Estero Bay Preserve State Park

UNIT MANAGEMENT PLAN

APPROVED

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMETAL PROTECTION
Division of Recreation and Parks

December 7, 2004

Estero Bay Preserve State Park

Ten-Year Land Management Plan

Prepared by

Florida Department of Environmental Protection

Office of Coastal and Aquatic Managed Areas
in cooperation with
Division of Recreation and Parks

for the period

October 2004
through
October 2014

Department of Environmental Protection

Jeb Bush
Governor

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

Colleen M. Castille
Secretary

December 7, 2004

Ms. Ellen Stere
Coastal and Aquatic Managed Areas
3900 Commonwealth Blvd., M.S. 235
Tallahassee, Florida 32399

Re: Estero Bay Preserve State Park **Lease #4083**

Ms. Stere:

On **October 15, 2004**, the Acquisition and Restoration Council recommended approval of the **Estero Bay Preserve State Park** management plan.

On **December 7, 2004**, the Office of Environmental Services, acting as agent for the Board of Trustees of the Internal Improvement Trust Fund, approved the management plan for the **Estero Bay Preserve State Park**. Pursuant to Section 253.034, Florida Statutes, and Chapter 18-2, Florida Administrative Code this plan's ten-year update will be due on **December 7, 2014**.

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

Sincerely,

Paula L. Allen
Office of Environmental Services
Division of State Lands
Department of Environmental Protection

cc: Ms. BryAnne White

The mission of the Florida Park Service is to provide resource-based recreation while preserving, interpreting and restoring natural and cultural resources.

Division of Recreation and Parks
3900 Commonwealth Boulevard
Mail Station 525
Tallahassee, Florida 32399
(850) 245-3051

Estero Bay Preserve State Park
Land Management Plan Executive Summary

Lead Agency: Florida Department of Environmental Protection(DEP) / Division of Recreation and Parks (DRP)

Common Name of the Property: Estero Bay Preserve State Park

Location: Lee County

Acreage: 10,405 acres acquired and under lease

Acreage breakdown for exec summary (as per FNAI):

Natural Community	Acreage	Natural Community	Acreage
Shell Mound…….….	5	Wet Flatwoods……	1,040
Tidal Marsh……...	1,213	Estuarine Tidal Swamp/Forest……	5,185
Unconsolidated Substrate……..	442	Coastal Rock Barren……	1
Coastal Berm ……	9	Maritime Hammock…….……	2
Mesic Flatwoods……..	413	Prairie Hammocks……..…..	2
Depression Marsh…….	38	Scrub……..…..	2
Scrubby Flatwoods……	61	Wet Prairie……...	4
Strand Swamp……	5	Ruderal/developed ……..……	64

These acres reflect all acquisitions as of August 2002, a total of 8,486 acres. The 1,919 acres acquired since then have not been surveyed in enough detail to provide this community acreage breakdown.

Leases: # 4083 (BOT/DEP)
Designated Use: Single use for conservation and public outdoor recreation
Management Responsibilities: Agency-FDEP, Division of Recreation and Parks
Lead, Lessee (state preserve - buffer for aquatic preserve)
Subleases: None
Encumbrances: None
Type Acquisition: Conservation and Recreation Lands (CARL), Florida Forever, donations, eminent domain, fee simple
Unique features: Shell mounds and middens, coastal scrub and unconsolidated substrate in the form of salt flats
Archaeological/Historical: Five archaeological sites (shell middens/sand mounds) and four historical sites (mullet boat graveyard, railroad bed, and two plane crash sites)
Management Needs: Additional acquisition within the Florida Forever boundary, continued exotic plant eradication and maintenance, public education and outreach, additional resource inventories, more frequent law enforcement patrols, habitat restoration, hydrological restoration, fire management, survey and control plans for exotic and feral animals, additional staff, and FNAI inventory of new parcels.
Acquisition Needs: Acquisitions needs within the Florida Forever boundary include those parcels south of Summerlin Road and north of Estero Bay, islands and shoreline in southern Estero Bay and parcels within the San Carlos Bay Addition. These lands total 1,862 acres. In addition, approximately 163 acres are needed to restore Mullock Creek Slough, which will be pursued through a possible boundary amendment. Fee simple acquisition, conservation easements, restoration projects and/or other avenues for restoration will be considered. A boundary amendment to delete all developed parcels from the Florida Forever boundary and add mangrove shoreline parcels that will provide for more cohesive management boundary will also be proposed.
Surplus Lands: None
Public Involvement: Advisory group meeting and public hearing.

18-2.021 Land Management Advisory Council.	
(4) Management Plans. Plans submitted to the division for council review under the requirements of Section 253.034 F.S. should contain where applicable to the management of resources the following:	
1. The common name of the property.	iii
2. A map showing the location and boundaries of the property plus any structures or improvements to the property.	3, 39
3. The legal description and acreage of the property.	Appendix A
4. The degree of title interest held by the Board, including reservations and encumbrances such as leases.	2
5. The land acquisition program (e.g., C. A. R. L., E. E. L., Save Our Coast), if any, under which the property was acquired.	5
6. The designated single use or multiple use management for the property, including other managing agencies.	1
7. Proximity of property to other significant State, local, or federal land or water resources.	5, 9
8. A statement as to whether the property is within an aquatic preserve or a designated area of critical State concern or an area under study for such designation.	2
9. The location and description of known and reasonably identifiable renewable and non-renewable resources of the property including, but not limited to, the following:	
A. Brief description of soil types, using U. S. D. A. maps when available;	11 - 12, 15
B. Archaeological and historical resources;	35
C. Water resources including the water quality classification for each water body and the identification of any such water body that is designated as an Outstanding Florida Waters;	17
D. Fish and wildlife and their habitat;	23 - 25, Appendix G
E. State and federally listed endangered or threatened species and their habitat;	26, 30
F. Beaches and dunes;	N/A
G. Swamps, marshes and other wetlands;	23, 27
H. Mineral resources, such as oil, gas and phosphate;	32
I. Unique natural features, such as coral reefs, natural springs, caverns, large sinkholes, virgin timber stands, scenic vistas, and natural rivers and streams; and	23 - 25, 36
J. Outstanding native landscapes containing relatively unaltered flora, fauna, and geological conditions.	11, 36
10. A description of actions the agency plans, to locate and identify unknown resources such as surveys of unknown archaeological and historical resources.	35, 59-60
11. The identification of resources on the property that are listed in the Natural Area Inventory.	Appendix F
12. A description of past uses, including any unauthorized uses of the property.	37
13. A detailed description of existing and planned use(s) of the property.	37 - 41
14. A description of alternative or multiple uses of the property considered by the managing agency and an explanation of why such uses were not	42

adopted.	
15. A detailed assessment of the impact of planned uses on the renewable and non-renewable resources of the property and a detailed description of the specific actions that will be taken to protect, enhance and conserve these resources and to mitigate damage caused by such uses.	38
16. A description of management needs and problems for the property.	51 - 70
17. Identification of adjacent land uses that conflict with the planned use of the property, if any.	41
18. A description of legislative or executive directives that constrain the use of such property.	49
19. A finding regarding whether each planned use complies with the State Lands Management Plan adopted by the Trustees on March 17, 1981, and incorporated herein by reference, particularly whether such uses represent "balanced public utilization", specific agency statutory authority, and other legislative or executive constraints. A copy of the plan may be obtained by writing to the Department of Environmental Protection, Division of State Lands, Bureau of Land Management Services, 3900 Commonwealth Boulevard, Mail Station 130, Tallahassee, Florida 32399-3000.	38
20. An assessment as to whether the property, or any portion, should be declared surplus.	41
21. Identification of other parcels of land within or immediately adjacent to the property that should be purchased because they are essential to management of the property.	41 - 42
22. A description of the management responsibilities of each agency and how such responsibilities will be coordinated, including a provision that requires that the managing agency consult with the Division of Archives, History and Records Management before taking actions that may adversely affect archaeological or historic resources.	59 - 60
23. A statement concerning the extent of public involvement and local government participation in the development of the plan, if any, including a summary of comments and concerns expressed.	6 - 7 Appendix C
Additional Requirements—Per Trustees	
24. Letter of Compliance of the management plan with the Local Government Comprehensive Plan.	Appendix Q
253.034 State-Owned Lands; Uses. —	
(5) Each entity managing conservation lands shall submit to the Division of State Lands a land management plan at least every 5 years in a form and manner prescribed by rule by the board.	
25. All management plans, whether for single-use or multiple-use properties, shall specifically describe how the managing entity plans to identify, locate, protect and preserve, or otherwise use fragile nonrenewable resources, such as archaeological and historic sites, as well as other fragile resources, including endangered plant and animal species.	55 - 56, 59 - 60
26. Provide for the conservation of soil and water resources and for the control and prevention of soil erosion.	52 - 53
27. Land management plans submitted by an entity shall include reference to appropriate statutory authority for such use or uses and shall conform to the appropriate policies and guidelines of the state land management plan.	6
28. All land management plans for parcels larger than 1,000 acres shall contain	42

an analysis of the multiple-use potential of the parcel, which analysis shall include the potential of the parcel to generate revenues to enhance the management of the parcel.	
29. Additionally, the land management plan shall contain an analysis of the potential use of private land managers to facilitate the restoration or management of these lands.	67
✱**253.034 (9)—**The following additional uses of conservation lands acquired pursuant to the Florida Forever program and other state-funded conservation land purchase programs shall be authorized, upon a finding by the board of trustees, if they meet the criteria specified in paragraphs (a)-(e): water resource development projects, water supply development projects, stormwater management projects, linear facilities, and sustainable agriculture and forestry. Such additional uses are authorized where: **(a)** Not inconsistent with the management plan for such lands; **(b)** Compatible with the natural ecosystem and resource values of such lands; **(c)** The proposed use is appropriately located on such lands and where due consideration is given to the use of other available lands; **(d)** The using entity reasonably compensates the titleholder for such use based upon an appropriate measure of value; and **(e)** The use is consistent with the public interest. ✱**This is not a land management plan requirement; however, it should be considered when developing a LMP.**	
253.036 .....Forest Management. —	
For parcels larger than 1,000 acres the lead agency shall prepare the analysis, which shall contain a component or section prepared by a qualified professional forester which assesses the feasibility of managing timber resources on the parcel for resource conservation and revenue generation purposes through a stewardship ethic that embraces sustainable forest management practices if the lead management agency determines that the timber resource management is not in conflict with the primary management objectives of the parcel.	Appendix J
259.032 Conservation And Recreation Lands Trust Fund; Purpose. —	
(10)(a) State, regional, or local governmental agencies or private entities designated to manage lands under this section shall develop and adopt, with the approval of the board of trustees, an individual management plan for each project designed to conserve and protect such lands and their associated natural resources. Private sector involvement in management plan development may be used to expedite the planning process. Individual management plans shall conform to the appropriate policies and guidelines of the state land management plan and shall include, but not be limited to:	
30. Individual management plans required by s. 253.034(5), for parcels over 160 acres, shall be developed with input from an advisory group.	6 - 7 Appendix C
31. The advisory group shall conduct at least one public hearing within the county in which the parcel or project is located.	6 - 7 Appendix C
32. Notice of such public hearing shall be posted on the parcel or project designated for management, advertised in a paper of general circulation, and announced at a scheduled meeting of the local governing body before the actual public hearing.	Appendix C
33. The management prospectus required pursuant to paragraph (9)(d) shall be available to the public for a period of 30 days prior to the public hearing.	Appendix C

34. Individual management plans shall conform to the appropriate policies and guidelines of the state land management plan and shall include, but not be limited to:	
A. A statement of the purpose for which the lands were acquired, the projected use or uses as defined in s. 253.034, and the statutory authority for such use or uses.	2
B. Key management activities necessary to preserve and protect natural resources and restore habitat, and for controlling the spread of nonnative plants and animals, and for prescribed fire and other appropriate resource management activities.	51 - 59
C. A specific description of how the managing agency plans to identify, locate, protect, and preserve, or otherwise use fragile, nonrenewable natural and cultural resources.	55-56 59-60
D. A priority schedule for conducting management activities, based on the purposes for which the lands were acquired.	Appendix P
E. A cost estimate for conducting priority management activities, to include recommendations for cost-effective methods of accomplishing those activities.	65 - 66 Appendix P
F. A cost estimate for conducting other management activities which would enhance the natural resource value or public recreation value for which the lands were acquired. The cost estimate shall include recommendations for cost-effective methods of accomplishing those activities.	65 - 66 Appendix P
35. A determination of the public uses and public access that would be consistent with the purposes for which the lands were acquired.	64 - 65
259.036 ..... Management Review Teams.—	
36. The managing agency shall consider the findings and recommendations of the land management review team in finalizing the required 5-year update of its management plan.	69 - 70 Appendix R

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I. Introduction

The Estero Bay Preserve State Park is located in Lee County, about 0.1 miles east of Fort Myers Beach, 0.25 miles north of Bonita Springs and 6.5 miles south of Fort Myers (Map 1). Access to the preserve is from Winkler Road on the north end, and from Broadway at the south end.

The State of Florida acquired the Estero Bay Preserve State Park to protect Estero Bay's water quality, its native plants and animals, its archaeological sites, and to provide recreational opportunities to the people of the rapidly growing Fort Myers area. The preserve is 10,405 acres, with approximately 643 upland acres and the remainder wetland. The preserve is the only large undeveloped area on the shorelines of the Estero Bay Aquatic Preserve, the first aquatic preserve in the state. The largest community types are estuarine tidal swamp/forest, tidal marsh and wet flatwoods. Unique features include shell mounds and middens, coastal scrub and unconsolidated substrate in the form of salt flats *(or saltern).*

In 1987, the Board of Trustees of the Internal Improvement Trust Fund (BOT) obtained title to the 333 acres of The Nature Conservancy (TNC) property, through a donation. Then in 1990 and 1991, other acquisitions totaling 5,426 acres were purchased with CARL funds. These lands were within the Estero Bay CARL project boundary and after acquisition became part of the Estero Bay State Buffer Preserve. Subsequently, other lands were acquired through Florida Forever, donations and with grant assistance of the USFWS. The BOT holds fee simple title to all the land within the Estero Bay State Buffer Preserve. Acquisitions were accomplished through a series of grass root efforts in cooperation with county and other local groups. The Department of Environmental Protection, Office of Coastal and Aquatic Managed Areas (CAMA) managed the property under Lease # 4083, dated February 22, 1996. The lease is for fifty (50) years, and will expire on February 21, 2046 (see Appendix A). On January 1, 2004, management authority for the lease from the BOT was transferred to the DEP Division of Recreation and Parks (DRP), and the property was renamed as the Estero Bay Preserve State Park. CAMA and DRP staff have collaborated on necessary modifications to this management plan, and will continue close coordination of management activities on the new preserve state park in the future.

Conservation and preservation as a buffer to the aquatic preserve, with compatible resource based outdoor recreation is the designated single use of the property.

This 10-year management plan is the update to the Estero Bay State Buffer Preserve management plan approved in May 1997.

Purpose and Scope of Plan

This management plan for the Estero Bay Preserve State Park describes its setting, natural resources, and the intended management. Acquired through the CARL and Florida Forever programs, donations and USFWS grants, the general management and use of the land is directed by the statutes and rules of those programs and the federal requirements of the grants. Additionally, management is guided by the purpose and intended use of the land described in the land acquisition project selection process. Other statutes and rules also control the use of the land.

The Estero Bay Preserve State Park is managed to buffer the Estero Bay Aquatic Preserve, conserve and protect the natural and cultural resources of the state park and to restore natural communities and original ecosystem functions to the greatest extent practical. Public visitation, environmental education, and scientific research are encouraged as long as such activities are consistent with protection of natural and cultural resources.

This management plan is submitted for review to the BOT through the Department of Environmental Protection, Division of State Lands (DSL). It is intended to comply with paragraph 7 of Lease # 4083 between the BOT and the DEP, Division of Recreation and Parks (Appendix A); Chapters 253 and 259, Florida Statutes (FS); and Chapters 18-2 and 16D-2, Florida Administrative Code (FAC). The plan is intended to be consistent with the State Land Management Plan. The format and content of this plan for the Estero Bay Preserve State Park are in accordance with the Acquisition and Restoration Council recommendations for management plans and the model plan outline provided by the staff of DSL. When approved, this plan will replace the current plan approved in May 1997.

All development and resource alteration encompassed in this plan are subject to the granting of appropriate permits, easements, licenses, and other required legal instruments. Approval of the management plan does not constitute an exemption from complying with the appropriate local, state, or federal agencies.

