide a line of defense for approaching off-site fires. The use of existing roads, trails, natural barriers (e.g., streams, creeks, etc.) or other man-made barriers should be considered when possible to minimize construction of any new fire break. Any new fire lines or ground disturbing activity including expansion of existing fire lines, will require prior review by the Florida Department of State's Division of Historical Resources (DHR), and planned in consultation with DRP's Bureau of Natural and Cultural Resources.

Preparation and planning for wildfires or escaped prescribed fires within the preserve should be a component of the preserve's annual burn plan. Preferred fire suppression techniques and guidelines should be identified and discussed with local Florida Forest Service staff as a component of pre-planning. Sensitive resources such as wetlands, imperiled species, and cultural sites should be identified and mapped, and that information should be conveyed to the Florida Forest Service prior to any suppression activities.

IMPERILED SPECIES

Estero Bay Preserve State Park has a rich diversity of plant and animal life, including a variety of imperiled species that utilize the preserve for breeding, nesting, resting, and feeding grounds. There are 16 imperiled plant species and 33 imperiled animal species that have been documented at Estero Bay Preserve State Park. For most of the imperiled species on the Imperiled Species Inventory table below, the primary threats have been habitat loss from land development, fire suppression, invasive plant invasions or all three. Endemic species are particularly vulnerable. Additional threats include pests and pathogens, such as the Mexican bromeliad weevil (*Metamasius callizona*) and cactus moth (*Cactoblastis cactorum*).

Most notable among the imperiled plant species at Estero Bay Preserve State Park are golden leather fern, wild cotton and state-endangered bromeliads such as giant air plant, banded wild pine, northern needleleaf and cardinal air plant. Golden leather fern is typically found in wet flatwoods, salt marsh and mangrove swamp communities. The banded wild pine and other bromeliads are typically found within the mesic flatwoods, strand swamp and dome swamps at the preserve. Major threats to these imperiled species include changes in hydrology and salinity. An additional threat to the giant air plant includes the Mexican bromeliad weevil. The adult weevils eat the outer leaves of the bromeliad and bore into the center of the plant to lay eggs. The eggs then hatch into larvae that destructively feast on the center of the plant, killing the plant. Populations of Mexican bromeliad weevils have been found at Koreshan Historic State Park across the Estero River. The status of infestation of the weevil in the preserve is unknown. Additionally, the cactus moth has been identified in many areas in Lee County and is known to destructively feed on state threatened shell mound prickly pear (*Opuntia stricta*) cacti.

Lee County is among the most important counties for Florida manatee (*Trichechus manatus latirostris*) on the west coast of Florida. In addition, the shallow waters of Estero Bay, including the shallow water around mangrove swamps, are designated as critical habitat for smalltooth sawfish.

There are several large colonies of gopher tortoise located at the Estero River Scrub parcel of the preserve within the mesic flatwoods and scrubby flatwoods communities. This is one of the few areas remaining in the county where large populations continue to thrive. Their populations are declining due

to the development of upland habitats for residential and commercial developments. Line distance transect sampling (LDTS) is the recommended method for determining gopher tortoise population sizes and density (Buckland et al. 2001) with multiple pilot surveys completed at state parks in the southwest district over the past 12 years. Surveys conducted in the state parks were completed by FWC staff or consultants hired by FWC. A pilot survey has not been completed at Estero Bay Preserve State Park to date but should be considered in the future with follow-up surveys completed within 10 years in accordance with the Gopher Tortoise Survey Handbook (Smith et al. 2009) published by the U.S. Army Corps of Engineers. Continued habitat management of mesic and scrubby flatwoods with prescribed fire should optimize the carrying capacity of the park's gopher tortoises.

New development at the park will need to follow FWC's Gopher Tortoise Permitting Guidelines (FWC 2008), which includes a 25-foot protective buffer around gopher tortoise burrows. Development activities within the 25-foot buffer require a permit from FWC.

Eastern indigo snakes were previously observed in the Estero River Scrub parcel in 2000 and 2004. This federally protected threatened species is increasingly rare in Florida due to destruction of habitat and persecution by humans. Both the eastern indigo snake and eastern diamondback rattlesnake (*Crotalus adamanteus*) are important predators of small mammals, helping to keep their populations in balance. These snakes are also closely associated with gopher tortoise, using the burrows for refugia and thermoregulation.

Estero Bay Preserve State Park currently harbors 36 imperiled bird species, a greater number than any other class of vertebrates within the preserve. The salt marsh and estuarine unconsolidated substrate community at the preserve is an important stopover point for many migrant birds, and its diverse wetlands provide suitable nesting habitat for imperiled residents such as the little blue heron (*Egretta caerula*) and tricolored heron (*Egretta tricolor*). The Winkler Point parcel is monitored by DRP and Sanibel Captiva Conservation Foundation staff during the FWC Florida Shorebird Database windows (March through August) to document Wilson's plover nesting activity within the salt flats.

Small mangrove swamp islands located in management zone EB-52 within Estero Bay provide important rookery habitat for several of the listed wading bird species. Estero Bay Aquatic Preserve staff have monitored these rookeries monthly during breeding season since 2008, and house additional monitoring data dating back to 1977. One of the rookeries east of Estero Island received a Critical Wildlife Area designation from FWC due to the continued nesting of great egret (*Ardea alba*), brown pelican (*Pelecanus occidentalis*), great blue heron (*Ardea herodias*) and state-threatened reddish egret (*Egretta rufescens*). Unfortunately, nesting on this island collapsed following Hurricane Ian in 2022 with much of the mangroves on the island experiencing die-off due to sedimentation from storm surge.

Though no longer listed as imperiled, bald eagles are noted here because of the FWC guidelines for activities near eagle nests during the October 1 to May 15 nesting season (FWC 2008). Bald eagle have multiple nests located within the preserve and contribute substantially to southwest Florida and national populations. Preserve staff take great care in considering the proximity of nests and nesting season when developing prescribed fire or other resource management plans and regulating public access during this time. Clearing around eagle nest trees outside of nesting season is also conducted where feasible to minimize impacts from prescribe fire and wildfire.

FWC received a species evaluation request from Audubon for the upgraded listing of Wilson's plovers to a state threatened status due to their population decline in the state of Florida. A seven-member Biological Review Group concluded that Wilson's plovers meet the criteria for designation due to population decline estimates (Biological Status Review Report – Wilson's plover 2024). Monthly breeding and nesting surveys are completed at the Winkler Point tract with assistance from biologists with the Sanibel Captiva Conservation Foundation and in accordance with FWC breeding bird survey monitoring protocols. Documented nesting of Wilson's plovers has occurred on the salt flats annually with variable success levels due in part to seasonal rain levels and predators, such as feral hogs. Additional impacts caused by unauthorized vehicular activity including electric bicycles on the salt flats has a high potential for negative impacts on nesting activity. The preserve is implementing multiple measures to prevent unauthorized access by vehicles and electric bicycles in these sensitive nesting areas.

No known Florida scrub-jay families currently occupy the preserve. This is possibly a result of insufficient contiguous scrub and scrubby flatwoods habitat remaining in the region and therefore, the preserve is not likely to support resident populations of scrub-jays. No scrub-jays have been reported on the preserve despite management practices including prescribed fire. The nearest known population is in Cape Coral, and any dispersal would likely be from that small population.

The Florida black bear (*Ursus americanus floridanus*) was delisted as a state-threatened species with the adoption of the Florida Black Bear Management Plan (FWC 2012, updated 2019). Although no documented sightings of the Florida black bear exists, tracks were found at Winkler Point in 1996. Additionally, tracks, scratching and scat were found on the Estero River Scrub parcel in 2000 by a consulting firm. Bears were documented with photos at nearby Koreshan Historic State Park in 2014. The preserve is one of the few havens west of Interstate 75 for transient Florida black bears and may become an area of increasingly greater importance for their foraging needs as development east of Interstate 75 continues. The tracks and other signs were found in wet flatwoods, mangrove swamps and unconsolidated substrates.

The Imperiled Species Inventory table below contains a list of all known imperiled species within the preserve and identifies their status as defined by various entities. It also identifies the types of management actions that are currently being taken by DRP staff or others and identifies the current level of monitoring effort. The codes used under the column headings for management actions and monitoring level are defined following the table. Explanations for federal and state status as well as FNAI global and state rank are provided.

Imperiled Species Inventory						
Common and *Scientific* Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FWC	**USFWS**	**FDACS**	**FNAI**		
PLANTS						
Triangle cactus *Acanthocereus tetragonus*			T	G5, S3	2	Tier 1
Golden leather fern *Acrostichum aureum*			T	G5, S3	1, 2	Tier 1
Curtiss' milkweed *Asclepias curtissii*			E	G5, S3	1, 2	Tier 1
Pinepink *Bletia pupurea*			T	G5?, S3	1, 2	Tier 1
West Indian cock's comb *Celosia nitida*			E	G5?, S2	2	Tier 1
Wild cotton *Gossypium hirsutum*			T	G4G5, S3	2	Tier 1
Nodding pinweed *Lechea cernua*			T	G3, S3	1, 2	Tier 1
Pine lily *Lilium catesbaei*			T	G4, S4	1, 2	Tier 1
Simpson's stopper *Myrcianthes fragrans*			T	G4, S4	2	Tier 1
Giant sword fern *Nephrolepis biserrata*			T	G5, S3	2	Tier 1
Shell-mound pricklypear *Opuntia stricta*			T	G4?, S3S4	2	Tier 1
Northern needleleaf *Tillandsia balbisiana*			T	G4G5, S3	2	Tier 1
Cardinal airplant *Tillandsia fasciculata*			E	G5, G4?	2	Tier 1
Banded wild pine *Tillandsia flexuosa*			T	G5, S3	2	Tier 1
Giant airplant *Tillandsia utriculata*			E	G5, S3	2	Tier 1
Florida mayten *Tricerma phyllanthoides*			T	G3G5, S3	2	Tier 1

Imperiled Species Inventory						
Common and *Scientific* Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FWC	**USFWS**	**FDACS**	**FNAI**		
FISH						
Smalltooth sawfish *Pristis pectinata*	FE	E		G1G3, S1S2	13	Tier 1
REPTILES						
American alligator *Alligator mississippiensis*	FT(SA)	SAT		G5, S4	13	Tier 1
Loggerhead sea turtle *Caretta caretta*	FT	T		G3, S3	13	Tier 1
Green sea turtle *Chelonia mydas*	FT	T		G3, S2S3	13	Tier 1
Eastern indigo snake *Drymarchon couperi*	FT	T		G3, S2?	1,2, 13	Tier 1
Gopher tortoise *Gopherus polyphemus*	ST			G3, S3	1,2,13	Tier 3
Kemp's ridley sea turtle *Lepidochelys kempii*	FE	E		G1, S1	13	Tier 1
BIRDS						
Florida scrub-jay* *Aphelocoma coerulescens*	FT	T		G1G2, S1S2	13	Tier 1
Florida burrowing owl *Athene cunicularia floridana*	ST			G4T3, S3	13	Tier 1
Short-tailed hawk *Buteo brachyurus*				G4G5, S1	13	Tier 1
Piping plover *Charadrius melodus*	FT	T		G3, S2	13	Tier 1
Snowy plover *Charadrius nivosus*	ST			G3, S1	13	Tier 1
Wilsons' plover *Charadrius wilsonia*				G5, S2	13	Tier 2
Little blue heron *Egretta caerulea*	ST			G5, S4	13	Tier 3
Reddish egret *Egretta rufescens*	ST			G4, S2	13	Tier 3

Imperiled Species Inventory						
Common and *Scientific* Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FWC	**USFWS**	**FDACS**	**FNAI**		
Tricolored heron *Egretta tricolor*	ST			G5, S4	13	Tier 1
Swallow-tailed kite *Elanoides forficatus*				G5, S2	13	Tier 1
Merlin *Falco columbarius*				G5, S2	13	Tier 1
Peregrine falcon *Falco peregrinus*				G4, S2	13	Tier 1
Southeastern American kestrel *Falco sparverius paulus*	ST			G5T4, S3	13	Tier 1
Magnificent frigatebird *Fregata magnificens*				G5, S1	13	Tier 1
Florida sandhill crane *Grus canadensis pratensis*	ST			G5T2, S2	13	Tier 1
American oystercatcher *Haematopus palliatus*	ST			G5, S2	13	Tier 1
Caspian tern *Hydroprogne caspia*				G5, S2	13	Tier 1
Black rail* *Laterallus jamaicensis*	FT	T		G3, S2	1, 13	Tier 1
Wood stork *Mycteria americana*				G4, S2	13	Tier 1
Roseate spoonbill *Platalea ajaja*	ST			G5, S2	13	Tier 1
American avocet *Recurvirostra americana*				G5, S2	13	Tier 1
Black skimmer *Rynchops niger*	ST			G5, S3	8, 9, 10, 13	Tier 1
Least tern *Sternula antillarum*	ST			G4, S3	13	Tier 1
Sandwich tern *Thalasseus sandvicensis*				G5, S2	13	Tier 1

Imperiled Species Inventory						
Common and *Scientific* Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FWC	**USFWS**	**FDACS**	**FNAI**		
MAMMALS						
Florida panther *Puma concolor cougar*	FE	E		G5T1, S1	10, 13	Tier 1
Florida manatee *Trichechus manatus latirostris*	FT	T		G2G3T2T3, S2S3	10, 13	Tier 1

* Designates the species as extirpated.

Management Actions:

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

Monitoring Level:

Tier 1. Non-Targeted Observation/Documentation: includes documentation of species presence through casual/passive observation during routine park 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: Update baseline imperiled species occurrence inventory lists for plants and animals.

Action:

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

Update imperiled species list as necessary to add or remove species in compliance with current FWC or U.S. Fish and Wildlife Service (USFWS) listing status and update any accepted nomenclature changes.

Fauna

Objective: Survey, monitor and document two selected imperiled animal species in the preserve.

Actions:

- Implement monitoring protocols for one selected imperiled animal species including gopher tortoises.
- Continue to implement monitoring protocols for selected imperiled animal species including Wilson's plovers.

When funding becomes available and if data supports a full LDTS survey, a pilot gopher tortoise LDTS survey should be completed to gain a baseline understanding of the gopher tortoise population size and density at the Estero River scrub parcel. Follow-up surveys completed 10 years after the pilot survey will assist in assessing population health and potential changes in population size.