Location

The Estero Bay Preserve State Park is located in southern Lee County (Map 1), about 0.1 miles east of Fort Myers Beach, 0.25 miles north of Bonita Springs and 6.5 miles west of Fort Myers. It borders Estero Bay and portions of Hendry Creek, Mullock Creek, Estero River, Spring Creek and the Imperial River. Several small islands in Estero Bay are part of the preserve. Access to the preserve is from Winkler Road on the north end, and from Broadway at the south end.

Regional Significance

Lee County has been an area of explosive growth over the last fifty years. The county population in 1950 was 23,404. By the 2000 census, that number had grown to 440,888. The population increased 31.6% in the last decade alone, and there is no indication that growth is slowing. The population increase and attendant infrastructure have drastically altered drainage patterns into Estero Bay The bay receives freshwater input from many small rivers, seeps, springs and marshes along the northern and eastern perimeters. The topography of the region is relatively level, creating slow-moving surface waters and poorly defined drainage patterns into the bay. Historically, sheet flow from north to south was the normal flow pattern. The rapid growth and development have altered this pattern, and large amounts of freshwater from drainage canals and stormwater runoff have altered the timing and amount of freshwater flow into the bay. Wetlands destruction and shoreline alterations have led to increased amounts of nutrients and suspended solids, low dissolved oxygen content and increased turbidity. The primary purpose for acquisition of lands in the Estero Bay Preserve State Park is to protect the Estero Bay Aquatic Preserve from impacts associated with development of lands surrounding the bay.

In addition to protecting the bay, the preserve provides significant habitat for native species. There are two active eagle's nests and a large colony of gopher tortoises on the preserve. Important bird habitat for nesting, roosting, feeding and transient stopover for resident and migratory birds is included in the boundaries. At least thirty-nine species of plants and thirty-four species of animals listed as endangered, threatened or otherwise legally listed spend all or part of their lives in habitats found within the preserve.

The preserve includes natural communities designated as Rare and Unique Uplands in coastal Lee County. These communities include cabbage palm hammock and coastal scrub.

In July 1995 the buffer preserve, as well as the entire Florida Forever boundary, was included in a new National Estuary Program (NEP) called the Charlotte Harbor NEP.

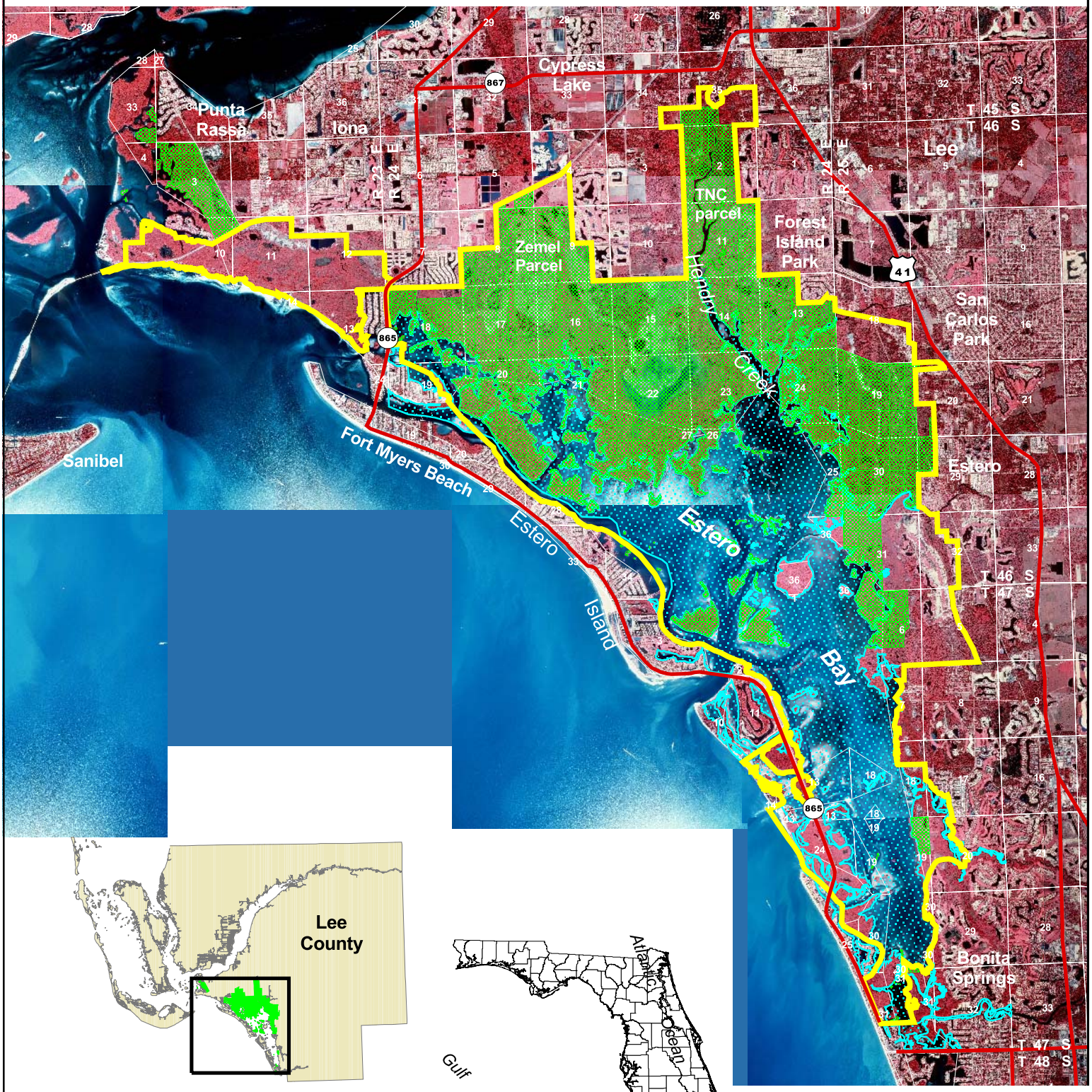
In February 2003 Estero Bay was designated a priority Surface Water Improvement and Management (SWIM) water body by the South Florida Water Management District (SFWMD).

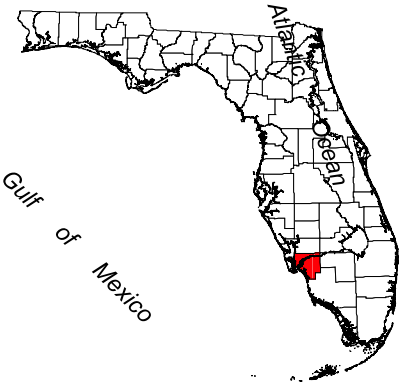
Land Acquisition

Purpose

The buffer preserve was acquired under the CARL and Florida Forever Programs. According to the Florida Forever 5- year Plan 2003, the purpose of state acquisition of the Estero Bay Florida Forever Project is to protect the bay's water quality, its native plants and animals and its archaeological sites, and to provide recreational opportunities to the people of the rapidly growing Fort Myers area. The plan designated this project as a buffer preserve to the Estero Bay Aquatic Preserve, with the intent that the project may provide opportunities for fishing, hiking and nature appreciation. The preserve is to be managed only as a preserve, along with other related uses necessary for the accomplishment of the purpose (February 22, 1996 Lease). Map 1 denotes the boundary of the current preserve and the land acquisition boundary.

Map 1 - Location and Boundary of the Estero Bay Preserve State Park and Florida Forever Project





Florida Forever Project boundary

Aquatic Preserve

Preserve State Park

2 0 2 4 Miles

2 0 2 4 Kilometers

N

Prepared by:
Office of Park Planning
Division of Recreation and Parks
Department of Environmental Protection
July, 2004
Aerial photography from 2000

Projection Albers
Datum NAD HPGN

The Estero Bay Preserve State Park is not an aquatic preserve as designated under the Florida Aquatic Preserve Act of 1975 (section 258.35, Florida Statutes), as amended. This preserve is adjacent to the state's first aquatic preserve, the Estero Bay Aquatic Preserve. Waters within the aquatic and state preserves have been designated as Outstanding Florida Waters, pursuant to Chapter 62-302 Florida Administrative Code. Surface waters in the aquatic and state preserves are classified as Class III waters by DEP, except for the waters in Matanzas Pass, Hurricane and Hell Peckney Bays, which are Class II. The Estero Bay Preserve State Park is not within an Area of Critical State Concern as defined in section 380.05, Florida Statutes. It is not under study for such designation.

History

The Estero Bay Florida Forever Project was first placed on the CARL land acquisition list in 1985 and land was first acquired in 1987. CAMA was given management authority in 1996. Table 1 provides an outline of benchmarks in the history of the Estero Bay Preserve State Park. The Estero Bay Project is on the 2003 Florida Forever list as Estero Bay in Category A, and is eligible for acquisition of parcels within the project boundary.

Table 1: Acquisition History and Status for the Estero Bay Preserve State Park

Year	Benchmark
1985	Estero Bay first placed on the CARL land acquisition list
1987	333 acres donated by TNC
1987	Management authority given to DEP
1988	880 acres deleted from boundary
1990	660 acres Windsor Stevens - first purchase
1991	4726 acres Estero Bay Trust purchase
1996	Lease between BOT and DEP approved.
1996	Project upgraded to #6 in the Priority Projects category.
1998	Two boundary amendments approved resulting in an addition of 1888 acres and deletion of 932 acres
1999	577 acre TNC donation – part of USFWS grant
2000	445 acre TNC purchase – part of USFWS grant
2000	1260 Sahdev purchase through eminent domain
2000	Boundary amendment approved, added 170 acres
2000	74.61 acre Bigelow purchase
2000	51.1 acre Hicks
2003	364 acre Staffile & Haywood purchase – part of USFWS grant
2003	129 acre Mullock Creek Preserve donated by Lee County – part of USFWS grant
2003	710 acre Zemel purchase – part of USFWS grant
2003	Exchange 1 acre for 13 acres
2003	34 acre Lee County donation
2003	594 acres of state owned islands included under management

Nearby Public Lands and Designated Water Resources

At least 16 public conservation lands occur within 10 miles of the Estero Bay Preserve State Park (Map 2).

- Charlotte Harbor Preserve State Park is composed of 40,565 leased acres of land and is managed by DEP/DRP. It was created to protect the five aquatic preserves in the Charlotte Harbor area.
- Deep Lagoon Preserve is three parcels totaling 247.6 acres managed by Lee County as public conservation.
- Lakes Regional Park is a 279 acre park managed by Lee County with 158 acres of freshwater lakes that provides rookery and nesting areas for many aquatic birds, and provides recreational opportunities for the public.
- Six Mile Cypress Slough Preserve is a 2,200 acre wetland ecosystem managed by Lee County with a mile long handicap accessible boardwalk trail, amphitheater, picnic and shelter area and observation decks. The slough preserve provides recreational and educational opportunities for the public and provides a natural filter marsh system for a portion the Estero Bay drainage basin.
- Matlacha Pass National Wildlife Refuge is a 512 acre refuge administered as part of the J. N. "Ding" Darling National Wildlife Refuge Complex. It encompasses 23 islands and is primarily composed of tidally influenced wetlands with low sand and shell ridges.

- Estero Bay Preserve State Park is 243.4 acres managed by Lee County as public conservation lands. It is named this because the Lee County staff name their Conservation 2020 parcels after nearby management areas.
- San Carlos Bay Bunche Beach Preserve is 727.1 acres managed by Lee County as public conservation lands.
- Bowditch Point Regional Preserve is an unspoiled sandy beach park at the north end of Estero Island with 17 acres on both the Gulf of Mexico and Estero Bay. It is managed by Lee County.
- Lynn Hall Memorial Park provides beachfront recreation and a fishing pier. It is managed by Lee County.
- Matanzas Pass Wilderness Preserve is a 56-acre retreat on Fort Myers Beach, where visitors can explore a live oak hammock and mangrove forest via two miles of wandering boardwalk and foot trails. Managed by Lee County, it has an overlook onto Estero Bay and provides educational and recreational opportunities.
- Estero Bay Aquatic Preserve is the preserve protected by the buffer preserve, and is managed by CAMA.
- Mound Key Archeological State Park, managed by the DEP Division of Recreation and Parks (DRP), is an island with Calusa Indian mounds thought to have been the hub of the Calusa nation. It has a boat landing.
- Koreshan State Historic Site preserves the site of an early pioneer, turn of the century, religious settlement. It is managed by the DEP Division of Recreation and Parks (DRP) and has camping, hiking, boat launch and canoe rentals.
- Lovers Key State Park is made up of Black Island, Lovers Key, Inner Key and Long Key is managed by DRP. This 1,616-acre area features canals and tidal lagoons fringed with mangroves, which support an array of fish and other aquatic animals. The remnant maritime hammock on Black Island hosts several species of hawks, woodpeckers, owls, and warblers. Osprey may be seen regularly fishing in the water and nesting in area trees. Marsh rabbits, raccoons and gray squirrels may also be observed in their natural setting. Many shore birds and wading birds, including roseate spoonbills and reddish egrets, may be seen feeding in the lagoons and along the beach area. Bottle-nosed dolphins and the endangered West Indian manatee also inhabit the near shore waters. It has a canoe/kayak launch.
- Big Hickory Island Preserve is 380 acres managed by Lee County for conservation.
- Imperial River Preserve is 47.58 acres managed by Lee County as public conservation lands.

The waters adjacent to the EBPSP have been designated as both an aquatic preserve and an Outstanding Florida Water. Aquatic preserves are bodies of water that were set aside by state legislation for the purpose of being preserved in an essentially natural or existing condition so that their aesthetic, biological and scientific values may endure the enjoyment of future generations. Estero Bay Aquatic Preserve was the state's first Aquatic Preserve, designated in 1966 and is comprised of 10,847 acres of submerged and wetland areas.

Outstanding Florida Waters (OFW) are defined as waters designated by the Environmental Regulation Commission as worthy of special protection because of their natural attributes. DEP affords the highest protection to these waters. No degradation of water quality, other than that allowed by rule, is to be permitted. The waters in and adjacent to the preserve have been designated as OFW.

Management Authority

Effective January 1, 2004, management authority for the Estero Bay Preserve State Park was transferred from the DEP Office of Coastal and Aquatic Managed Areas to the DEP Division of Recreation and Parks (DRP). In accordance with Chapter 258, Florida Statutes, and Chapter 62D-2, Florida Administrative Code, the Division of Recreation and Parks is charged with the responsibility of developing and operating Florida's recreation and parks system.

In the management of the Estero Bay Preserve State Park, preservation and enhancement of natural conditions is all important. Resource considerations are given priority over user considerations and development is restricted to the minimum necessary for ensuring resource protection and maintenance, limited access, user safety and appropriate interpretation. Permitted public uses are of a passive nature, related to the aesthetic, educational and appropriate recreational enjoyment of the preserve, although other compatible uses are permitted in limited amounts. Interpretive program emphasis is placed on the natural and cultural attributes of the preserve.

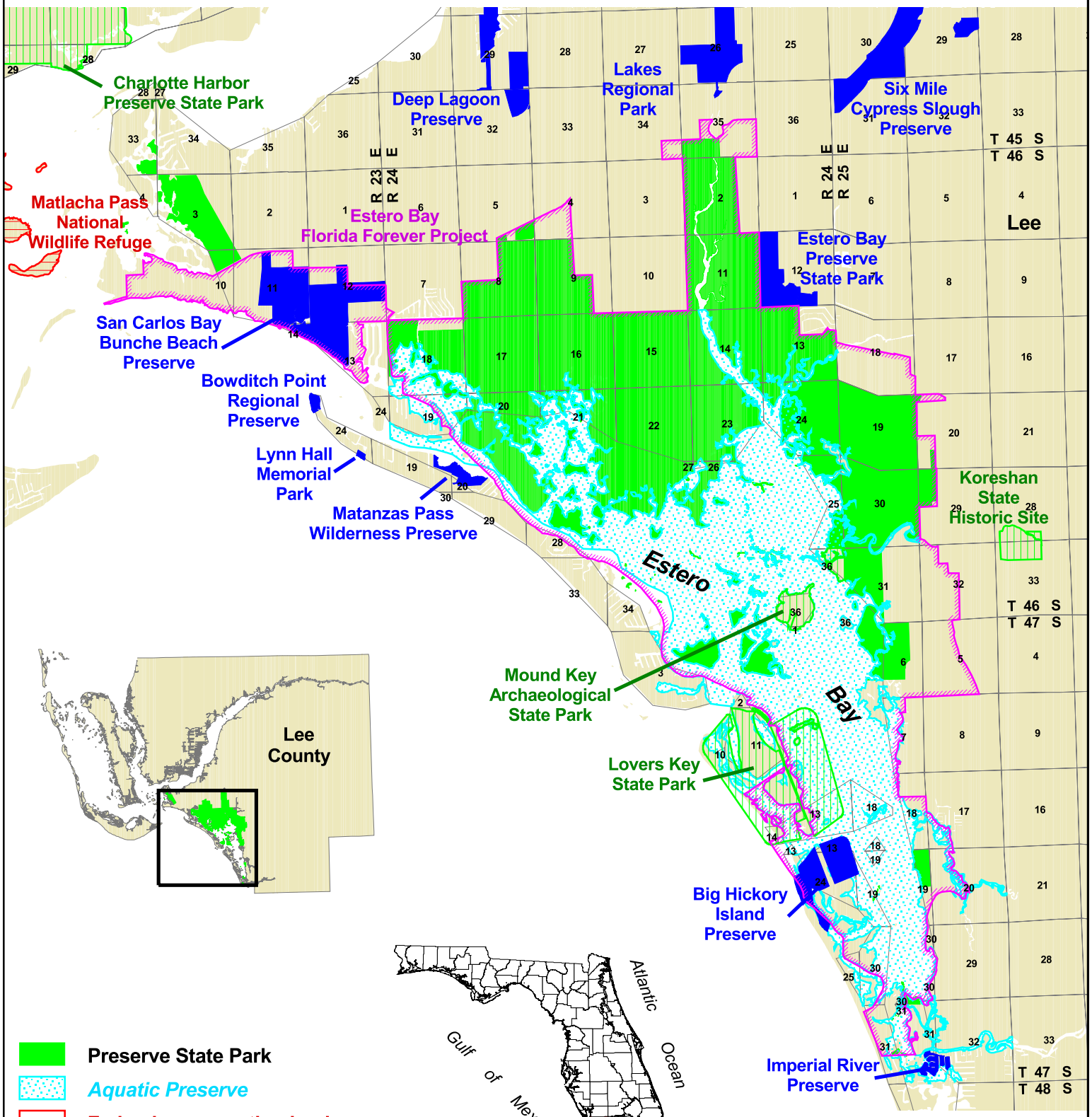
Many operating procedures are standard system wide and are set by policy. These procedures are outlined in the Division's Operations Manual (OM) that covers such areas as personnel management, uniforms and personal appearance, training, signs, communications, fiscal procedures, interpretation, resource management, law enforcement, protection, safety and maintenance.

Public Involvement

A management advisory group meeting was held in conjunction with a public meeting, as required by Ch. 259.032(10) FS, in Estero, Florida on Tuesday, August 10, 2004 to obtain input from both public and private stakeholders regarding management of the Estero Bay Preserve State Park. A summary of issues and opportunities raised by the advisory group and other members of the public, as well as a list of participants, is included as Appendix C.

Refer to Appendix C - Public Involvement, which contains public notices, copy of advertisement, list of advisory group members/affiliation, names of meeting attendees, summaries of advisory group and public input and where each issue raised in the public meeting is addressed in the plan and how it is addressed.

Map 2 - Nearby Public Lands and Designated Water Resources



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Division of Recreation and Parks
Department of Environmental Protection
July, 2004

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II. Natural and Cultural Resources

This chapter describes the natural and cultural resources of the Estero Bay Preserve State Park and problems affecting the resources. Chapter IV details how the resources will be managed and how the problems will be addressed.

Physiography

Topography/Geomorphology

The EBPSP is in Florida's Coastal Lowlands within the Southern Zone of the state. More specifically, it is in the Caloosahatchee Valley and Southwestern Slope provinces adjacent to the Okeechobee Plain, Caloosahatchee Incline, Everglades, Immokalee Rise and Big Cypress Spur. The Caloosahatchee Valley is characterized by a gradual upward slope north to the Caloosahatchee River. The Southwestern Slope is characterized by a northwest-southeast trending area gently tilted towards the Gulf of Mexico. Historically, the major drainage system in the area was Spring Creek, which flows southwest before emptying into Estero Bay near Bonita Springs. Development has altered this pattern and the Estero and Imperial Rivers now contribute more drainage to the bay. 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 (msl) on Dog Key, to less than 1 foot along the bay edge of the preserve (Map 3, Topographic map of the EBPSP). Alterations to the topography of the preserve include wildfire plow lines, FPL power lines, mosquito ditches and railroad tracks.

Geology

Regionally, deposits of varied origin underlie the area. In descending order, these deposits include the Holocene Sediment and the Caloosahatchee formation within the Tertiary-Quarternary Fossiliferous Sediments of Southern Florida. Described from youngest to oldest respectively, these deposits represent the Holocene Series and the Pliocene-Pleistocene Series. The Tertiary-Quarternary Fossiliferous Sediments of Southern Florida Group is the oldest formation exposed in the vicinity.

Where they occur, Holocene Sediment deposits are made up of quartz sands, carbonate sands and muds and organics. These deposits range to over 70 feet in thickness and are generally a reliable source of potable water.

Tertiary-Quarternary Fossiliferous Sediments of Southern Florida deposits range to over 100 feet in thickness. These deposits consist primarily of fossiliferous sands and carbonates. The deposits may contain a confining layer and are generally used as a source for water.

The Floridian Aquifer occurs under the preserve.

Soils

Prior to September 2002, there were twenty-two (22) soil types identified by the USDA Soil Conservation Service (currently Natural Resource Conservation Service) that are presented in Table 2. The 1,919 acres acquired since then have not been surveyed in enough detail to provide soil types acreage breakdown. Soils range from a dry Satellite Fine Sands that support rosemary, lichen, and live oak vegetation to a wet Wulfert Muck that support mangroves and black needle rush vegetation. Peckish Mucky and Wulfert Muck soils exist on 45% of the buffer lands. Map 4 contains all soils within the current preserve boundary (10,405 acres) and was created from South Florida Water Management District (SFWMD) data. Therefore, there are some soils identified on the map that are not within the soil types list. Appendix D contains the detailed soil type descriptions.

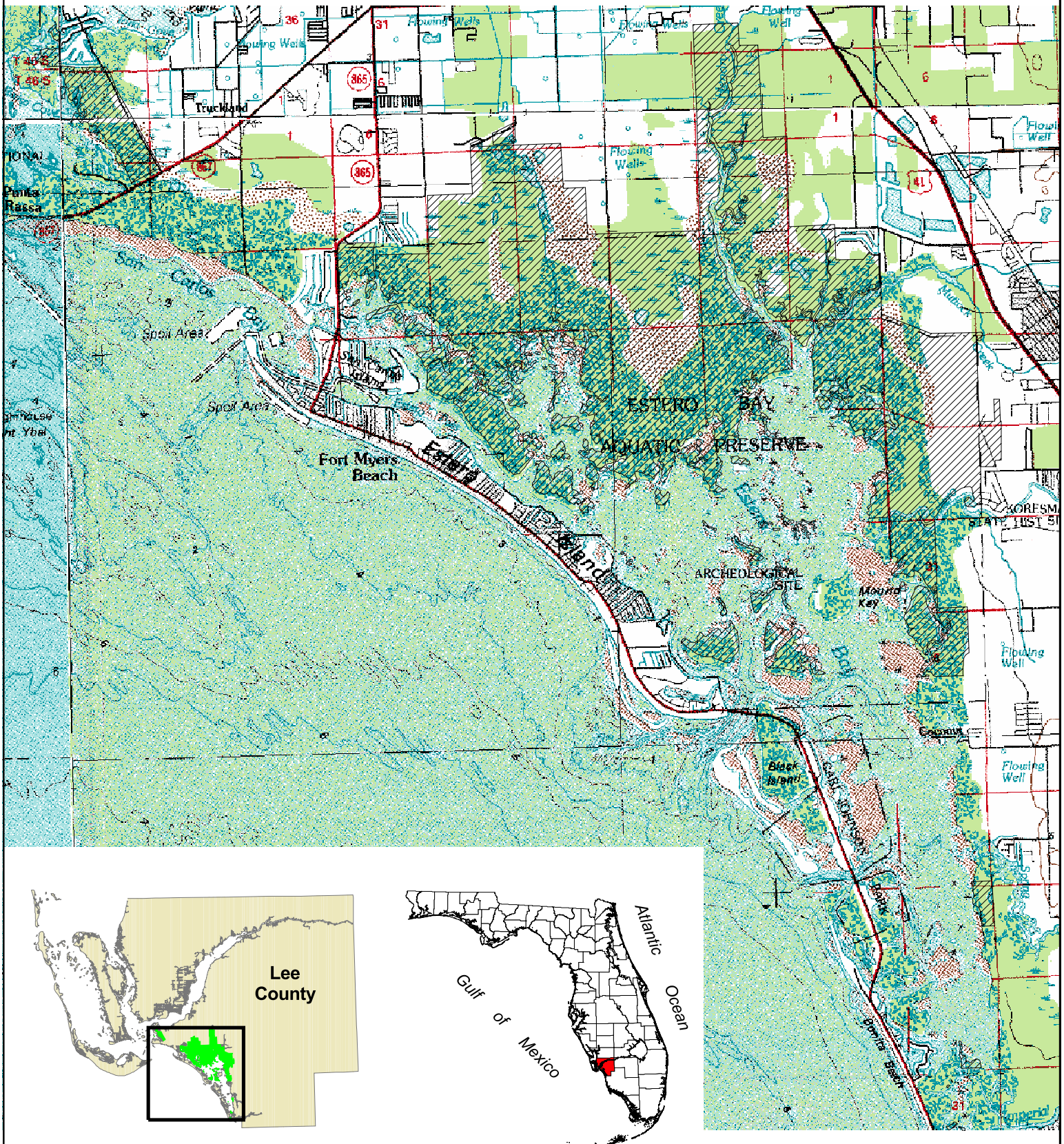
Table 2: Soil Types			
Lee Map Unit #	**Soil Name**	**% on Buffer**	**Total Acres**
6	Hallandale Fine Sand	4.06	345
7	Matlacha-urban land complex	.46	39.2
8	Hallandale Fine Sand, Tidal	3.61	306.1
10	Pompano Fine Sand	4.99	422.9
11	Myakka Fine Sand	.8	66.4
13	Boca Fine Sand	9.57	812.3
15	Estero Muck	10.07	855.2
16	Peckish Mucky Fine Sand	22.4	1,900.4
17	Daytona Sand	2.3	194.7
23	Wulfert Muck	22.5	1,912.5
24	Kesson Fine Sand	.6	50
26	Pineda Fine Sand	.12	10.1
27	Pompano Fine Sand, depressional	.25	21.2
28	Immokalee Sand	6.88	583.7
37	Satellite Fine Sand	.25	21.4
39	Isles Fine Sand, depressional	.35	29.7
42	Wabasso Sand, limestone substratum	3.63	308.1
43	Smyrna Fine Sand	.38	32.2
53	Myakka Fine Sand, depressional	.27	22.9
56	Isles Muck	6.41	544
63	Malabar Fine Sand, high	.03	2.3
69	Matlacha Gravelly Fine Sand	.07	5.7
	TOTAL	100%	8,486

USDA Soil Conservation Service, Soil Survey of Lee County.

Approximately 60% of the soils in Lee County are coastal**,** interior flatwoods and sloughs soils of the Hallandale-Boca and Isles-Boca-Pompano complex. They are nearly level, poorly drained, sandy soils with loamy subsoil. The remaining soils are Wulfert-Kesson-Captiva and Peckish-Estero-Isles soils of tidal areas and barrier islands, which are poorly drained, sandy and mucky soils. The Estero Bay watershed contains the four major hydrologic soil groups (Table 3) and are categorized as such:

- Group A (low runoff potential) – soils with high infiltration rates even when thoroughly wetted. Minimum infiltration rate=0.3-0.45 in/hr.
- Group B (low to moderate runoff potential) – soils with moderate infiltration rate even when thoroughly wetted. MIR=0.15-0.3 in/hr.
- Group C (moderate to high runoff potential) – soils with slow infiltration rate even when thoroughly wetted. MIR=0.05-0.15 in/hr.
- Group D (high runoff potential) – soils with very slow infiltration rate even when thoroughly wetted. MIR=0.0-0.05 in/hr.

Map 3 - Topography Map of Estero Bay Preserve State Park



Preserve State Park

2 0 2 4 Miles

2 0 2 4 Kilometers

N

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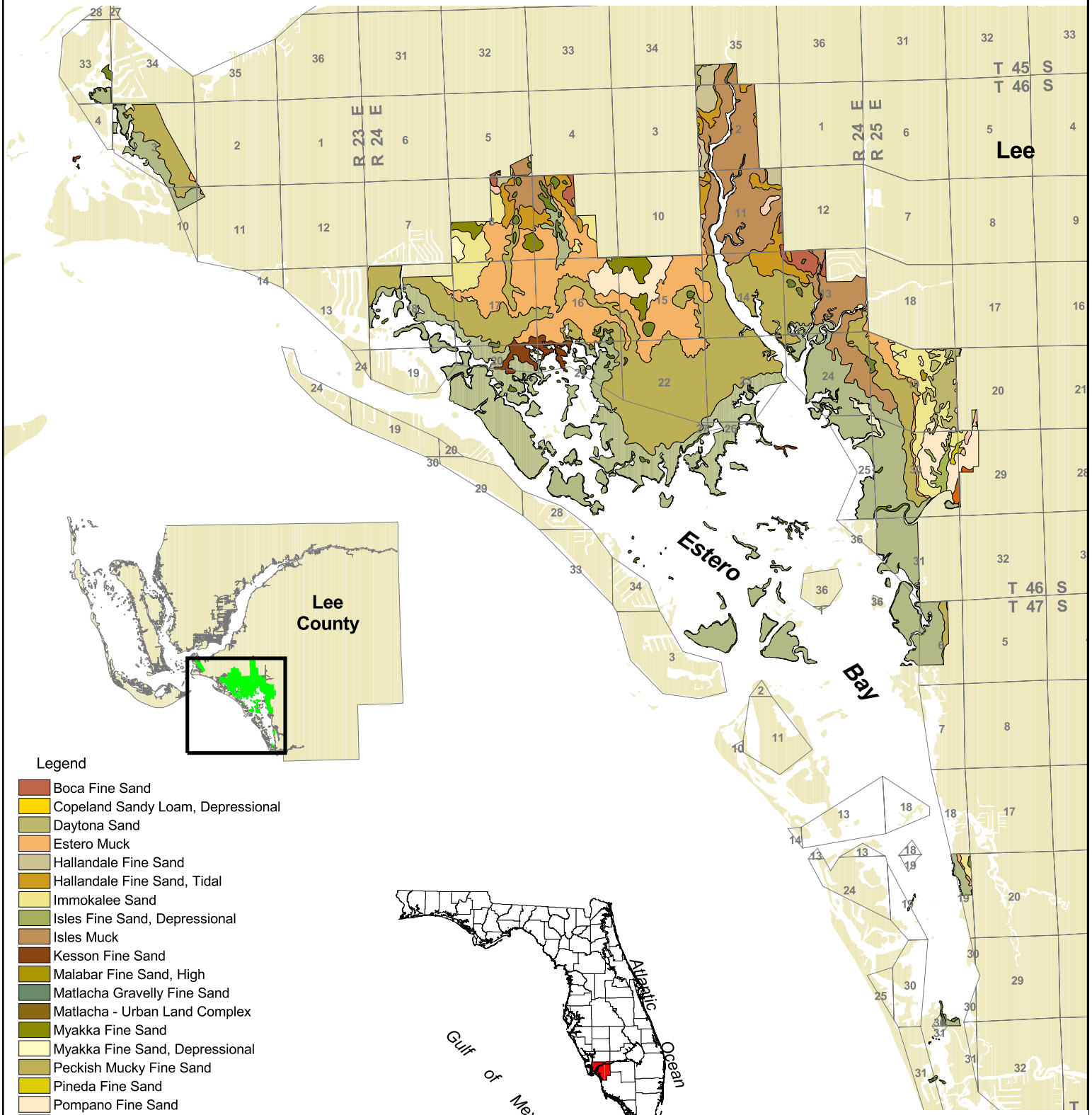
Map 4 - Soil Types Found in the Estero Bay Preserve State Park



Legend

- Boca Fine Sand
- Copeland Sandy Loam, Depressional
- Daytona Sand
- Estero Muck
- Hallandale Fine Sand
- Hallandale Fine Sand, Tidal
- Immokalee Sand
- Isles Fine Sand, Depressional
- Isles Muck
- Kesson Fine Sand
- Malabar Fine Sand, High
- Matlacha Gravelly Fine Sand
- Matlacha - Urban Land Complex
- Myakka Fine Sand
- Myakka Fine Sand, Depressional
- Peckish Mucky Fine Sand
- Pineda Fine Sand
- Pompano Fine Sand
- Pompano Fine Sand, Depressional
- Satellite Fine Sand
- Smyrna Fine Sand
- Valkaria Fine Sand
- Wabasso Sand, Limestone Substratum
- Water
- Wulfert Muck

2 0 2 4 Miles

2 0 2 4 Kilometers

N

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Table 3: Hydrologic Soil Types in the Estero Bay Watershed		
Hydrologic Soil Group	**Acres**	**Percent**
A	2,015	1%
B	846	< 1%
C	9,578	3%
D	263,507	95%
Total	**186,161**	**100%**

USDA Soil Conservation Service, SFWMD.