Wilson's plovers have been observed nesting in the preserve and should continue to be monitored according to FWC protocol, which includes completion of monthly surveys during established breeding bird count windows to assess breeding behavior and nesting success. Wilson's plovers have been seen near the keys tidal rock barren area in the Estero River Scrub parcel and have been documented nesting annually in the salt flats at the Winkler Point parcel.

Flora

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

Action:

- Develop monitoring protocols for two selected imperiled plant species including nodding pinweed (*Lechea cernua*) and Curtiss' milkweed (*Asclepias curtissii*).

DRP staff have previously completed rare plant species monitoring within the scrub community at Estero Bay Preserve State Park. DRP will develop monitoring protocols and implement surveys to document imperiled nodding pinweed and Curtiss' milkweed at the preserve.

INVASIVE SPECIES

Estero Bay Preserve State Park contains a variety of invasive plant species throughout the preserve. Brazilian pepper is common throughout the preserve due to its ability to thrive in a wide range of ecosystems including maritime forest, which makes it difficult to manage. It forms dense thickets that are devoid of native plant growth due to the acidity of its leaves. It has been the focus of recent invasive treatment contracts. Melaleuca is another dominant invasive species at the preserve inhabiting both upland and wetland locations, forming dense monocultures. Most large stands of melaleuca were aerially treated and killed in place in 2001 and again in 2015. In the winter of 2016, hand crews followed up the aerial treatment by targeting the remaining live melaleuca in and around the treatment areas. It was believed that the trees would decompose rapidly; however, much of the standing biomass left from the dead trees is still in place as of 2025 and does not appear to be decomposing as rapidly as hoped. Hurricanes Ian in 2022, and Helene and Milton in 2024 knocked down many of the decomposing trees

during storm surge events; however, snags are still present in all areas of the preserve. Monitoring and treating melaleuca seedlings in these areas is important in controlling regrowth.

Additional problem invasive species persist, such as carrotwood (*Cupaniopsis anacardioides*), guinea grass (*Panicum maximum*), rosary pea (*Abrus precatorius*) and Caesar's weed (*Urena lobata*). Species of particular concern in the uplands are cogongrass (*Imperata cylindrica*), small leaf climbing fern and earleaf acacia. Cogongrass is found throughout the preserve and forms dense monocultures in a short period of time. It prefers dry upland areas but can tolerate a lot of different conditions and requires multiple treatments to effectively eliminate. Small leaf climbing ferns have been rapidly spreading throughout the preserve since discovered in 2004.

The most serious animal threats at Estero Bay Preserve State Park are from the invasive feral hog populations. Feral hogs are omnivorous, eating mostly plant material, but also insects, fish, small birds and the eggs of ground-nesting birds, small mammals and a variety of herpetofauna. They compete for food with native wildlife, including deer, turkey and wood ducks. Pig rooting and wallowing create severe ground disturbance that negatively impacts native plant species diversity and local hydrology, in public use areas as well as in natural areas. Hog traffic is a vector for invasive species and numerous diseases including brucellosis and hepatitis. These pathogens are a threat to both domestic hog populations and to humans. At Estero Bay Preserve State Park, feral hogs are found in every management zone, devastating the salt marshes. Since 2021, DRP had funded USDA trapper efforts at the preserve. Over the past 10 years, preserve staff and USDA have removed 84 feral hogs across all management areas of the preserve.

Other invasive wildlife at Estero Bay Preserve State Park include brown anole (*Anolis sagrei*), nine-banded armadillo (*Dasypus novemcinctus*), veiled chameleon (*Chamaeleo calyptratus*), Peter's rock agama (*Agama picticauda*), green iguana (*Iguana iguana*), greenhouse frog (*Eleutherodactylus planirostris*) and Cuban tree frog (*Osteopilus septentrionalis*). Invasive species documented elsewhere in Lee County include black spiny tailed iguana (*Cteosaura similis*), Argentine black and white tegu (*Salvator merianae*), Nile monitor (*Varanus niloticus*), marine toad (*Rhinella marina*) and Burmese python (*Python bivittatus*). Nile monitors are large, semi-aquatic lizards and aggressive, opportunistic predators that could have serious implications for native wildlife at the preserve, especially wading bird rookeries. DRP should continue to be vigilant for the invasive species identified in Lee County and develop a plan that addresses actions to be taken immediately if they are observed at the preserve.

Invasive Plant Species			
Species Name ***Scientific Name* – Common Name**	**FISC Category**	**Distribution**	**Zone ID**
Rosary pea *Abrus precatorius*	I	Single Plant or Clump	EB-28
		Scattered Plants or Clumps	EB-18, EB-19, EB-26C
Earleaf acacia *Acacia auriculiformis*	I	Single Plant or Clump	EB-25, EB-27A, EB-27B

Invasive Plant Species			
Species Name ***Scientific Name* – Common Name**	**FISC Category**	**Distribution**	**Zone ID**
		Scattered Plants or Clumps	EB-02, EB-03, EB-04, EB-05, EB-06, EB-07, EB-08, EB-12, EB-14A, EB-15, EB-16B, EB-18, EB-19, EB-20, EB-22, EB-23A, EB-23B, EB-24, EB-26A, EB-26B, EB-28, EB-29, EB-30, EB-31, EB-32
		Scattered Dense Patches	EB-11D, EB-21, EB-28
		Dominant Cover	EB-11A, EB-11B, EB-11C, EB-11E, EB-43
Australian pine *Casuarina equisetifolia*	I	Single Plant or Clump	EB-16A, EB-26B
		Scattered Plants or Clumps	EB-02, EB-03, EB-04, EB-05, EB-06, EB-07, EB-08, EB-11A, EB-11B, EB-11C, EB-11D, EB-11E, EB-12, EB-14A, EB-35, EB-39
		Linearly Scattered	EB-44
Carrotwood *Cupaniopsis anacardioides*	I	Single Plant or Clump	EB-27B
		Scattered Plants or Clumps	EB-18, EB-20, EB-21
Air potato *Dioscorea bulbifera*	I	Scattered Dense Patches	EB-27B
Cogon grass *Imperata cylindrica*	I	Scattered Plants or Clumps	EB-02, EB-03, EB-04, EB-05, EB-06, EB-07, EB-19, EB-23A, EB-25, EB-26A, EB-28, EB-29, EB-30
		Scattered Dense Patches	EB-24, EB-27B, EB-28

Invasive Plant Species			
Species Name ***Scientific Name* – Common Name**	**FISC Category**	**Distribution**	**Zone ID**
Brazilian jasmine *Jasminum fluminense*	I	Scattered Plants or Clumps	EB-48
Small leaf climbing fern *Lygodium microphyllum*	I	Single Plant or Clump	EB-27A
		Scattered Plants or Clumps	EB-09A, EB-09B, EB-10A, EB-10B, EB-11A, EB-11B, EB-11C, EB-11E, EB-13, EB-14A, EB-14B, EB-15, EB-16A, EB-16B, EB-23A, EB-24, EB-25, EB-26A, EB-26B, EB-30, EB-31, EB-34, EB-53
		Scattered Dense Patches	EB-02, EB-03, EB-04, EB-05, EB-06, EB-07, EB-28
Melaleuca *Melaleuca quinquenervia*	I	Single Plant or Clump	EB-24, EB-27A
		Scattered Plants or Clumps	EB-02, EB-03, EB-04, EB-05, EB-06, EB-07, EB-08, EB-11A, EB-11B, EB-11D, EB-11E, EB-12, EB-14A, EB-17A, EB-17B, EB-18, EB-23A, EB-23B, EB-24, EB-25, EB-26A, EB-26B, EB-26C, EB-28, EB-29, EB-30, EB-31, EB-32, EB-34, EB-35, EB-39, EB-47, EB-53
		Scattered Dense Patches	EB-09A, EB-09B, EB-11C, EB-14B, EB-15, EB-16A, EB-28, EB-43
		Dominant Cover	EB-10A, EB-10B