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Hydrology/Water Management

Surface Waters

The Estero Bay Preserve State Park is considered part of the Big Cypress Watershed, located within the Everglades West Coast Basin. It is adjacent to and borders the northern and a portion of the eastern shoreline of the 10,847 acre Estero Bay Aquatic Preserve (EBAP). Its tributaries lie entirely within Lee County. Portions of the preserve are islands within the EBAP. 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 Sec.258.39(28) FS.

There are five tributaries that discharge directly into Estero Bay. These include Hendry Creek, Mullock Creek, the Estero River, Spring Creek, and the Imperial River. The Estero and Imperial Rivers are the largest 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 sheetwater flow. This allowed rainfall to provide a constant input of fresh water 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 (OFW) on August 8, 1994, as specified in Chapter 403 FS and Chapter 62-302 FAC. This is the highest level of protection for water quality that a body of water 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 all categorized by DEP as Outstanding Florida Waters (OFW). These waters are worthy of special protection because of their exceptional ecological or exceptional recreational significance. In general, DEP cannot issue permits for direct pollution and discharges to OFWs that would lower ambient (existing) water quality or for indirect discharges that would significantly degrade the OFW. Environmental Resource Permits for activities in OFWs must be clearly in the public interest. The Ten-Mile Canal and all other artificial waterbodies have not been declared Outstanding Florida Waters.

The Estero River has been part of the State Canoe Trail System since 1981. It flows through the southeastern unit of the preserve. In addition, in February 2003 Estero Bay was designated a priority SWIM body by the SFWMD.

The Estero Bay only partially meets its 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 only waters within Estero Bay to have a Class II water quality designation, as defined in Chapter 62-302 FAC. This classification refers to a designated use of "shellfish propagation or harvesting." Although once tested regularly and classified as "open," these waters have degraded, and are considered "closed." No testing has been done since 1991; therefore, no waters within Estero Bay are approved by the Shellfish Environmental Assessment Section of DEP (SEAS) for shellfish propagation or harvesting. As a result of this "prohibited" classification by SEAS, these Class II waters cannot be used for shellfish harvest or propagation. The park supports the resumption of water testing for shellfish harvesting.

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."

Some segments of all of the bay's tributaries have been listed as "impaired" under the Impaired Waters Rule, chapter 62-303 FAC. Parameters of impairment include Dissolved Oxygen (DO), nutrients, copper, and fecal coliform. Water bodies found to be impaired require the development of Total Maximum Daily Loads (TMDLs), and are listed in Table 4.

The one artesian well, located on the preserve within the Zemel parcel, should be capped.

Table 4: Water Body Impairments in the EBPSP			
WBID	**Waterbody Segment**	**Parameters Identified with IWR**	**Concentration Causing Impairment**
3258B	Hendry Creek (Fresh)	Nutrients (chl a)	TN=0.825 mg/L TP=0.06 mg/L
3258B1	Hendry Creek (Marine)	Nutrients (chl a)	TN=0.82 mg/L TP=0.07 mg/L
3258B1	Hendry Creek (Marine)	DO	<5.0 mg/L
3258B1	Hendry Creek (Marine)	Fecal Coliforms	>800 per 100 mL
3258C	Estero Bay Drainage (Mullock Creek)	Nutrients (chl a)	TN=0.88 mg/L TP=0.05 mg/L
3258C	Estero Bay Drainage (Mullock Creek)	DO	<5.0 mg/L
3258D1	Estero River (Marine)	Nutrients (chl a)	TN=0.65 mg/l TP=0.05 mg/L
3258D1	Estero River (Marine)	Copper	>2.9 ug/L
3258D1	Estero River (Marine)	DO	<4.0 mg/L
3258E	Imperial River (Fresh)	DO	<5.0 mg/L
3258E	Imperial River (Fresh)	Nutrients (chl a)	TN=0.77 mg/L TP=0.07 mg/L
3258E1	Imperial River (Marine)	Copper	>2.9 ug/L
3258H1	Spring Creek (Marine)	Nutrients (chl a)	TN=0.675 mg/L TP=0.05 mg/L
3258H1	Spring Creek (Marine)	Copper	>2.9 ug/L
3258H1	Spring Creek (Marine)	DO	<4.0 mg/L

IWR – Impaired Waters Rule WBID – Waterbody Identification DO- Dissolved Oxygen TN – Total Nitrogen TP – Total Phosphorus

Watershed

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 of these small rivers, with the exception of the Imperial River (second order), are considered first order streams. These streams rise from seeps, springs, and marsh headwaters and have no major confluences with other streams before their discharge into Estero Bay. Average stream length is between five and ten miles from mouth to source. The watershed's drainage area is about 293 square miles (758.5 sq. km).

Cow Slough and Hendry Creek drain much of what is known as the Fort Myers peninsula, 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 run-off 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 and the increasing construction of housing and retail complexes. Spring Creek (and a small coastal stream, Coconut Creek) 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

I-75 corridor to drain the western portion of CREW. This area is the largest undeveloped wetland drainage of the Estero Bay Basin and is considered vital to maintaining the environmental integrity, freshwater ground sources 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, Hendry Creek, and Mullock Creek have most of their drainages currently protected within the present preserve. The remaining three streams 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 managers to design a truly comprehensive plan for managing the whole of the Estero Bay ecosystem.

Drainage Patterns

The topography of the Estero Bay watershed is relatively level, creating slow-moving surface water and poorly defined drainage patterns into the bay (USACOE, 1999). Historically, sheet flow drifted from north to south, with a shift in flow and the blending of watersheds as the summer rains brought large amounts of water to the area. However, this natural flow pattern has become altered with the rapid growth and development occurring within the area (SFWMD, 1999). A network of drainage canals constructed in communities along the coast has increased the flow of fresh water into Estero Bay. In addition, sheet flows between San Carlos Park and Vanderbilt Beach Estates along I-75 have been obstructed by a series of berms and dikes (FDEP, 2001). Now, as stormwater gathers from eastern Lee County and the rest of the watershed (approximately 350 sq. miles), all of the water flows southwest and accumulates in the Imperial River and Estero River watersheds (Estero Bay Agency on Bay Management, 2000).

The increased surface flow from canal construction has also had an effect on the groundwater resources within the Estero Bay watershed. The increased flow has prevented adequate recharge of groundwater, allowing saltwater to penetrate into the aquifer (USACOE, 1999). There are two recharge areas located within the watershed upstream of Estero Bay tributaries. They can be found on the Estero River east of US-41, and on the Imperial River east of I-75. The preserve is not within a groundwater recharge area.

History of Hydrological Alterations

The alteration of drainage patterns into Estero Bay has not been just a recent issue. Water once drained into Estero, Hell Peckney, and Hurricane Bays as sheetflow over sand flats between Hendry Creek and Cow Slough. Settlers came in and modified the natural flow pattern through the creation of drainage canals, mosquito control structures, and road fills. This has reduced current sheetflow to minimal levels (Tabb et al., 1974).

Around 1920 the Ten Mile Canal was constructed to drain a 70 square mile area for agricultural purposes. All of this water was diverted into Mullock Creek (USACOE, 1999). This diversion had a large impact on the headwaters of Hendry Creek, which currently receive a much 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).

"Until the 1960s and 1970s, the goal of surface water management was to drain surface water off of the land for agricultural, commercial, and residential development. The basic drainage works of ditches and dikes were physically inconsistent with the natural systems of surface hydrology, except where a natural feature was 'improved' to become useful to the drainage network…These activities have altered the quantity, quality, and timing of water entering… estuarine systems" (W. Dexter Bender and Associates, 1990). In addition to canals, the construction of roads and berms has also resulted in extensive flooding, mostly along the Imperial River. Historically, both the Imperial and the Estero Rivers provided much less input into Estero Bay than at present (USACOE, 1999).

Other significant impacts have come from wetlands destruction and shoreline alterations. Contamination from nutrients (nitrogen and phosphorous), suspended solids, and turbidity has increased. As a result, eutrophication is accelerating. There is anecdotal evidence that the bay's seagrass beds and fisheries have declined significantly since the 1960s because of increased turbidity, low DO levels, and the altered timing of freshwater flows (FDEP, 2001).

Portions of the preserve have undergone historical alterations such as the construction of railroad lines, which altered the flow of stormwater across the preserve and into the bay. The Estero River Scrub parcel, Hendry Creek parcels, and the Zemel tract contain old railroad lines that navigate through the preserve. The Florida Power and Light Company has utilized portions of these elevated berms for the installation of power lines and is currently managing these easement areas. Mosquito ditches have also played in the alteration of natural drainage patterns on the buffer. Ditches can be found on several parcels of the preserve, including Staffile/Haywood, Shell Point, the Hendry Creek

and Hurricane Bay parcels, the Estero River Scrub, and Hicks. These features are all shown on Map 5. There is also a large berm that runs along the shoreline of the Estero River.

Restoration Projects
Restoration efforts to return historical hydrology to the preserve have been prepared. One restoration project, however, has already been completed. Prior to acquiring the Shell Point parcel, approximately one mile of mosquito ditches along the southern end of the property line was restored. In the future, it is planned that some mosquito ditches throughout the preserve may be filled in and returned to natural grade. Other planned restoration efforts include the installation of culverts or geo-webbing across FPL easements and historic railroad lines to restore historic hydrologic flow across the entire area.

Biogeography

The preserve lies within one biogeographic zone: subtropical. The Florida Natural Areas Inventory (FNAI) has listed five dominant natural community types that can be found on the preserve. These include wet flatwoods, tidal estuarine marshes, tidal estuarine swamp, mud flats, and shell mounds. The preserve exhibits high flora and fauna species diversity due to the range of ecosystems. Several plant and animal species that are listed on the FNAI threatened and/or endangered species lists can be found in the aquatic and park preserves.

The area has traditionally been recognized as an abundant sport fishing ground and is home to a substantial population of manatees and bottle-nosed dolphins. An important area for wading and shorebirds, the aquatic and buffer preserves offer nesting, roosting and transitory stopover habitat for more than 100 resident and migratory bird species. The diverse environments provide vital habitat for a broad assortment of plants and wildlife.

Climate

The climate on the preserve is subtropical. Summers are generally warm, wet and humid, while winters are drier and cooler. The rainy season and the hurricane season officially begin June 1 and end November 30. Approximately 54.19" of rain falls each year. Roughly 67% of the total amount occurs between May and September. Climatic factors that significantly impact the aquatic and buffer preserves include hurricanes, tropical storms, and thunderstorms. The Gulf of Mexico plays a vital part in moderating coastal temperatures. The average highs for the local climate range from 75 degrees to 92 degrees in the summer and from 54 degrees to 74 degrees in the winter.

The climate is reflected in the characteristics of the preserve year round. Southwest Florida's high humidity levels and abundant rainfall in the summer support a wide variety of natural communities of abundant diversity. The most drastic differences relating to climate occur during the wet and dry seasons.

Natural Communities

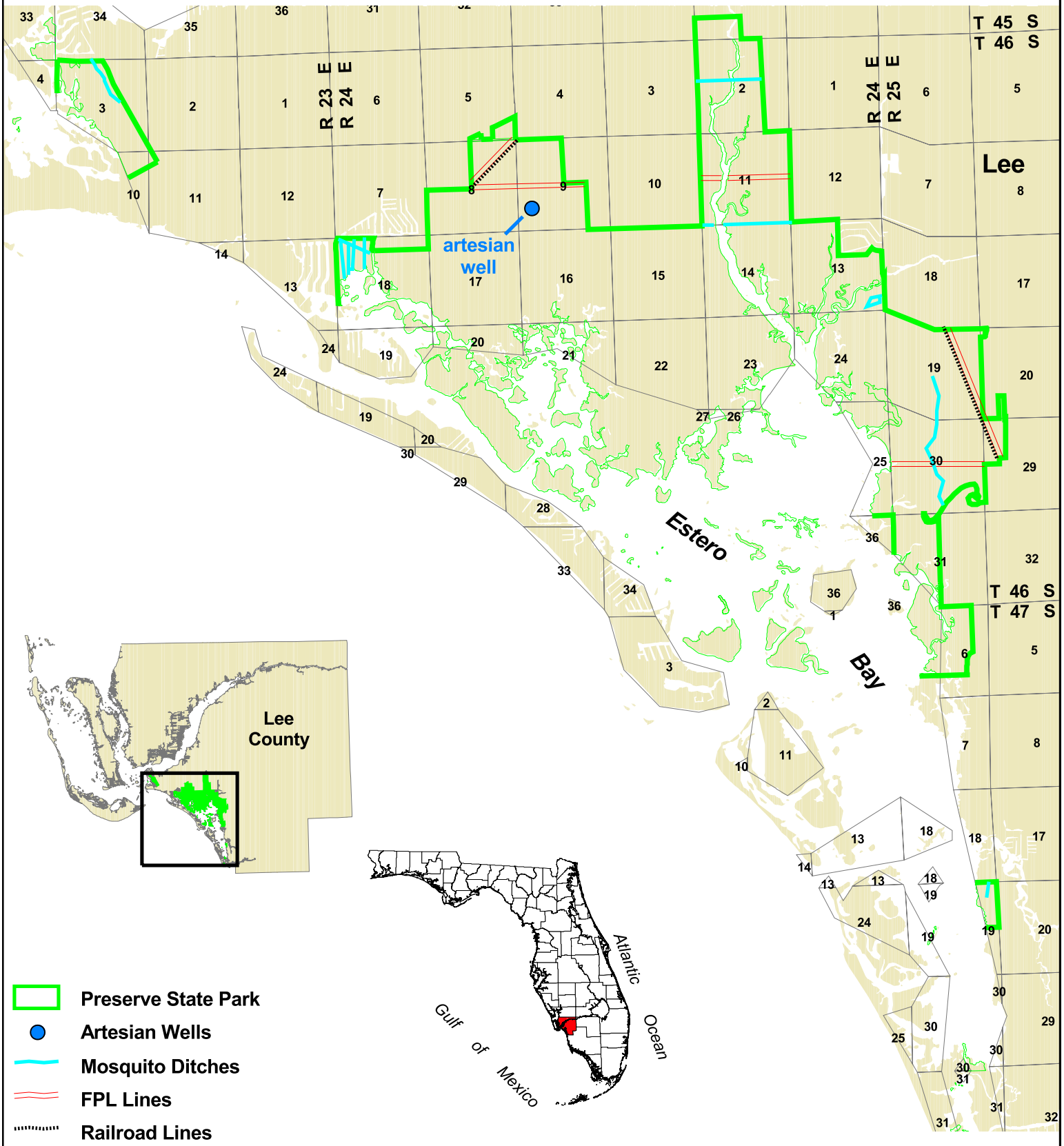
The Florida Natural Areas Inventory (FNAI) and the Florida Department of Environmental Protection developed the natural community classification used in this plan. The community types are defined by a variety of factors, such as vegetation structure and composition, hydrology, fire regime, topography and soil type. The community types are named for the most characteristic biological or physical feature (FNAI and DEP, 1990).

FNAI also assigns Global (G) and State (S) ranks to each natural community and species that FNAI tracks. These ranks reflect the status of the natural community or species worldwide (G) and in Florida (S). Lower numbers reflect a higher degree of imperilment (e.g., G1 represents the most imperiled natural communities worldwide, S1 represents the most imperiled natural communities in Florida). Appendix E provides a full explanation of the FNAI ranking system.