Invasive Plant Species			
Species Name ***Scientific Name* – Common Name**	**FISC Category**	**Distribution**	**Zone ID**
		Dense Monoculture	EB-13, EB-16B
		Linearly Scattered	EB-44
Natal grass *Melinis repens*	I	Scattered Plants or Clumps	EB-18, EB-20
Torpedo grass *Panicum repens*	I	Scattered Plants or Clumps	EB-25
		Scattered Dense Patches	EB-26A, EB-28
		Linearly Scattered	EB-04
Downy rose-myrtle *Rhodomyrtus tomentosa*	I	Single Plant or Clump	EB-27B
		Scattered Plants or Clumps	EB-18, EB-19, EB-22, EB-23B, EB-24, EB-25, EB-26A, EB-26B, EB-26C, EB-27A, EB-28, EB-29, EB-30, EB-31, EB-32, EB-34
		Scattered Dense Patches	EB-02
Brazilian pepper *Schinus terebinthifolius*	I	Single Plant or Clump	EB-27B
		Scattered Plants or Clumps	EB-01A, EB-01B, EB-02, EB-03, EB-04, EB-05, EB-06, EB-07, EB-08, EB-14A, EB-15, EB-16A, EB-16B, EB-17C, EB-20, EB-23A, EB-23B, EB-24, EB-25, EB-26A, EB-29, EB-30, EB-31, EB-32, EB-33, EB-34, EB-35, EB-39, EB-47, EB-49, EB-53

Invasive Plant Species			
Species Name ***Scientific Name* – Common Name**	**FISC Category**	**Distribution**	**Zone ID**
		Scattered Dense Patches	EB-09A, EB-09B, EB-10A, EB-10B, EB-11A, EB-11B, EB-11C, EB-11D, EB-11E, EB-12, EB-13, EB-14B, EB-17A, EB-17B, EB-21, EB-43
		Linearly Scattered	EB-44
Climbing cassia *Senna pendula*	I	Single Plant or Clump	EB-16A
Wetland night shade *Solanum tampicense*	I	Scattered Plants or Clumps	EB-09A, EB-13
Caesar's weed *Urena lobata*	I	Scattered Plants or Clumps	EB-27B
		Scattered Dense Patches	EB-19
Lead tree *Leucaena leucocephala*	II	Scattered Plants or Clumps	EB-12
Balsampear *Momordica charantia*	II	Scattered Dense Patches	EB-27B
Guinea grass *Panicum maximum*	II	Scattered Plants or Clumps	EB-13, EB-19, EB-20, EB-22, EB-23A, EB-24, EB-25, EB-27B
		Scattered Dense Patches	EB-19
Wedelia *Sphagneticola trilobata*	II	Scattered Plants or Clumps	EB-27B
		Dense Monoculture	EB-21
Mahoe *Taliparitti tiliaceum*	II	Scattered Plants or Clumps	EB-48, EB-49, EB-51

Invasive Plant Treatment

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

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 5,403 gross acres of habitat already in maintenance condition as needed.

Actions:

- Survey all maintenance areas yearly for new infestations.
- Treat areas where invasive plant spread is imminent (e.g., after prescribed fire, mechanical or other disturbance).
- Document treatments and update surveys in DRP's Natural Resources Tracking System (NRTS).

Objective: Reduce or maintain cover class on 7,653 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.

Priority should be given to treating invasives in the high tidal salt marsh communities throughout the preserve. These treatments should focus on removing melaleuca, Australian pine, earleaf acacia and Brazilian pepper. In 2015, DRP received funding from FWC uplands invasive plant management to treat 800 acres of melaleuca aerially. Successful herbicide treatment of melaleuca is important for removal of seed sources during and after prescribed fires in the marsh. Without herbicide treatment melaleuca can continue to spread into the marsh.

Also, a priority is keeping maritime hammock and shell mound natural communities in maintenance condition for invasive plant species. It is recommended to annually evaluate and treat any Florida Invasive Species Council (FISC) category I and II invasive plant species present. The primary species of concern include seaside mahoe and Brazilian pepper.

Invasive and Nuisance Animal Control

Objective: Implement control measures on one invasive animal to protect native species and habitats.

Actions:

- Continue trapping and removal of feral hogs.
- Manage other invasive or nuisance animals as needed.

Feral hog are a major concern in the preserve, especially within the salt marsh and transitional wetland areas where melaleuca and Brazilian pepper has invaded extensive portions following hog damage. Feral hog removal at the preserve is an on-going program that involves both preserve staff and USDA staff. Preserve staff and USDA have successfully removed over 84 hogs from the preserve over the last 10 years. The preserve has witnessed positive impacts from these efforts including but not limited to increased ground nesting bird populations, such as Wilson's plover, and significantly less ground disturbance in sensitive areas. Nuisance animals will continue to be managed on a case-by-case basis.

CULTURAL RESOURCES

Prehistoric and Historic Archaeological Sites

Estero Bay Preserve State Park contains 12 cultural sites recorded in the Florida Master Site File (FMSF) within the boundaries of the preserve. Florida's coastal areas, especially uplands contiguous with water, often have a rich history of human settlement. A review of the FMSF was conducted on October 18, 2011, as well as a site assessment of the preserve by DHR in 1997 and 2001. These research efforts disclosed several archaeological and historical sites to be within or near Estero Bay Aquatic Preserve and Estero Bay Preserve State Park.

Artifacts documented in the FMSF attest to more than four cultures represented in the preserve. These include Late Glades II-III, Unspecified Caloosahatchee/Glades, Glades area/Caloosahatchee Subarea and 20th century American, including World War II (WWII). Site types included in the files are prehistoric mounds, historic homesteads, a sand burial mound, shell middens, historic boat refuse, an airplane crash, artifact and ceramic scatter and a railroad grade segment.

Specific problems that cultural/archaeological resources face include, but are not limited to, development, burrowing animals, vandalism, site looting, deterioration and erosion.

The history of human habitation on the preserve extends back thousands of years. The Archaic Period, 6500 B.C. to 500 B.C., is possibly the earliest evidence of human habitation on the preserve. Archaeological sites dating to the Late Archaic have been identified in the Bonita Bay Development, which is just east of Estero Bay Preserve State Park. The majority of presently known archaeological sites date from approximately A.D. 1550 to the 20th century. Estero Bay falls within the Caloosahatchee Culture Area, which lasted from 500 B.C. to the time of Spanish contact. Indications are that Native American populations occupied much of the area during this period. The Calusa Indians inhabited the Charlotte Harbor/Estero Bay area during the Caloosahatchee V period, A.D. 1513 to A.D. 1750. The Calusa capital city, Calos, was likely located on Mound Key, which is located within Estero Bay Aquatic Preserve, but is a separate park managed by DRP. The Calusa Indian population significantly declined in the 1600s due to the introduction of European diseases and warfare. By the mid-18th century, coastal

Lee County saw an influx of Cuban fisher folk. In the early 1700s, the Creek Indians from the southeastern United States came to Florida, following induced population pressures and conflict with Europeans. The Creek interacted with other native groups and African American slaves and eventually became known as the Seminoles. This cultural group occupied much of southwest Florida. Following the Indian Removal Act of 1830 and the Second Seminole War (1835-1842), significant Anglo-American settlement began in the area. Conflict and disease eventually led to the decimation and dispersal of the majority of Seminole Indians from the area.