There are multitudes of natural communities located within the preserve that range from xeric uplands down to tidal swamp habitat. The acreage estimates provided are based on property acquired through August 2002.

The 1,919 acres acquired since then have not been surveyed in enough detail to provide this community acreage breakdown.

Map 5 - Hydrologic Alterations Within the Estero Bay Preserve State Park



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There are fifteen (15) types of natural communities that occur within the preserve, see Table 5. Four of the natural communities found within the preserve, Shell Mound, Coastal Rock Barren, Coastal Berm, and Scrub, are ranked by FNAI as S1 or S2, Critically Imperiled or Imperiled in Florida, respectively. All of these communities have been affected by human activities such as vehicular traffic (off-road, FPL, or DOF wildfire plow lines), illegal scavenger digging or quarrying. An additional four (Tidal Swamp, Maritime Hammock, Depression Marsh, and Scrubby Flatwoods) are ranked S3, Very Rare or Local throughout range in Florida. The most common natural communities in the project area are Tidal Swamp, Tidal Marsh, and Wet Flatwoods. The last two communities have experienced the greatest levels of disturbance; hence support the heaviest amounts of invasive non-native melaleuca plant, which thrives in wetland areas. The least common, Coastal Rock Barren and Scrub, are not documented within the preserve by FNAI. Appendix F contains summaries of occurrences of FNAI natural communities within the preserve. Ruderal and developed areas are locations with spoil piles, ditches, borrow pits, and power lines.

Shell Mound- The preserve's shell mound community occupies approximately 5 acres of land. These communities are primarily a result of the activities of prehistoric Native American cultural activity. Dog Key and Julies Island contain the vast majority of the accumulated shell midden material and both are state listed archaeological sites. These sites have experienced damage from artifact-seekers, unauthorized campers, prior quarry mining, and erosion. Typical plants include gumbo-limbo, cabbage palm, saffron plum, rouge-plant, stopper, key limes, yucca, and the endangered geiger tree. Invasive plant control efforts have been successfully performed on the islands to eradicate Brazilian pepper, seaside mahoe, life plant, and night blooming cereus.

Wet Flatwoods- One of the largest natural communities consists of approximately 1,040 acres on the preserve. It also contains the highest density of invasive non-native melaleuca plants and therefore has been greatly impacted and will take several years to recover. These communities are usually characterized as open-canopy forests of scattered slash pine trees or cabbage palms. Additional plants include spikerush, beakrush, sedges, wax myrtle, gall berry, and saw palmetto. Several threatened and endangered plants noted within the preserve's wet flatwoods include pinepink orchid, many-flowered grasspink, wild coco, and yellow butterwort. Typical animals include oak toad, southern toad, Florida cricket frog, southern chorus frog, black racer, pygmy rattlesnake, red-shouldered hawk, box turtle, and cotton rat. Once control is gained over the several species of invasive non-native plants, an essential fire regime will be reintroduced as native vegetation becomes reestablished.

Tidal Marsh- The second largest of the preserve's natural communities is tidal marsh, which consist of 1,213 acres. It is characterized by expanses of grasses, rushes, and sedges along coastlines of low wave-energy and river mouths. Other typical plants include saltgrass, cordgrass, saltwort, sea oxeye daisy, bulrushes, Florida seashore dropseed, black needlerush, glasswort, seablight, and marsh fleabane. An endangered plant noted is golden leather fern. Typical animals include marsh snail, periwinkle, spiders, fiddler crabs, isopods, amphipods, wading birds, osprey, alligator, and raccoon. Tidal marshes are extremely important because of their storm buffering capacity and their pollutant filtering actions. Invasive non-native plant control work against melaleuca, Brazilian pepper, and old world climbing fern has been performed within the tidal marsh community.

Estuarine Tidal Swamp/Forest- This is the largest natural community that covers 5,185 acres of the preserve. Marine and estuarine tidal swamps are floral based natural communities characterized as dense, low forests occurring along relatively flat, intertidal and supratidal shorelines of low wave energy along southern Florida. Typical plants include red mangrove, black mangrove, white mangrove, buttonwood, black needlerush, spikerush, glasswort, sea purslane, saltwort, sea oxeye daisy, and mangrove rubber vine. Common animals include brown pelican, osprey, bald eagle, shore and wading birds, raccoon, sponges, oysters, barnacles, mangrove tree crabs, fiddler crabs, mosquitoes, invertebrates, various species of fish, and alligator. Tidal swamp communities are significant because they function as nursery grounds for most of the state's commercially and recreationally important fish and shellfish and are also the breeding grounds for substantial populations of wading birds, shorebirds, and other animals. Tidal swamps are closely associated with and often grade into seagrass beds (aquatic preserve), unconsolidated substrates, tidal marshes, shell mounds, coastal berms, and maritime hammocks natural communities.

Unconsolidated Substrate- There are approximately 442 acres of this natural community. Marine and estuarine unconsolidated substrates are mineral based natural communities generally characterized as expansive, relatively open areas of subtidal, intertidal, and supratidal zones which lack dense populations of sessile plant and animal species; fiddler crabs being a common inhabitant of these areas. The preserve's unconsolidated substrates (salt flat/salt tern) communities typically grade into tidal marsh and tidal swamp natural communities.

Coastal Rock Barren- A unique feature of the preserve is this 1-acre natural community that is comparable to the consolidated substrate category. Although FNAI identifies this community only along the rocky coastlines

in the Florida Keys, an accredited state biologist with the Florida Park Service has identified it as coastal rock barren. The area contains flat rocklands with exposed and eroded limestone and is sparsely vegetated with stunted black mangrove and sea purslane. This small patch is adjacent to salt flats (unconsolidated substrate) and mangroves (tidal swamp) and is somewhat reminiscent of a small scale Grand Canyon landscape.

Coastal Berm- The preserve contains approximately 9 acres of this natural community that are scattered about throughout several locations. Typical plants include cabbage palm, sea grape, marsh elder, Florida dropseed, Spanish bayonet, wax myrtle, sea purslane, sea oxeye daisy, privet, and snowberry. Either thin, long ridges or small circular areas adjacent to unconsolidated substrate, tidal marsh, or tidal swamp communities distinguish the coastal berm areas.

Maritime Hammock- Hidden away by an adjacent invasive melaleuca forest (wet flatwoods) is approximately 2 acres of this natural community. This area lies between depression marsh and wet flatwoods communities and requires additional invasive plant control because of the encroaching melaleuca and Brazilian pepper plants. Typical native plants include dahoon holly, sea grape, saw palmetto, beautyberry, coral bean, myrsine, marlberry, and ferns.

Mesic Flatwoods- This natural community comprises approximately 413 acres of the preserve. Generally mesic flatwoods are characterized by as an open canopy forest of widely spaced pine trees with little or no understory but a dense ground cover of herbs and shrubs. Typical plants include slash pine, gallberry, saw palmetto, shiny blueberry, tarflower, bog buttons, bloodroot, false foxglove, yellow-eyed grass, gopher apple, and wiregrass. Other uncommon inhabitants include the threatened American bald eagle, eastern indigo snake, pine lily, reflexed wild pine and endangered fuzzy-wuzzy air plant and giant wild pine. Mesic flatwoods require periodic fire (1-8 years), which nearly all plants and animals inhabiting this community are adapted to. Since fire has been suppressed for many years, much of this natural community has become overwhelmed with the native saw palmetto. Mesic flatwoods areas that have undergone invasive non-native plant control work (melaleuca and downy rose myrtle) will experience reintroduction of prescribed fire.

Prairie Hammock- There are approximately 2 acres dispersed throughout the preserve. These locations are characterized as a clump of tall cabbage palms and live oaks in the midst of marsh communities, some with saw palmetto ringing the perimeter of the round clumps. Additional typical plants include wax myrtle, marlberry, and wiregrass.

Depression Marsh- There are approximately 38 acres of depression marsh scattered throughout the preserve. Typical plants include St. John's wort, spikerush, yellow-eyed grass, maidencane, wax myrtle, bloodroot, buttonbush, pickerelweed, and bladderwort. Depression marshes are associated with and grade into wet prairie, wet flatwoods, and mesic flatwoods and are threatened by hydrological alterations, pollution, fire suppression, and invasive exotic species. Nearly all locations with depression marshes dry down during the winter/spring seasons.

Scrub- Small pockets of the scrub natural community only occupy approximately 2 acres of the preserve. The preserve's scrub community is totally encompassed within the larger scrubby flatwoods habitat. Typical plants include sand live oak, myrtle oak, shiny blueberry, Chapman's oak, tarflower, scrub oak, rosemary, rusty lyonia, ground lichens, prickly-pear cactus, an occasional slash pine, and the endangered Curtiss' milkweed. Since scrub is essentially a fire maintained community, prescribed fires will be utilized to sustain this habitat, although the area is too small to support a scrub jay population. Several species of vertebrates, invertebrates and amphibians, such as oak toads and gopher tortoises inhabit these areas.

Scrubby Flatwoods- There is approximately 61acres of scrubby flatwoods located on the preserve. They are adjacent to scrub and mesic flatwoods habitat. They are similar in community structure to the mesic flatwoods, but are better drained. This increased drainage allows for oaks to proliferate. The oaks in this community are dense with an average height of 10 feet. Occasional lightning-induced wildfires have occurred within portions of this community. Typical plants include slash pine, sand live oak, tarflower, rusty lyonia, sand oak, and lichens. The endangered stiff-leaved wild pine along with the Curtiss' milkweed and threatened crestless plume orchid and banded wild pine also inhabit this plant community.

Wet Prairie- This natural community only occupies approximately 4 acres of the preserve. Common plants include wiregrass, spikerush, beakrush, marsh pinks, yellow-eyed grass, wax myrtle, and St. John's wort. Typical animals include Florida cricket frog, southern toad, southern chorus frog, black racer, red rat snake, marsh rabbit, and cotton rat. Melaleuca has also invaded this community, but it's very scattered.

Strand Swamp- There is approximately 5 acres of strand swamp on the preserve. The strand swamp is shallow, forested, elongated depressions dominated by bald cypress. The strand swamp location is downstream from an impacted cypress slough system, which has experienced hydrological alteration from various forms of

developmental infrastructure. Typical plants include red maple, leather fern, sawgrass, strangler fig, water hyssop, wax myrtle, pond apple, coastal plain willow, butterfly orchid, bromeliads, and buttonbush. This community was heavily invaded with melaleuca before receiving extensive exotic plant removal work. Vigilant exotic plant maintenance needs to continue as well as searching out small populations of the old world climbing fern noted within this community.

Ruderal/developed areas- Although not a natural community, approximately 64 acres have been impacted by various development measures. Whether it be roadways, drainage ditches, mosquito ditches, navigational channels, borrow pits (prior cattle use), or utility easements, all have some level of impact and are considered hydrological alterations. Performing habitat restoration on these sites will be an expensive, if not improbable, undertaking. Despite this, there are restoration plans to accept such a challenge at some of these locations.

Table 5: Summary of Natural Communities

FNAI Natural Communities Type	# Acres	% of Area	Global Rank	State Rank	Comments
Shell Mound	5	< 1	G3	S2	Islands
Wet Flatwoods	1,040	12	G??	S4?	Dense melaleuca coverage
Tidal Marsh	1,213	14	G4	S4	
Estuarine Tidal Swamp/Forest	5,185	61	G3	S3	
Unconsolidated Substrate	442	5	G5	S5	
Coastal Rock Barren	1	< 1	G3?	S1	May also be considered consolidated substrate
Coastal Berm	9	< 1	G3?	S2	
Maritime Hammock	2	< 1	G4	S3	
Mesic Flatwoods	413	~ 5	G?	S4	
Prairie Hammock	2	< 1	G4	S4	
Depression Marsh	38	<1	G4?	S3	
Scrub	2	< 1	G2	S2	
Scrubby Flatwoods	61	~ 1	G3	S3	
Wet Prairie	4	<1	G?S4?	G?S4?	
Strand Swamp	5	<1	G4?S4?	G4?S4?	cypress habitat restored
Ruderal/developed areas	64	~ 1	NA	NA	
TOTAL	8,486	100			

See Appendix E for an explanation of rankings.

Funding has not been available to obtain precise natural community maps from FNAI. Therefore, Map 6 was derived from 1995 land cover data from SFWMD that provides some level of information concerning habitats found within the preserve, but does not delineate sufficient natural communities categories.

Native Species

Because of the diversity of natural communities found within the preserve, a diverse array of flora and fauna exists on the preserve. The preserve contains upland communities (scrub, flatwoods), adjacent wetlands (hydric hammock, freshwater marsh), and associated ecotones. Much of our knowledge about the flora and fauna found on the preserve comes from plant and animal surveys conducted on The Nature Conservancy parcels and the Estero River Scrub parcel in 2001. Since that time, the focus of the organism inventory has been the flora. The list of species of plants and animals found in the preserve is in Appendix G. The plant list for the preserve totals 409 species, including some rare and listed species. Three hundred sixty-five species of animals have been documented or are likely to

occur within the preserve. Because of the close association between the preserve habitats and the aquatic preserve, aquatic species have been included in the species listings. Continued inventory methods such as small mammal trapping and bird and herpetofauna surveys will expand this number.

Listed Species

Statutorily-recognized lists of rare and endangered species are produced at the federal level by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service and at the state level by the Florida Fish and Wildlife Conservation Commission and the Florida Department of Agriculture and Consumer Services. The Florida Natural Areas Inventory (FNAI) also produces a list of rare and endangered species, and maintains a database of occurrences of these species in Florida.

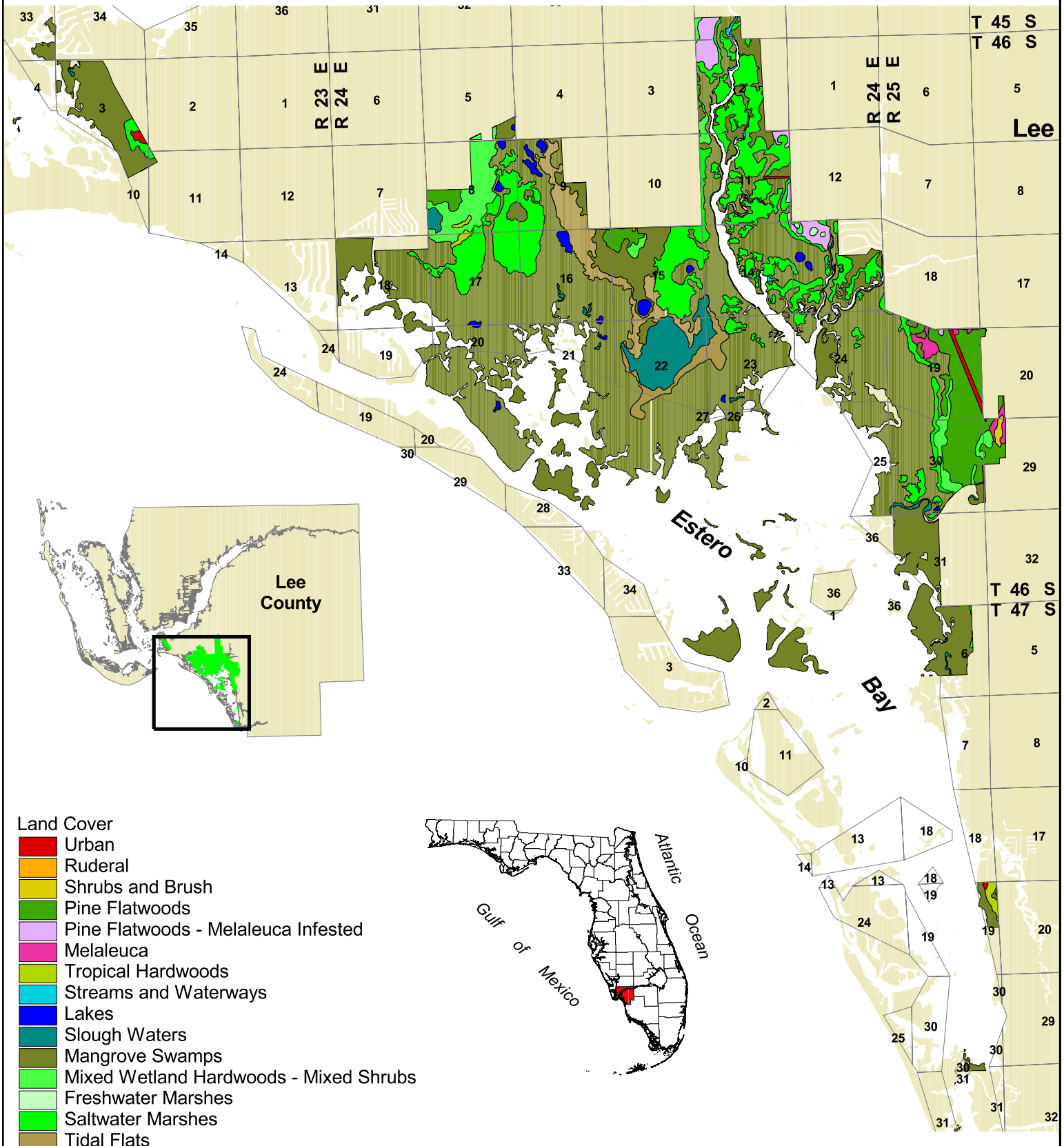
FNAI lists 34 types of plants, 65 vertebrates, and 1 invertebrate as rare or endangered in Lee County. Within the preserve, FNAI has documented occurrences of zero types of plants, 2 mammals, 10 birds, 4 reptiles, zero amphibians, zero fish, and zero types of invertebrates. FNAI has documented a total of 16 occurrences of these various organisms within the preserve (Appendix H, Protected Species List and Managed Area Tracking Record). From other sources, preserve staff have documented an additional 20 sightings. This includes 2 types of plants, 1 mammal, 13 birds, 3 reptiles, zero amphibians, zero fish, and zero types of invertebrates that are present on the preserve. Note that some of these sightings are reports of species already documented by FNAI, but found in new locations. Data were acquired through staff observation and environmental consultants. Staff does report new findings to FNAI as they occur.

FNAI qualifies their data by stating that the data should not be used as a substitute for actual field work, as many areas FNAI covers have not been adequately surveyed. Intense surveying for other threatened and endangered species has not been started at this time, but staff does try to look for threatened and endangered plant species when time permits. Based on natural community types present in the preserve and the species reported to be in this county by FNAI, preserve staff estimate an additional 3-5 FNAI-listed species potentially occur within the preserve.

Listed Plant Species

Most notable among the listed plant species known to occur on the preserve are golden leather fern, Curtiss' milkweed, many-flowered grasspink, geiger tree, stiff-leaved wild pine and giant wild pine. Golden leather fern occurs in tidal marsh and unconsolidated substrates. The tidal marsh community is threatened by exotic plants and hydrological changes caused by upland development. Curtiss' milkweed is found in scrub and scrubby flatwoods. This species is under threat from upland development. Many-flowered grasspinks are found in wet prairies and wet flatwoods. This species is threatened due to development and reduced fire frequency. The geiger tree is located on the edge of the tidal swamp and shell mound communities on some of the mangrove islands. Exotic plants threaten this species. The stiff-leaved wild pine and giant wild pine can be found in scrubby flatwoods. These bromeliads are listed as state endangered due to predation by the Mexican bromeliad weevil (*Metamasius mosieri*). These weevils arrived in Florida in bromeliad shipments from Mexico. The adult weevil eat the outer leaves of the bromeliad, and bores into the center of the plant to lay eggs. The eggs hatch into larvae, which eats at the center of the plant, killing the plant. The preserve staff is very concerned about the Mexican bromeliad weevil because populations were found at Koreshan State Historic Site, a state park located across the Estero River from the preserve.

Map 6 - Land Cover Map for the Estero Bay Preserve State Park



Prepared by:
Office of Park Planning
Division of Recreation and Parks
Department of Environmental Protection
July, 2004

Projection Albers
Datum NAD HPGN

Table 6 contains the 19 listed plant species known to occur on the preserve. Appendix I contains listed plants and animals known to occur within the county and therefore potentially occurring on the preserve, though not currently documented.

Table 6: Listed Plant Species Known to Occur on the EBPSP.

Scientific Name	**Common Name**	**FDACS**	**USFWS**	**FNAI**
Acrostichum aureum	golden leather fern	E		G5S3
Acrostichum danaeifolium	giant leather fern	C		
Asclepias curtissii	Curtiss' milkweed	E		G3S3
Bletia purpurea	pinepink orchid	T		
Calopogon multiflorus	many-flowered grasspink	E	MC	G3S2S3
Cordia sebestena	geiger tree	E		
Encyclia tampensis	butterfly orchid	C		
Eulaphia alta	wild coco	T		
Lilium catesbaei	pine lily	T		
Osmunda cinnamomea	cinnamon fern	C		
Osmunda regalis	royal fern	C		
Pinguicula lutea	yellow butterwort	T		
Pteroglossaspis ecristata	crestless plume orchid	T		G2S2
Tillandsia balbisiana	reflexed wild pine	T		
Tillandsia fasiculata	stiff-leaved wild pine	E		
Tillandsia flexuosa	banded wild pine	T		G5S3
Tillandsia pruinosa	fuzzy-wuzzy air plant	E		G4S1
Tillandsia utriculata	giant wild pine	E		
Zamia floridana	Florida coontie	C		

See Appendix E for an explanation of listings and ranks.

Listed Animal Species

Most notable among the animal species known to occur on the preserve are the Florida black bear, gopher tortoise, and Eastern indigo snake. We have no documented sightings of the Florida black bear, but tracks were found at Winkler Point in 1996, and tracks, scratchings and scat were found on the ERS parcel in 2000 by a consulting firm. The preserve is one of the few havens west of I-75 for transient Florida black bear, and may become an area of increasingly greater importance for their foraging needs as development east of I-75 continues. The tracks and other signs were found in wet flatwoods, tidal swamp and unconsolidated substrates. There are several large colonies of gopher tortoises located at the ERS parcel of the preserve. 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. They have been seen living in scrubby flatwoods and mesic flatwoods. Eastern indigo snakes are a commensal of the gopher tortoise, which means that this snake can be found living in a gopher tortoise's burrow.

Table 7 contains listed animal species known to occur on the state park and aquatic preserves. Many of the listed wading bird documentations are associated with small bird rookeries located at the southwest end of the preserve. The rookeries are found on mangrove islands within the aquatic preserve and successfully nest several species each year. Twenty-seven animal species documented on the preserve are listed as endangered, threatened, or species of special concern, and include the West Indian manatee, gulf sturgeon and common snook.

Appendix I lists plants and animals known to occur within the county and therefore potentially occurring on the preserve, though not currently documented. University of Florida researchers and staff patrolled Estero Bay in 1999-2000 looking for American alligators and American crocodiles. Some alligators were captured and measurements taken, but no crocodiles were located. No known scrub jay families currently occupy the preserve, possibly because the scrubby habitats are overgrown and/or there may not be a sufficient quantity of contiguous habitat remaining and therefore, not likely to support resident populations of scrub jays. No scrub jays have been reported on the preserve; however, after management practices such as prescribed fire and/or roller chopping are utilized, the scrubby areas might be used for foraging if any scrub jays live nearby.

Table 7: Listed Animal Species Known to Occur on the EBPSP				
Scientific Name	**Common Name**	**FWC**	**USFWS**	**FNAI**
Acipenser oxyrinchus desotoi	Gulf sturgeon	SSC	T	G3T2S2
Ajaia ajaja	roseate spoonbill	SSC		G5S2S3
Alligator mississippiensis	American alligator	SSC	T(S/A)	G5S4
Caretta caretta	loggerhead turtle	T	T	G3S3
Centropomus undecimalis	common snook	SSC		
Chelonia mydas mydas	Atlantic green turtle	E	E	G3S2
Dermochelys corias	leatherback	E	E	G3S1
Drymarchon corais couperi	eastern indigo snake	T	T	G4T3S3
Egretta caerula	little blue heron	SSC		G5S4
Egretta rufescens	reddish egret	SSC		G4S2
Egretta thula	snowy egret	SSC		G5S4
Egretta tricolor	tri-colored heron	SSC		G5S4
Eretmochelys imbricata	hawksbill turtle	E	E	G4S3
Eudocimus albus	white ibis	SSC		G5S4
Falco peregrinus	peregrine falcon	E		G4S2
Falco sparverius paulus	southeastern American kestrel	T		G5T3T4S3?
Gopherus polyphemus	gopher tortoise	SSC		G3S3
Haematopus palliates	American oystercatcher	SSC		G5S3
Haliaeatus leucocephalus	bald eagle	T	T	G4S3
Lepidochelys kempi	Kemp's ridley turtle	E	E	G4S3
Mycteria Americana	wood stork	E	E	G4S2
Pelecanus occidentalis	brown pelican	SSC		G5S4
Rostrhamus sociabilis	snail kite	E	E	G4G5T1S1
Rynchops niger	black skimmer	SSC		G5S3
Sterna antillarum	least tern	T		G4S3
Trichechus manatus	manatee	E	E	G2S3
Ursus americanus floridanus	Florida black bear	T		G5T2S2

See Appendix E for an explanation of listings and ranks.

Invasive Non-Native Species

At least thirty-four (34) plant (Table 8) and six (6) animal (Table 9) invasive, non-native species are known to occur within the preserve. According to the Florida Exotic Pest Plant Council (EPPC), twenty-three (23) of these plant species are considered Category I and seven (7) are considered Category II invasive species (EPPC, 2003). Category I invasive plant exotics alter native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives. This definition does not rely on the economic severity or geographic range of the problem, but on the documented ecological damage caused. Category II invasive exotics are those that have increased in abundance or frequency, but have not yet altered Florida plant communities to the extent shown by Category I species. Florida does not have an official invasive non-native animal species list, but at least 270 exotic animal species are known to occur in Florida.

A distribution map of prevalent invasive plant species is shown on Map 7. Primarily, melaleuca is the most prolific on the preserve and has greatly affected natural communities such as Tidal Marsh, Wet Flatwoods, and Strand Swamp (cypress slough). Furthermore, melaleuca is present within most of the preserve's natural communities, except four (Shell Mound, Estuarine Tidal Swamp/Forest, Unconsolidated Substrates, Coastal Rock Barren). In order to simplify the map view, only the top five (5) invasive plants and old world climbing fern were projected. Although distribution of old world climbing fern is still at a "low" range on the preserve, it is imperative to maintain vigilance against this invasive plant species, because it can be rather "explosive" in nature. This invasive fern has reportedly invaded many natural communities found throughout Florida and can "climb and blanket other vegetation, ultimately causing mortality to mature canopy and subcanopy trees" (EPPC, 2001).

Table 8: Invasive Non-Native Plant Species Known to Occur on the EBPSP					
Scientific Name	**Common Name**	**EPPC Cat.**	**Gov. List**	**Degree of Infestation**	
Abrus precatorius	rosary pea	I		Low	< 5 ac
Acacia auriculiformis	earleaf acacia	I		Low	< 3 ac
Albizia lebbeck	woman's tongue	I		Low	< 1 ac
Bauhinia variegata	orchid tree	I		Low	< 1 ac
Casuarina spp.	Australian pine	I	P	Medium	20 ac
Cereus undatus	night blooming cereus	NA		Low	< 2 ac
Cupaniopsis anacardioides	carrotwood	I	N	Low	< 5 ac
Dioscorea bulbifera	air potato	I	N	Low	< 2 ac
Eugenia uniflora	Surinam-cherry	I		Low	< 1 ac
Ficus spp.	ficus ?	I or II		Low	< 1 ac
Imperata cylindrical	cogon grass	I	N, U	Low	< 2 ac
Kalanchoe pinnata	life plant	II		Low	< 1 ac
Leucaena leucocephala	lead tree	II		Low	< 2 ac
Lygodium microphyllum	old world climbing fern	I	N	Low	< 5 ac
Melaleuca quinquenervia	melaleuca	I	P, N, U	High	1,800 ac
Melia azedarach	Chinaberry	I		Low	< 1 ac
Momordica charantia	wild balsam apple	NA		Low	< 4 ac
Oeceoclades maculata	ground orchid	NA		Low	< 1 ac
Panicum repens	torpedo grass	I		Low ?	10 ac ?
Psiduim guajava	guava	I		Low	< 1 ac
Rhodomyrtus tomentosa	downy rose-myrtle	I	N	Medium	150 ac
Rhoeo spathacea	oyster plant	I		Low	< 1 ac
Richardia brasiliensis	Mexican clover	NA		Low	< 3 ac
Sansevieria hyacinthoides	bowstring hemp	II		Low	<1 ac
Scaevola taccada	beach naupaka	I		Low	< 1ac
Schefflera actinophylla	schefflera	I		Low	< 1 ac
Schinus terebinthifolius	Brazilian pepper	I	P, N	Medium	250 ac
Solanum viarum	tropical soda apple	I	N, U	Low	< 2 ac
Syzygium cumini	java plum	I		Low	< 1 ac
Thespesia populnea	seaside mahoe	I		Low	< 3 ac
Tradescantia spp.	wandering jew	I ?		Low	< 1 ac
Tribulus cistoides	puncture weed/vine	II		Low	< 1 ac
Urena lobata	caesar weed	II		Low	< 5 ac
Wedelia triobata	wedelia	II		Low	< 3 ac

EPPC Cat. = Exotic Pest Plant Council Category. Categories I & II are explained above, while NA (not applicable) are less invasive non-native plants.
Gov. list: P = Prohibited by Fla. Dept. of Environmental Protection, N = Noxious weed listed by Fla. Dept. of Agriculture & Consumer Services, U = Noxious weed listed by U.S. Department of Agriculture.

Of the invasive animal species, *Sus scrofa*, feral hogs, are the greatest concern, due to their well-documented degradation of habitat. The preserve engages the services of a professional trapper, who removes this species in compliance with the numerous guidelines of Florida's Department of Agriculture and Consumer Affairs (refer to Chapter 585 (Animal Industry), Florida Statute). This current trapping arrangement allows feral hogs to be controlled with a minimum of man-hours by state employees and money.

Table 9: Invasive Non-Native Animal Species Known to Occur on the EBPSP		
Scientific Name	**Common Name**	**Degree of Infestation**
Anolis sagrei	brown anole	High, naturalized
Bufo marinus	marine or giant toad	Low
Dasypus novemcinctus	nine-banded armadillo	High, naturalized
Eleutherodactylus planirostris planirostris	greenhouse frog	Low
Osteopilus septentrionalis	Cuban tree frog	Low
Sus scrofa	feral hog	Medium

Problem Species

Native species can cause problems within many of Florida's ecosystems. Sometimes man's activities in an area can result in native species becoming a disruptive influence, or sometimes a native species may have what appear to be unnatural effects on a system such as pine beetle epidemics that kill large areas of healthy pines. The preserve has experienced a couple of small sections in which pine beetles have attacked unhealthy pine communities, such as areas heavily infested with exotic plants or with hydrological alterations from nearby urban development communities.

In addition, native plant species such as cattails (*Typha spp*.) and wild grape vine have become aggressive in certain habitats and have overtaken other native vegetation such as grasses, sedges, rushes, shrubs, and trees. Cattails have become a large problem because "nutrient enriched" run-off (from golf courses, lawns that are fertilized, roadways, etc.) causes them to grow out of control and spread throughout wetland locations. Conservatively, nearly 100 acres (within most of the management units) contain some level of cattail infestation. The wild grape vine has only become a problem at some locations within the Estero River Scrub Management Unit where it climbs into slash pines (acts as a ladder fuel during fires), along fence lines, within densely populated gopher tortoise communities, and into canal embankments (has fallen into navigational waterways).

Forest Resources

Sustainable forestry is an important component of Florida's economy and can provide funds for management of lands. Chapter 253, Florida Statutes, requires that plans for 1,000+-acre parcels contain an analysis of multiple-use potential, to include a professional forester's assessment of the resource conservation and revenue-producing potentials of the tract's forests. DRP considers forest management consistent with the purposes for acquisition of this property when the activities contribute to restoration management. A timber management assessment has been conducted for this preserve, and is included as Appendix J. It is not apparent that the South Florida slash pines have been logged, however some cypress trees have been noted as removed. All of the accessible timber is South Florida slash pine and roadway access is very limited.