In 1894, an Anglo-American settler named Cyrus Teed settled in Estero, establishing a religious sect known as the Koreshan Unity along the Estero River. Following Teed's death in 1908, membership began to decline and in 1961, the remaining Koreshan members gave 305 acres to the state of Florida, most of which later became Koreshan Historic State Park and parts of Estero Bay Preserve State Park.

The entire preserve has not been systematically searched for cultural resources. Based on information received from DHR, it is likely that additional archaeological sites are present. DHR performed a site assessment on the preserve titled "Inventory and Assessment of Cultural Resources on the Estero Bay Aquatic and Estero Bay Buffer Preserves, Lee County, Florida, 1997." The site assessment provides a summary of the known sites on both the aquatic preserve and the state park, a description of each, and a synopsis of important details. Additional information on a few of these sites can be found in the text "An Archaeological Site Inventory Zone Management Plan for Lee County, Florida," performed for the Lee County Department of Community Development, Division of Planning, by Robert J. Austin, Piper Archaeological Research, Inc., St. Petersburg, Florida, 1987 (Austin 1987). The purpose of this project was to assist Lee County in constructing a management plan to conserve and protect the county's cultural resources.

In 2014, a predictive model for cultural resources was published. The research that led to this publication was commissioned by the Florida Park Service and was completed by the University of South Florida. "Archaeological Resource Sensitivity Modeling in Florida State Parks Districts 4 and 5: The Southwest and Southeast Florida Regions," is the first comprehensive predictive model developed for Estero Bay Preserve State Park. This predictive model will be a useful tool when considering ground disturbances in conjunction with hydrological restoration and future park development. During this project aerial LiDAR data was used to refine maps and update the FMSF locations for several sites (Collins et al. 2014). The model predicts the presence or absence of cultural resources throughout the park. The model identified 1,015 acres within the park as high sensitivity for archaeological resources. A further 510.60 acres were identified as medium sensitivity for presence of cultural resources, and the remaining 9,854.22 acres having a low probability for presence of cultural resources.

Of the 12 cultural sites located within Estero Bay Preserve State Park, three archaeological and historical sites are considered in good condition, including Cow Slough (LL01922), Mullet Boat Cove (LL01923) and LL02034, a historic rail line grade dating from the 20th century. This linear feature has been recorded with the FMSF but only some well-known history concerning the local area is included in the documentation. Sites within the preserve are listed within the Cultural Sites table below. The remaining nine sites are in fair condition because they are threatened by trees uprooting, have experienced looting in the past and still have evidence of looters' pits and/or require preserve boundary or interpretive signage. Sites within the preserve are monitored at least twice a year (occasionally much more frequently) by trained preserve personnel. Looting and vagrant camps on the sites are of particular

concern and preserve personnel have worked with state law enforcement as well as Lee County law enforcement to ensure that these potentially destructive events are rapidly reported and addressed. Looting is a very rare occurrence and has only occurred once on Dog Key (LL00726) and consisted of a small 1m-by-0.5m pit dug into the side of a shell midden on the island. However, this problem should be monitored very closely because it can accelerate if law enforcement or DRP personnel do not react quickly and make their presence known.

Dog Key is eligible for listing on the Natural Register Historic Places. The remaining sites are considered ineligible, not evaluated, or there was insufficient information to evaluate.

Slight erosion as a result of invasive plant removal (which formed the majority of the canopy) on the islands is being monitored closely and should continue to be by future preserve staff as this is an issue that could quickly become problematic because of heavy rain and flooding. Preservation measures are described in more detail below.

Cultural Sites Listed in the Florida Master Site File					
Site Name and FMSF #	**Culture/Period**	**Description**	**Significance**	**Condition**	**Treatment**
LL00724 Lone Slash Pine	Glades II: AD 750-1200	Prehistoric Mound	NE	G	P
LL00726 Dog Key	Glades I: 1000 BC-AD 750 Through American: 1821	Shell Middens Burial Mounds Historic Refuse	NRE	F	P
LL00727 Starvation Key	Glades I: 1000 BC-AD 750	Prehistoric Mound Shell Midden Ceramic/Artifact Scatter	NE	F	P
LL00728 Julies Island	Glades I: 1000 BC-AD 750 Through American: 1821	Prehistoric Mound Shell Midden Ceramic/Artifact Scatter Historic Refuse	NE	F	P
LL01922 Cow Slough	Glades: 1000 BC-AD 1700	Midden Artifact Scatter (Low Density)	NS	G	P
LL01923 Mullet Boat Cove	American: 1930s-1980s	Artifact Scatter Historic Refuse	NS	G	P
LL01986 T-6 Texan	WWII: 1941-1950	Aircraft Wreckage Memorial Plaque On-Site	NS	F	P
LL02034 Seaboard Air Line	American: 20th century	Rail Line Bed	NS	G	P
LL02524 Hurricane Bay Mound I	Caloosahatchee I, possibly IIA, IIB	Shell Midden	NE	F	P
LL02525 Hurricane Bay Mound II	Caloosahatchee I, possibly IIA, IIB	Burial Mound	NE	F	P
LL02526 Mosquito Midden	Caloosahatchee I, possibly IIA, IIB	Low Density Artifact Scatter	NE	F	P
LL02527 Three Middens	Caloosahatchee I, possibly IIA, IIB	Shell Midden and Artifact Scatters	NE	F	P
LL2642 IDD Canal U	WWI and Aftermath/Boom Times (American early 20th century)	Canal	NS	F	N/A

Significance:	Conditions:	Recommended Treatment:
NRL - National Register Listed	G - Good	RS - Restoration
NRE - National Register Eligible	F - Fair	RH - Rehabilitation
LS - Locally Significant	P – Poor	ST - Stabilization
NE - Not Evaluated		P - Preservation
NS - Not Significant		R – Removal

Condition Assessment

Objective: Monitor and assess all recorded cultural resources in the preserve.

Action:

- Complete 12 assessments/evaluations of archaeological sites.

Assessments of archaeological sites located within Estero Bay Preserve State Park will be conducted at least once a year, with informal assessments taking place at least two to three times a year. This has been routinely done at the preserve and will continue to be part of the operating procedures. Updated site file forms should be filed during the yearly formal assessment. The formal FMSF update form should continue to be filled out on an annual basis or whenever a significant change or event takes place at the archaeological or historical site.

Additional research is needed throughout Estero Bay Preserve State Park, as only preliminary archaeological studies have taken place at certain sites. The preserve's goal should be to maintain and preserve these sites until such time as intensive research can be conducted by either the state of Florida or a credible academic institution.

Historical documentation such as ethnographic materials and administrative history has been compiled by Estero Bay Preserve State Park. These records are maintained in the Koreshan Historic State Park Museum Archives.

Preservation Measures

Objective: Bring nine of 12 cultural sites into good condition.

Actions:

- Consult DHR regarding preservation and restoration of looting pits at three cultural sites.
- Create and implement a cyclical maintenance program for each selected cultural resource.

Nine cultural resources are considered to be in fair condition due to past looting with the threat of additional looting, and the potential for trees to topple on or near cultural resources. Preserve staff will continue monitoring sites for looting or other disturbances twice a year, remove trees that pose a toppling threat to shell middens and burial mound sites and refill and restore looter pits. Additional preserve boundary signage is needed to inform visitors that they are entering a state park, with additional interpretive signage that informs visitors all natural and cultural resources are protected. Repair and restoration projects are conducted on an as-needed basis whenever damage to the particular site is discovered (e.g., looting pits). Preservation and the prevention of further degradation of the site as a result of both natural and human interference is the park's primary goal. DHR will be consulted for any proposed cultural site preservation efforts at the preserve.

Objective: Maintain three of 12 recorded cultural resources in good condition.

Action:

- Create and implement a cyclical maintenance program for each selected cultural resource.

Cultural resources within Estero Bay Preserve State Park are monitored regularly throughout the year with each site being visited formally once each year, and informally two to three times a year to check for looting activity.

Three cultural resources are considered in good condition including the Seaboard Air Line railroad bed (LL02034), Cow Slough (LL01922) and Mullet Boat Cover (LL01923).

Currently, there are no sites within the preserve that are in a poor state of preservation, and erosion and looting have thus far been isolated incidents that have been corrected by preserve staff when necessary. Currently large-scale restoration of the smaller sites within the preserve are not necessary.

SPECIAL MANAGEMENT CONSIDERATIONS

Marine Seagrass Bed

Along the shorelines of Estero Bay Preserve State Park and throughout Estero Bay, the seagrass bed community is extensive. These seagrass beds are part of the Estero Bay Aquatic Preserve managed and monitored by DEP staff. Even though the seagrass bed community is technically outside of state park boundaries, these areas are no less important to the state park and its natural and imperiled resources. Seagrass is a photosynthesizing plant requiring sunlight to reach through the water column and has rhizomes anchoring it into the sediment. These expansive stands of vascular plants occur in subtidal or coastal waters where wave energy is moderate. Seagrass is a critical habitat and nursery area providing food and shelter for many commercial and recreational fisheries, including threatened and endangered species. Imperiled species that frequent seagrass beds for foraging include sea turtles, manatees and smalltooth sawfish. Seagrass provides many environmental benefits including sediment stabilization, increasing water clarity by trapping particulates, absorbing nutrients and carbon dioxide, and producing oxygen. The monetary value of seagrasses has been estimated to be worth up to $19,000 per hectare and year (Costanza et al. 1997), with a local study in Pine Island Sound assessing the sea grass bed total economic value as approximately $93,490 per acre (Beever et al. 2012). Species found in Estero Bay seagrass beds include turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme*) and shoal grass (*Halodule wrightii*).

Health of seagrass beds has been declining in Estero Bay in recent years due to multiple factors including increased sedimentation from storms, propellor scarring and declines in water quality. Aerial imagery captured by the SFWMD is used to determine the geographic extent of seagrass beds and assess changes over time. These coverage maps show signs of some seagrass bed loss from 2014 to 2021 throughout Estero Bay.

Following Hurricane Ian in 2022, vessels were wrecked across the waters of the preserve. Derelict vessels damage seagrasses and other submerged natural features and gradually degrade water quality. Accordingly, removal is essential and ongoing efforts must be continued.

Preserve staff will continue to operate all preserve vessels within designated channels and at speeds

consistent with posted markers or observed conditions. The preserve will display educational signage and provide educational materials to recreational boaters that visit the main park entrance. DRP district and preserve staff will continue to coordinate with the Estero Bay Aquatic Preserve on any proposed activities at the preserve that might have an impact within the adjacent aquatic preserve.

Arthropod Control Plan

All DRP lands are designated as "environmentally sensitive and biologically highly productive" in accordance with Chapter 388, F.S. If a local mosquito control district proposes a treatment plan, DRP works with the local mosquito control district to achieve consensus. By policy of DEP since 1987, aerial adulticiding is not allowed, but larviciding and ground adulticiding (truck spraying in public use areas) is typically allowed. DRP does not authorize new physical alterations of marshes through ditching or water control structures.

In 1995, an agreement between the Lee County Mosquito Control District (LCMCD) and DEP allowed a three-year experimental use of Abate, with monitoring by Mote Marine Laboratory, after which Abate use would continue unless "substantial adverse impacts to non-targets" were shown by Mote. The experiment concluded with a finding of no significant impacts, and the use of Abate was authorized in a formal amendment to the arthropod management plan (AMP) in 1999.

Even though the 1987 AMP only allowed Bti, the 1999 amendment to the AMP stated that "the use of methoprene, Bti, and monomolecular films…remains unchanged. All other chemicals used on designated lands will be reported." Because of the heightened concern with the toxicity of Abate, the 1995 agreement defined the low marsh "recurring breeding areas" as those which needed regular treatment and high marsh "non-recurring areas" as those which only needed occasional treatment. The types of habitats were mapped, ground truthed and adopted by mutual consent. The 1999 amendment did not institute these designations but rather identified "treatment areas" and "non-treatment areas." The amendment required an annual meeting between LCMCD and DEP staff, prior to the treatment season, to review maps and decide which acreages should be classified in the two categories for that year.

In 2017, DEP approved limited aerial adulticiding in state parks within Lee County, with specific restrictions and excluding Cayo Costa State Park. Additionally, the use of Spinosad was authorized in designated areas, with its use subject to reevaluation every five years.

Mosquito control plans temporarily may be set aside under declared threats to public or animal health, or during a declared state of emergency.

LAND USE COMPONENT

VISITATION

Comprising over 11,000 acres, Estero Bay Preserve State Park was initially acquired to serve as a buffer to protect the water, inlets and islands along 10 miles of the Estero Bay Aquatic Preserve. This sprawling preserve offers several opportunities for outdoor recreation and wildlife observation including hiking, biking, birding, nature study and picnicking. Visitors can traverse the preserve's nearly 16 miles of hiking trails through two separate use areas, the Estero River Scrub and Winkler Point trailhead locations. These trails wind through diverse habitats, from mangrove-fringed estuaries to upland pine flatwoods that shelter gopher tortoises and other native species. Due to the marshy nature of the Winkler Point trails, it is suggested that shoes suitable for walking through mud and water are worn. As part of the Great Florida Birding and Wildlife Trail, avian enthusiasts can catch glimpses of the many residents, including bald eagles, herons and roseate spoonbills. From the Estero River Scrub Trailhead, anglers can hike to the blue trail and fish along the shoreline of the Estero River.

Florida Circumnavigational Saltwater Paddling Trail (CT)

Segment 12, an approximately 40-mile portion of the CT from Cayo Costa State Park/Cabbage Key to Lovers Key/Bowtie Island, features several state parks including Estero Bay Preserve State Park. Paddlers along the Main Trail have opportunities along Matlacha Pass, San Carlos Bay, Estero Bay and Rocky Bay to access the park and enjoy a hike through rare scrub habitat.