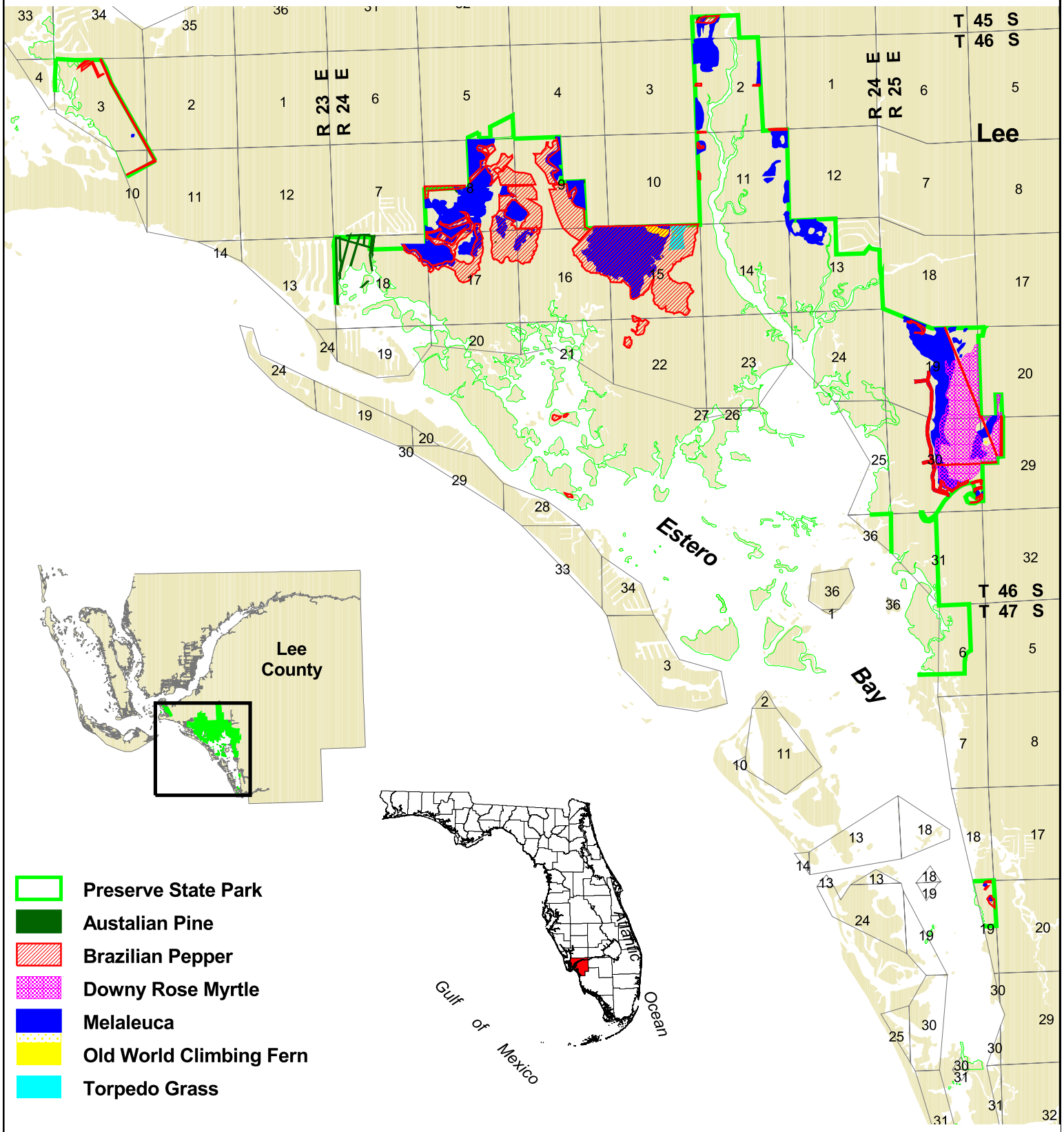
Historically, most of the commercially valuable trees found on the preserve would have been South Florida slash pine (*Pinus elliotti* var. *densa*). Furthermore, with reference to Appendix J, it must be contested that the preserve only contains approximately 474 acres of "mesic and scrubby flatwoods that have or are capable of growing pine timber." Although there are 1,040 acres of wet flatwoods, this natural community contains high-density levels of invasive plants with only minute levels of pine that either remain or can be historically attributed to these locations. The timber assessment indicated that "basal areas of natural South Florida slash pine stands throughout the preserve vary from 0 to over 100 sq. ft. per acre. Stand ages are mostly mixed with a limited number of trees over 60 years." Unfortunately, the timber assessment does not specify the amount of acres > 80 basal area, which is the recommended limit for harvesting/thinning. Although, in summary, the timber assessment does specify "there is a limited volume of timber currently on this tract."

As of October 2002, a fire management plan was completed for the preserve. Preliminary fire lines were installed in May/June 2002, implementation of prescribed burning began in March 2003, and the fire management plan is included as Appendix K. The Florida Division of Historical Resources was informed concerning this land management activity (fire line project) and the preserve received a letter dated May 16, 2002, authorizing the activity. Furthermore, during May/June 2003 additional fire lines were installed utilizing a mulcher mower and roller chopping activities that were performed within four pine flatwoods locations. This latest project did not involve soil disturbance (upheaval or digging of soils).

Mineral Resources

There are no significant mineral resources on the preserve.

Map 7 - Distribution of Prevalent Invasive Non-Native Plant Species in the Estero Bay Preserve State Park



Prepared by:
Office of Park Planning
Division of Recreation and Parks
Department of Environmental Protection
July, 2004

Projection Albers
Datum NAD HPGN

Cultural, Archaeological, and Historical Resources

Florida's coastal areas, especially uplands contiguous with water, often have a rich history of human settlement. The Florida Division of Historical Resources (DHR) maintains a Master Site File that documents many of Florida's archaeological and historical features. A review of the Florida Master Site File on June 9, 2003 and a site assessment of the preserve by a DHR team in 1997 and 2001, disclosed several archaeological and historical sites to be within or near the Estero Bay Aquatic Preserve and the Estero Bay Preserve State Park. The DHR Site Assessment of Archaeological and Cultural Resources documentation is included as Appendix L. Nine sites have been specifically assigned to the preserve for management. Artifacts documented in the Master Site Files attest to more than four cultures represented in the preserve. These include Late Glades II-III, Unspecified Caloosahatchee/Glades, Glades area/Caloosahatchee Subarea and twentieth century American, including WWII. Site types included in the files are prehistoric mounds, historic homesteads, a sand burial mound, shell middens, historic boat refuse, two airplane crashes, artifact and ceramic scatter, and a railroad grade segment. The DHR publication "Management Procedures for Archaeological and Historical Sites and Properties on State-Owned or Controlled Lands" is included as Appendix M. A map of archaeological and cultural sites based on information from DHR was submitted under separate cover to the Division of State Lands and the Acquisition and Restoration Council.

Specific problems that cultural/archaeological resources face include, but are not limited to, development, borrowing, 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. – 500 B.C., is possibly the earliest evidence of human habitation on the preserve. While no archaic sites have been identified on the preserve, it is likely that there are archaeological sites that exhibit components dating to this era. Archaeological sites dating to the Late Archaic have been identified on the Bonita Bay Development, which is just east of the preserve. The majority of presently known archaeological sites date from approximately 1550 A.D. 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 – A.D. 1750. The Calusa capital city, Calos, was located on Mound Key, which is located within the aquatic preserve but is managed by Koreshan State Historic Site. The Calusa Indian population significantly declined in the 1600's 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 1700's, the Creek Indians from the southeastern United States came to Florida, following population pressures and conflict with Europeans. The Creek became known as the Seminoles and 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 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, remaining Koreshan members gave 305 acres to the state of Florida, most of which later became the Koreshan State Historic Site.

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.

The Division of Historical Resources 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 preserve 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. The purpose of this project was to assist Lee County in constructing a management plan to conserve and protect the county's cultural resources. Of the 9 archaeological sites, 4 of the sites were listed in the assessment. They included Lone Slash Pine, Dog Key, Julies Island, and Starvation Key.

Scenic Resources

The Estero Bay Aquatic Preserve and the Estero Bay Preserve State Park are host to a single state-designated scenic resource, the Estero River Canoe Trail, part of Florida's Statewide System of Greenways and Trails and Lee County Blueways. This trail begins at Koreshan State Historic Site and then continues along the Estero River Scrub and past mangrove islands of the preserves to Lover's Key State Park.

The preserve has two public access points, at the western end of Broadway in Estero and at the southern end of Winkler Road. At each of these trailheads there are several designated trails for visitors. These trails offer the public a chance to view disappearing Florida habitats, primarily upland scrub at Broadway, salt marsh and flats at Winkler, as well as an opportunity to view wildlife, such as wading birds, at both locations. A description of the Estero River Canoe Trail and copies of the trail guides for both public access points are contained in Appendix N. Both areas have been subject to intense exotic-removal recently, offering the public an educational glimpse at habitat restoration efforts representative of those being undertaken across South Florida.

III. Use of the Property

Previous Use and Development

Previous use of the lands of the preserve began with pre-Columbian and essentially pre-historic settlement by the Calusa and other local Native-American cultures. These peoples took advantage of the abundant fishery of the local bay waters. Settlements along these shores were numerous, as is attested by the shell middens and mounds that remain the most visible signs of development over much of the low-lying areas.

This coast was an early discovery of Europeans, among the first visited by Juan Ponce de León in 1513. The lands of Estero Bay were not readily settled. It was very close to here that Ponce de León attempted a settlement in 1521, and died of wounds he received from Calusa in that vain attempt. During the centuries of Spanish rule, it was an outlaw, pirate coast. Storms and shipwrecks were commonplace; Lloyds declared it the most dangerous coast in the world. It was a haven for the Confederate Navy during the Civil war, a hotbed of smuggling during Prohibition and then again during the drug wars of the Sixties and Seventies. Certainly the lands around Estero Bay have a rich history, much of it illicit and probably forever undocumented and unknown.

Nineteenth and 20th century maps of the area show no settlements on the lands of the Estero Bay Preserve State Park, the closest being Estero (Koreshan) to the south and Ft. Myers to the north. A railroad, the Atlantic Coast Line, did pass through the lands of the Preserve, and its graded right-of-way remains a prominent land feature of the Estero River Scrub and Zemel sections of the preserve.

The first of the lands acquired by the Estero Bay Preserve State Park was the land around Winkler Point, which had been scheduled by entrepreneurs for development in the style of Cape Coral. A citizen's lawsuit in the 1960's resulted in acquisition of these lands by the State, and eventually they became the Estero Bay State Buffer Preserve. Decades later, some citizens of Estero lobbied successfully for the State to acquire, through eminent domain, the Estero River Scrub parcel, another large land holding scheduled for development.

In general, the lands that make up the preserve have never been developed residentially or commercially or even used much for agricultural uses, other than perhaps grazing. Most of the preserve is wetlands, and would require a lot of "fill" to be developed. As laws prohibiting the filling of wetlands became more prevalent, these areas became commensurately less desirable to investors. The scrub and other uplands owned in large blocks by land speculators were mostly undeveloped as well, serving as hunting areas for the local populations, unbeknownst to the landowners.

Land use surrounding the preserve is typical of developing Florida. The watershed is stressed by all forms of development: commercial, residential and agricultural. Most of the cypress has long been logged out, replaced by melaleuca. Gravel and phosphate mines dot the landscape as seen from the air. Farms that once leached fertilizers and other organics into the watershed have been replaced by golf courses that probably leach a little less; this may be seen as progress. As current history unfolds here, the value of the preserve is more apparent each coming day. Early maps of the area showing gradual development are found in Appendix O.

Current Public Use and Land Uses

The Estero Bay Preserve State Park contains two public access points. Both access areas have trail counters, are open from sunrise to sunset and are for foot and/or bicycle traffic only. The first access area is located at the southern end of Winkler Road in South Fort Myers. Winkler Road ends in a cul-de-sac at the northern boundary of the preserve, an area of pine flatwoods that has been invaded by exotic plants, primarily melaleuca, most of which have been chemically treated. The second access area is located in Estero at the western end of a road called Broadway West at the southwestern boundary of the preserve, an area known as the Estero River Scrub. Along residential interfaces with the preserve, fire lines and fencing have been installed at both access areas. Resource based recreation such as bird watching, environmental education, hiking and nature appreciation are public uses, which are accommodated at both public use areas. Due to the sensitive wetland habitat at the Winkler public access, bike riding is an activity that is permitted only at the Estero River Scrub.

The Winkler public access point was created in 1999 and encompasses over 600 acres of pine flatwoods, salt flats, transitional tidal marsh and mangroves. The area offers roughly 5 miles of marked, primitive, hiking trails

developed by DEP staff, Estero Bay Buddies and Department of Correction crews, and utilizes some existing trails and a dirt road. Benches were installed along the trails and at two observation decks adjacent to two ponds, located along trails routes, one pond is tidally influenced at extreme high tides while the other is freshwater. These trails are wet during much of the year, usually June through November. This site offers visitors education concerning habitat restoration efforts, such as exotic plant removal. There is an educational kiosk with trail guides, brochures and posted information as well as a bike rack at the trailhead. A maintenance shed for this area is located offsite.

The Broadway access point was created in 2000 and encompasses 1,260 acres along and north of the Estero River. The Estero River Scrub offers approximately 9 miles of marked, primitive, hiking trails through scrubby flatwoods, pine flatwoods, salt marshes, and salt flats bordering mangroves. DEP staff and Estero Bay Buddies developed the trails using some existing trails and a dirt road. Benches were installed along the trails. This area offers habitats for birding, gopher tortoise viewing and education concerning habitat restoration efforts, such as prescribed burning and exotic plant management. There is an educational kiosk with trail guides, brochures and posted information as well as a bike rack at the trailhead. A maintenance shed and fenced compound off limits to the public are located here. Florida Gulf Coast University and Edison Community College students and faculty have performed various research activities here also. The trail system at the Estero River Scrub runs to and along the Estero River. The public has been accessing this area of the preserve via watercraft, pulling up on shore and walking up the riverbank. This activity, as well as the increased boat traffic on the river, had exacerbated the erosion of this shoreline and upland vegetation. Therefore, shoreline stabilization in the form of hand placed rip rap planted with red mangroves and other plantings more landward occurred on approximately 250' section of shoreline. The design incorporates a natural stair-step design so that the public arriving in non-motorized vessels can access the preserve at this location. The West Coast Inland Navigation District funded most of this project. Additional signage to educate the public about wise use of the preserve's resources was installed at this location.

A maintenance shed to service the Cow Slough and No Name Slough areas of the preserve has been located on the disturbed upland portion of this area.

Map 8 shows the current public uses and facilities.