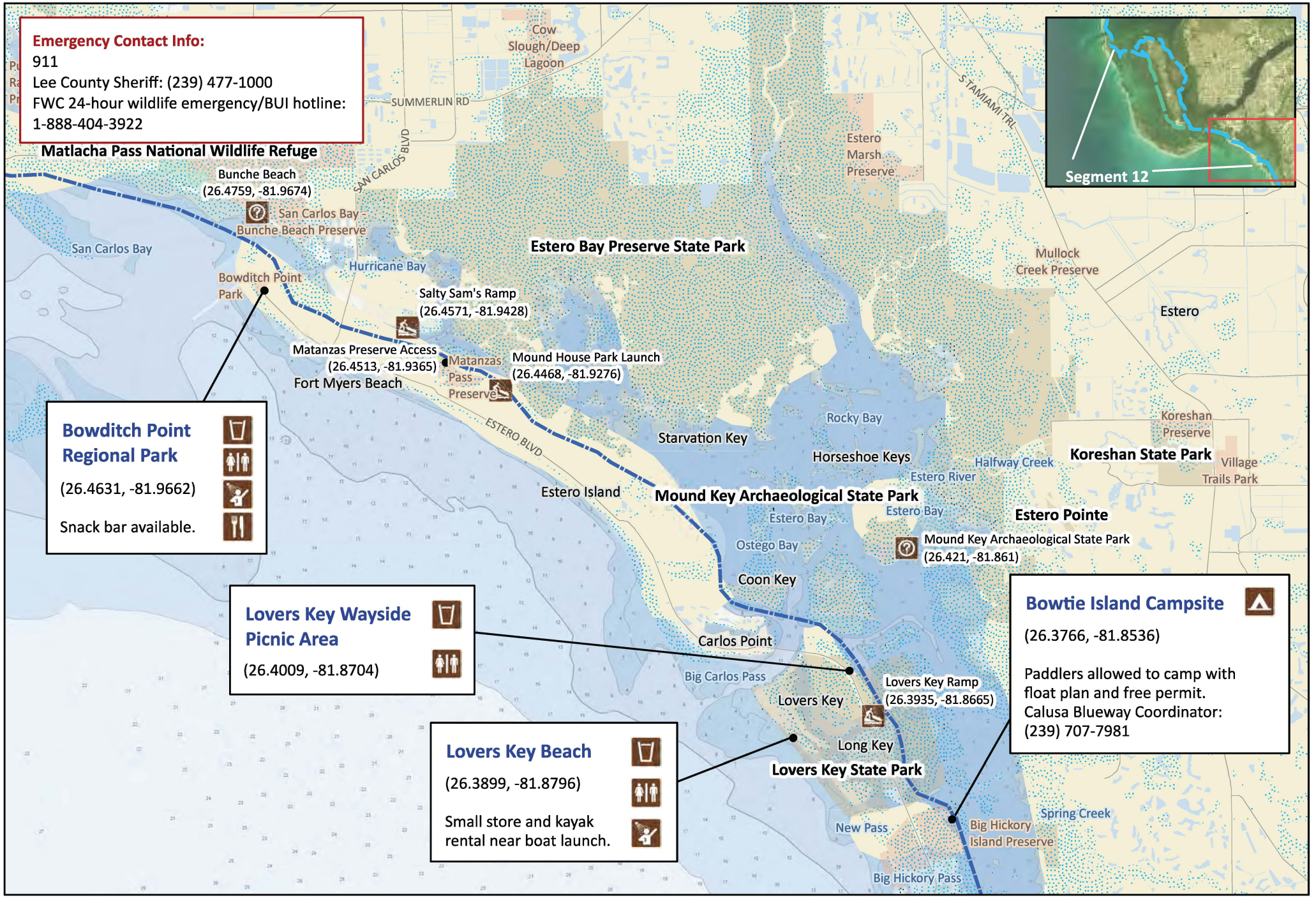
Trends

Visitation at Estero Bay Preserve State Park tends to remain low but consistent throughout the year, with a slight dip in the hot summer months as well as months with a significant amount of rainfall. Visitation numbers are estimated given there is only one honor box located at the Estero River Scrub location.

From 2015 to 2025, visitation at the preserve increased simultaneously with the region's population growth. Over the last decade, an estimated 28,000 visitors have been recorded in the park. Dry season tends to record the highest attendance, while months with heavier rain and storm events generally see a decline in visitation. Hurricanes Ian (2022), Helene and Milton (2024) impacted the preserve's resources and limited staff availability, and like many other state park units in the vicinity, Estero Bay Preserve was closed to assess storm damage.

Economic Impact

Attendance over the 10-year period from FY 2015-16 through FY 2024-25 totaled 278,623 visitors. By DRP estimates, the visitors contributed $32,056,529 in direct economic impact. Visitor spending supported a cumulative total of approximately 455 one-year job equivalents over the 10-year period. (DEP 2015-2025).



Florida Circumnavigational Saltwater Paddling Trail

Segment 12: Pine Island/Estero Bay (Map 3 of 3)

Begin: Cayo Costa State Park
End: Lovers Key/Bowtie Island

Distance: 38.3-41.5 miles
Duration: 2-3 days

0 0.75 1.5 3 Miles

Updated: 12/2/2024

N

EXISTING FACILITIES AND INFRASTRUCTURE

Given that the park is classified as a preserve, development of facilities is limited to only what is essential. As a result, the park has just two designated use areas.

In the northern portion of the park, at the southern end of Winkler Road, a trailhead provides access to the Winkler Point trails. Parking is available along the shoulder of the cul-de-sac off Winkler Road. This area also includes a storage shed and a pole barn located on LCMCD property.

On the east side of the park, the Estero River Scrub Trailhead offers additional amenities, including a composting restroom, picnic pavilion, unimproved parking area, storage shed, interpretive kiosk and honor box.

Facilities Inventory

Winkler Point Trailhead	
Storage Shed	1
Pole Barn	1
Interpretive Kiosk	1
Hiking Trails (mileage)	6
Estero River Scrub Trailhead	
Honor Box	1
Storage Shed	1
Unimproved Parking Area (approximately 10 spaces)	2
Composting Restroom	1
Picnic Pavilion	1
Interpretive Kiosk	1
Multi-Use Trails (mileage)	10
Shell Point Use Area	
Pavilion	1

CONCEPTUAL LAND USE PLAN

Parkwide

Objective: Improve orientation and interpretation at preserve trailheads.

Action:

- Develop and implement an interpretive sign plan.

Interpretive planning is recommended to determine the most effective way to connect visitors to the preserve's significance and relevant themes at the trailheads for Winkler Point and Estero River Scrub. The type, design, quantity and placement of interpretive elements to deepen understanding and improve orientation will be specified during this planning process. Appropriateness and durability in this harsh climate will be considered. Specific relevant themes for interpretation include the expansive estuarine habitats grading to fire-type uplands, rare salt flats and prehistoric cultural significance.

CALOOSAHATCHEE RIVER
GULF HARBOR
IONA
IONA POINT
HARLEM HEIGHTS
SHELL CREEK
KIOSK SHELTER
RIVER REACH
SAVING SQUARE
SHELL POINT
SOUTH PLAZA
VILLA PLAZA
WINKLER RD
WINKLER PRESERVE
THE OAKS
FORT MYERS
PUNTA RASSA
TRUCKLAND
CR-869
41
CONNIE MACK ISLAND
GRASSY POND
BIG BAYOU
HIDDEN HARBOR
CR-867
POLE BARN/STORAGE
SOUTH WIND
GREAT CALUSA BLUEWAY
WINKLER POINT TRAILS
MULLOCK CREEK
HENDRY CREEK
SAN CARLOS ISLAND
HURRICANE BAY
ESTERO RIVER SCRUB TRAILS
MATANZAS PASS
HELL PECKNEY BAY
DOG KEY
TRAILHEAD PARKING LOT
FORT MYERS BEACH
INSET
JULIES ISLAND
STARVATION KEY
ESTERO RIVER
OKEECHOBEE WATERWAY CANOE TRAIL
ESTERO BAY AQUATIC PRESERVE
KORESHAN STATE HISTORIC SITE PADDLING TRAIL LAUNCH
CR-865
MOUND KEY ARCHAEOLOGICAL STATE PARK
BLACK KEY
ESTERO ISLAND
COON KEY
CHARLIE KEY
DAVIS KEY
COCONUT
BIG CARLOS PASS
BLACK ISLAND
ESTERO BAY
LOVERS KEY STATE PARK
GULF OF AMERICA
NEW PASS
ESTERO RIVER CANOE TRAIL
SPRING CREEK
BIG HICKORY ISLAND
BIG HICKORY PASS
BROADWAY CHANNEL
BONITA BAY
BONITA BEACH
FISH TRAP BAY
LITTLE HICKORY ISLAND
BONITA BEACH RD

- Park Boundary
- US Highway
- County Road
- Park Road Stabilized
- Park Road Unstabilized
- Private Road
- Hiking
- Hiking/Biking
- Paddling
- Parking Lots
- Structures

INSET

PICNIC PAVILION
TRAIL SIGN
REST ROOM
KIOSK SIGN
TRAILHEAD PARKING LOT
FENCE LINE
BROADWAY W
ARMADA CT
STORAGE

ESTERO BAY PRESERVE STATE PARK
Existing Facilities

N

0 1 2 Miles

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Winkler Point Trailhead

Objective: Balance resource protection and passive recreational use.

Actions:

- Implement permit-only access system for visitor use management.
- Monitor visitor use and impacts to trail and surrounding natural resources.
- Expand perimeter fencing around trailhead.
- Install low water crossings at trailhead.

The Winkler Point trails are intended to provide passive recreational opportunities while protecting the surrounding salt marsh and mangrove swamp natural communities. The trails provide visitors with excellent opportunities to view the avian diversity of the preserve, including wading birds and waterfowl. Due to the vulnerability of these natural areas, implementing a permit-only entry system is necessary to aid in preventing further degradation due to excessive use. Implementation entails in-person or online registration, signage at trailheads to explain the requirement and field oversight of visitor use and impacts. Securing the area around the Winkler Road cul-de-sac with adequate fencing is imperative. A frequently inundated ditch surrounding the cul-de-sac precludes most entry from outside the main visitor access gate. Water conveyed from the ditch often floods the trailheads at the access gate. Low water crossings should be installed at the trailheads adjacent to the main gate to enable interior access during wet periods.

Objective: Improve trail to enhance the hiking experience and reduce impacts on natural resources.

Actions:

- Implement armoring and/or stabilization measures as necessary.
- Revegetate denuded and eroded segments of trail.

The Winkler Point trails consist of three loops totaling 6 miles that traverse wet flatwoods, salt marsh and mangroves. The soil in this area is typically saturated and can be inundated with standing water following rain events. If feasible, improvements should be made along particularly wet trail segments to improve sustainability and eliminate or reduce alterations to hydrology or other natural processes. These improvements may include appropriate fill material to once again match the surface of the trail to the adjacent grade, on-grade armoring with environmentally compatible materials and installation of low elevated segments of walking beams.

Where necessary and appropriate, particularly for low points along trails caused by trampling, fill material may be added. Materials should consist of sand, shell or other native substrate. In conjunction with filling eroded low points, trampled vegetation along the peripheries of the trails should be restored, which may require partitioning replanting areas or temporarily closing entire segments of trail. In effect, the trail will be restored to its intended narrow width.

The concept of walking beams is globally employed across local, state and federal park systems. In typical form, walking beams are either single or double plank-width and only modestly raised above natural grade by perpendicular block supports, enabling sheetflow. Such walking beam configurations are especially compatible with single-track or otherwise narrow-gauge trails and discourage hikers from forging new trail or widening existing trail. Given seasonally wet conditions, the current trail has been widened by hikers habitually seeking dry ground, causing substantial impacts to trailside ecology and

ESTERO BAY PRESERVE STATE PARK
Conceptual Land Use Plan

N
0 2,000 4,000 Feet

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aesthetics. Where installed, vegetation is apt to regenerate over the trampled ground alongside the beams. As a result, hikers experience close contact with adjacent natural communities without deleterious impacts of walking at grade across wet terrain. Distance of such walking beams will be based on extent of wet and eroded trail conditions. Installation and maintenance of beams and associated supports has the benefits of low cost and ease of maintenance.

Estero River Scrub Trail

Objective: Provide trail access to the natural areas of the Estero River scrub.

Actions:

- Install an electric gate.
- Improve parking area drainage.
- Construct permanent restroom.
- Install low water crossings on trail.

Currently, the preserve utilizes a manual gate to close the trailhead parking area after hours. To improve park management, an automatic electric gate should be installed to replace the existing gate easing operations and enhancing preserve security.

As the parking area is prone to flooding, drainage improvements are recommended. Stormwater capture may be integrated with municipal infrastructure along Broadway Road.

The trailhead is served by a composting toilet that should be kept in operation until municipal sewage is available at which time a small permanent unisex restroom is recommended within the existing altered area.

The Estero River Scrub trail system traverses wet flatwoods and borders salt marsh that are frequently inundated. These trails are also typically flooded during the wet season from May to October. Additionally, given dynamic factors like sea level rise and ecological succession, low water crossings should be installed on flood-prone sections of the trails to facilitate consistent access throughout this portion of the preserve.

OPTIMUM BOUNDARY

Numerous parcels adjacent to Estero Bay Preserve are identified for acquisition to further the park's original purpose of protecting water quality in Estero Bay Aquatic Preserve (see Optimum Boundary map). A subset of these parcels are within the former Estero Bay Florida Forever project boundary and are thus already eligible for state acquisition. Acquisition of these parcels would enhance ecological connectivity to surrounding conservation lands and buffer the aquatic preserve. Consistent with the character of the preserve, these proposed acquisitions would also expand recreational and interpretive opportunities, even in remote areas. These remote acquisition proposals consist primarily of natural community types requiring only passive oversight such that distance from operational facilities should not negate management feasibility. Although some of the identified parcels are located near Lovers Key State Park, their estuarine composition is optimally suited for the backcountry recreation of Estero Bay Preserve rather than the beach recreation of Lovers Key.

Existing Park Boundary

Other Existing Conservation Lands

Optimum Boundary

Proposed Acquisition

ESTERO BAY PRESERVE STATE PARK
Optimum Boundary

N

0 1 2 Miles

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