Planned Uses and Assessment of their Impacts

Determination of Public Uses that are Consistent with Acquisition Purposes

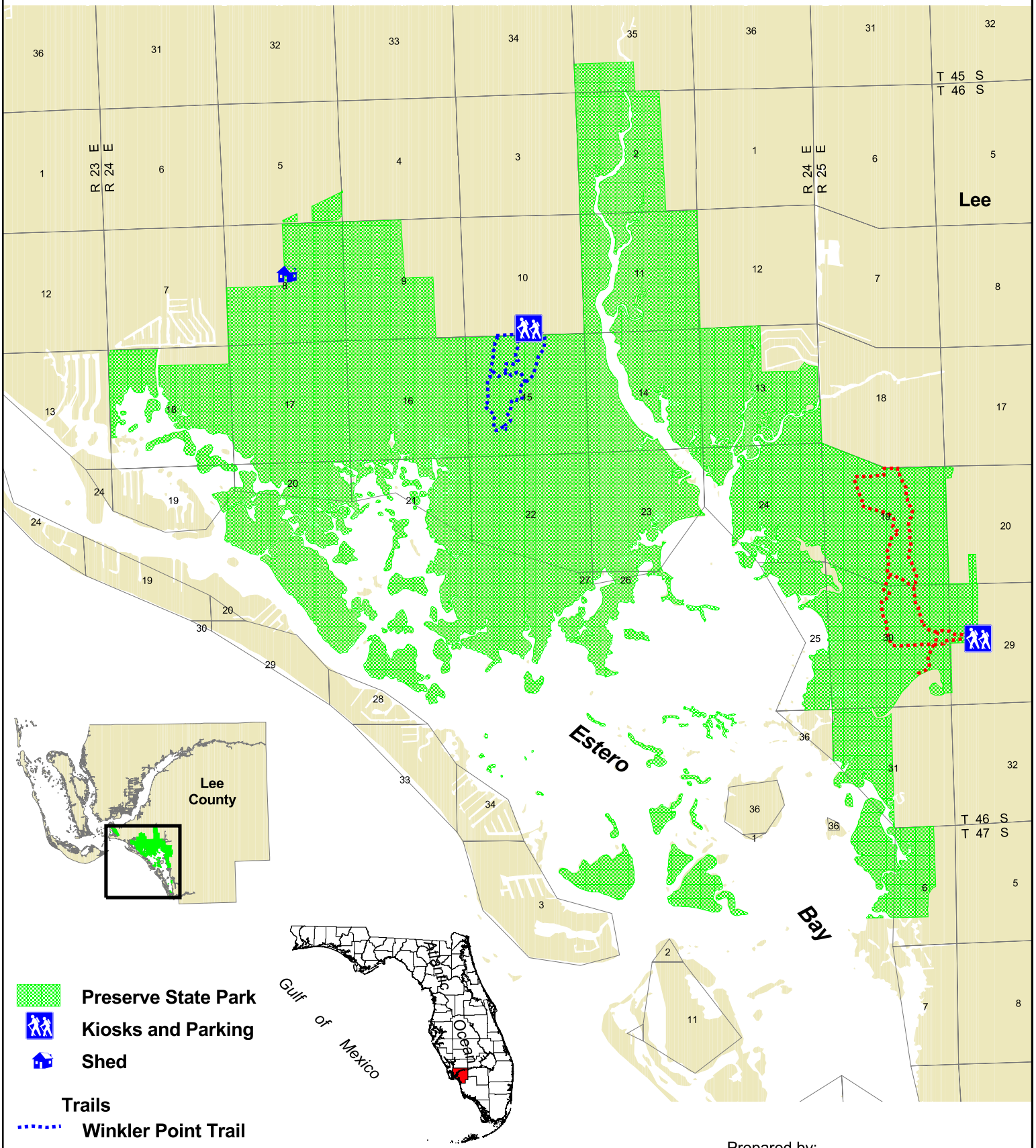
Public uses of the Estero Bay Preserve State Park must follow the statutory requirements of the program(s) under which the lands were acquired, the management policy statement, and the management prospectus. In addition, they must comply with Chapter 62D-2, FAC. According to the 2003 Florida Forever Report, the intended public use of this property is "designated as a buffer preserve to the Estero Bay Aquatic Preserve and can provide opportunities for fishing, hiking, nature appreciation, and primitive camping." However, based on properties acquired, there currently are no appropriate areas for primitive camping. Uses planned for the Estero Bay Preserve State Park comply with the Conceptual State Lands Management plan and represent "balanced public utilization" and are detailed below under "Planned Public Uses and Assessment of Impacts" and "Analysis of Multiple Use Potential". Uses other than those approved below must be reviewed by DEP/DRP. Only if approved will those uses be permitted.

Planned Public Uses and Assessment of Impacts

Because of the sensitivity of habitats and organisms and the natural restrictions to accessibility in tidal and freshwater wetlands, the management focus for the preserve is environmental enhancement and resource protection. All attempts will be made to locate any infrastructure in disturbed areas and it will be the minimum needed for appropriate public access and management.

Culverts are needed under a trail as it crosses Mullock Creek Slough at the Estero River Scrub for appropriate public and management access, as well as for hydrological restoration. These altered conditions existed prior to acquisition. Installation of culverts will depend on permitting and construction costs and feasibility. If necessary, the South Florida Water Management District and the Army Corps of Engineers will issue any required permits that will include mitigation conditions.

Map 8 - Current Public Uses and Facilities for the Estero Bay Preserve State Park



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Datum NAD HPGN

The most northerly section of trail at the Estero River Scrub runs along what is now an upscale residential golf course community. This also functions as a fire line and as management access, but since the construction of the development in 2002, this approximately ½ mile section of trail/fire line has retained more water for a longer period of time and remains impassable to safety vehicles for all practical purposes. An assessment of the amount of rock/shell material or other alternative means needed to make this fire line passable will be made. Any improvements made will depend on permitting and construction costs and feasibility. Again, the South Florida Water Management District will issue any required permits that will include mitigation conditions, if necessary.

In addition to Estero Bay Preserve State Park's two public entrances, at the western end of Broadway in Estero and at the southern end of Winkler Rd, a third public access, near Pine Ridge Road, at the west end of the "Zemel" parcel, will be evaluated. This area has wetlands as well as handsome pinewoods, and is a potential hiking area. A public access point here would probably require the development of an existing easement, as well as construction of a visitor kiosk and pedestrian gate, including trail counters.

Trail signage indicating plants the public will encounter, as well as habitat types, prescribed fire and other resource information is planned for all public access points.

Map 9 shows the proposed public uses and facilities.

Adjacent Land Uses

Map 10 shows the land uses for properties adjacent to the preserve. The preserve is surrounded by developed areas (residential and commercial) and is impacted by its proximity to this development. Multiple drainages through and from these developed areas enter the buffer areas and aquatic preserves and therefore water quality is an issue of critical concern. All tributaries to Estero Bay that pass through the preserve have been classified as impaired based on different parameters (Table 4). Adjacent land uses may be contributing to these impairments. A change in vegetation adjacent to many of the residential golf course communities that border the aquatic preserve and preserve state park has been documented. Specifically, cattails are replacing areas of native vegetation. Past and recent permitting practices have impacted the preserve through stormwater runoff and destruction of available buffers and wildlife corridors. With the rapid pace of development of land in the Estero Bay watershed and immediately adjacent to the preserves, these impacts have the potential to increase unless more protective measures are implemented in permitting processes here.

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.

Potential Surplus Lands

All of the lands within the EBPSP are suitable and necessary for the stated management objectives and none should be considered or declared as surplus.

Prospective Land Acquisitions

Not all lands within the Florida Forever project boundaries for the Estero Bay Preserve State Park have been acquired. Some of the remaining acquisitions are more important than others. Map 11 shows those areas within the project boundaries that remain to be acquired. Those available parcels through which Mullock Creek Slough flows, the lands north of the Zemel parcel and south of Summerlin Road, lands adjacent to Spring Creek, and those lands north of the TNC and Bigelow parcels adjacent to Hendry Creek and south of Summerlin Road, and are of highest importance because of their imminent risk of development. They would provide a more manageable property boundary, provide linkage to other county-owned conservation lands, and improve and ensure hydrological connections. Through acquisition and management including exotic plant control, seed sources for the rest of the

preserve will be reduced, thereby increasing the ability to control exotic plants on the preserve. All additional acquisitions within the Florida Forever boundary will provide increased protection for the aquatic preserve. They will also conserve and restore native, coastal habitats and associated wildlife that are in decline due to development. Acquisitions of privately owned mangrove islands in the southern portion of the bay are of lowest priority due to the lesser development risk.

Council members and staff involved in the evaluation of CARL and, now, Florida Forever applications develop project boundaries based on numerous factors, primarily related to the natural and cultural resources of a project. After a project is acquired, management staff is often able to assess the natural resource and management needs of a preserve in more detail. Oftentimes a change or potential changes in surrounding land use or the necessity to provide additional facilities indicate the original boundaries are not sufficient to ensure the preserve's perpetual protection. Preserve staff has identified other properties totaling 476.3 acres for addition to the preserve that are not contained within the Florida Forever project boundary (Map 11). These properties are necessary to provide the optimum boundary for the preserve. The higher priority addition is proposed to provide a larger buffer to restore and enhance Mullock Creek and its cypress slough. As additional needs are identified through preserve use, development, and research, and as adjacent land uses continue to change on private properties, the optimum boundary for the preserve may be modified for the enhancement of natural and cultural resources, recreational values, and/or management efficiency. Efforts will be made to coordinate with Lee County's successful land acquisition program, Conservation 2020, the South Florida Water Management District, and the Comprehensive Everglades Restoration Program.

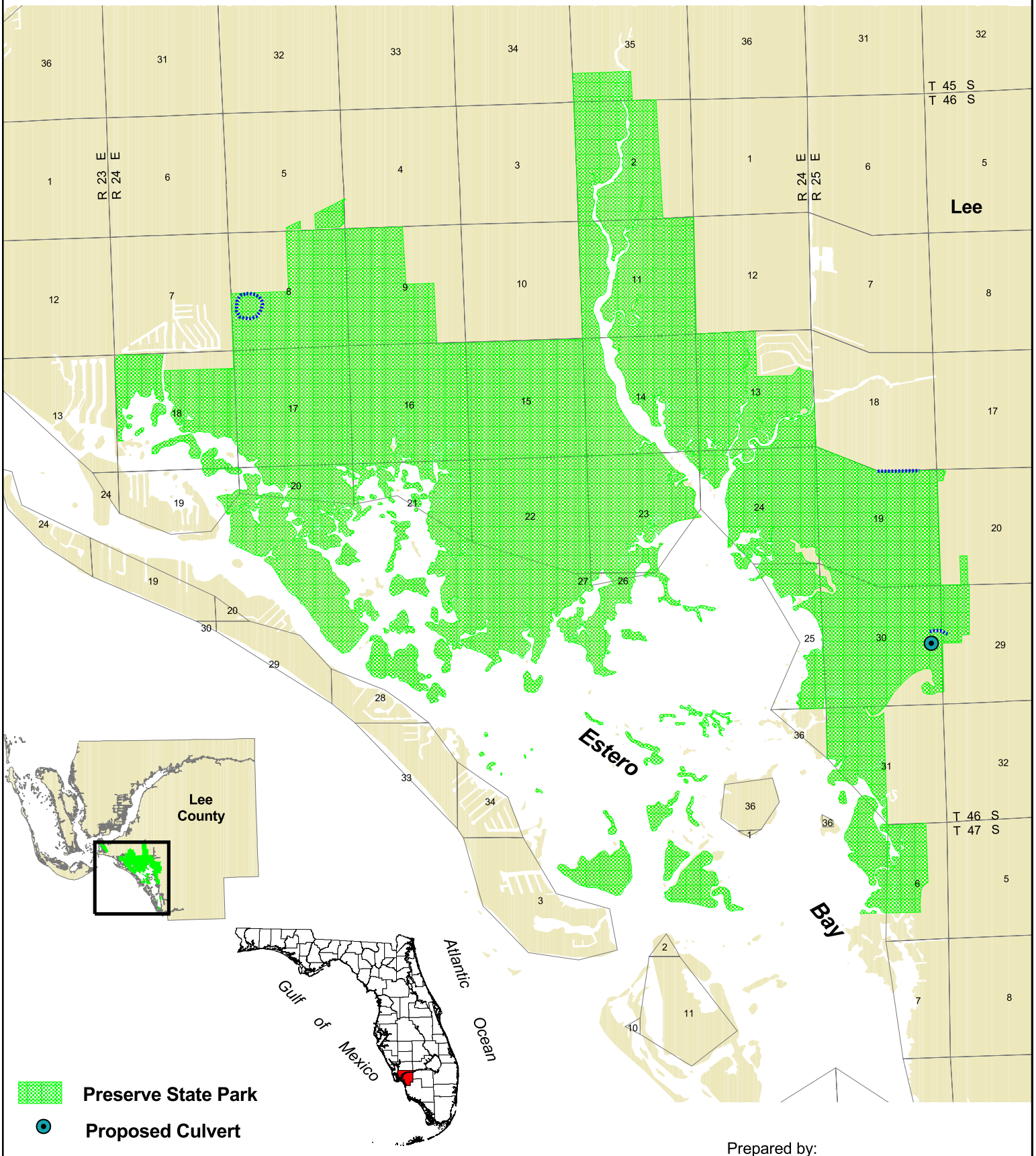
Identification of prospective land acquisitions is solely for planning purposes and not for regulatory purposes. A property's identification as a prospective acquisition is not meant to be used by any party or other government body to reduce or restrict the lawful right of private landowners. Identification of these lands does not empower or require any government entity to impose additional or more restrictive environmental land use or zoning regulations. Identification is not meant to be used as the basis for permit denial or the imposition of permit conditions.

Analysis of Multiple Use Potential

In the development of this plan, the potential of the preserve to accommodate secondary management purposes ("multiple uses") was analyzed. These secondary purposes were considered within the context of the Division's statutory responsibilities, the purposes for acquisition and an analysis of the resource needs and values of the preserve. This analysis considered the preserve's natural and cultural resources, management needs, aesthetic values, visitation and visitor experiences. For this preserve, it was determined that no secondary purposes could be accommodated in a manner that would not interfere with the primary purposes. Uses such as, water resource development projects, water supply projects, stormwater management projects, linear facilities and sustainable agriculture and forestry (other than those forest management activities specifically identified in this plan) are not consistent with this plan or the management purposes of the preserve and should be discouraged.

The potential for generating revenue to enhance management was also analyzed. 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 and similar measures will be employed on a case-by-case basis as a means of supplementing park management funding.

Map 9 - Proposed Public Uses and Facilities on the Estero Bay Preserve State Park



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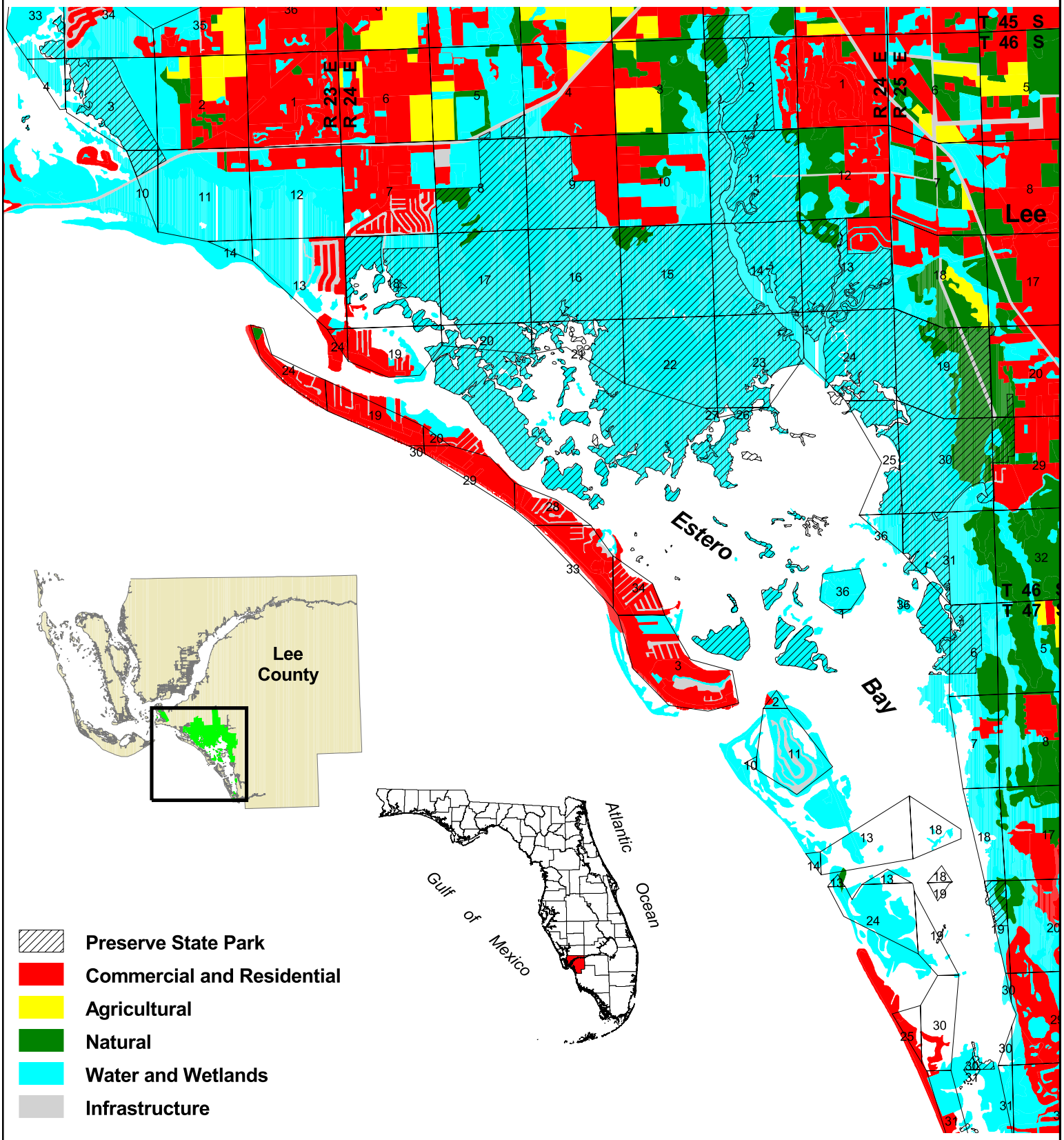
Map 10 - Land Use Adjacent to the Estero Bay Preserve State Park



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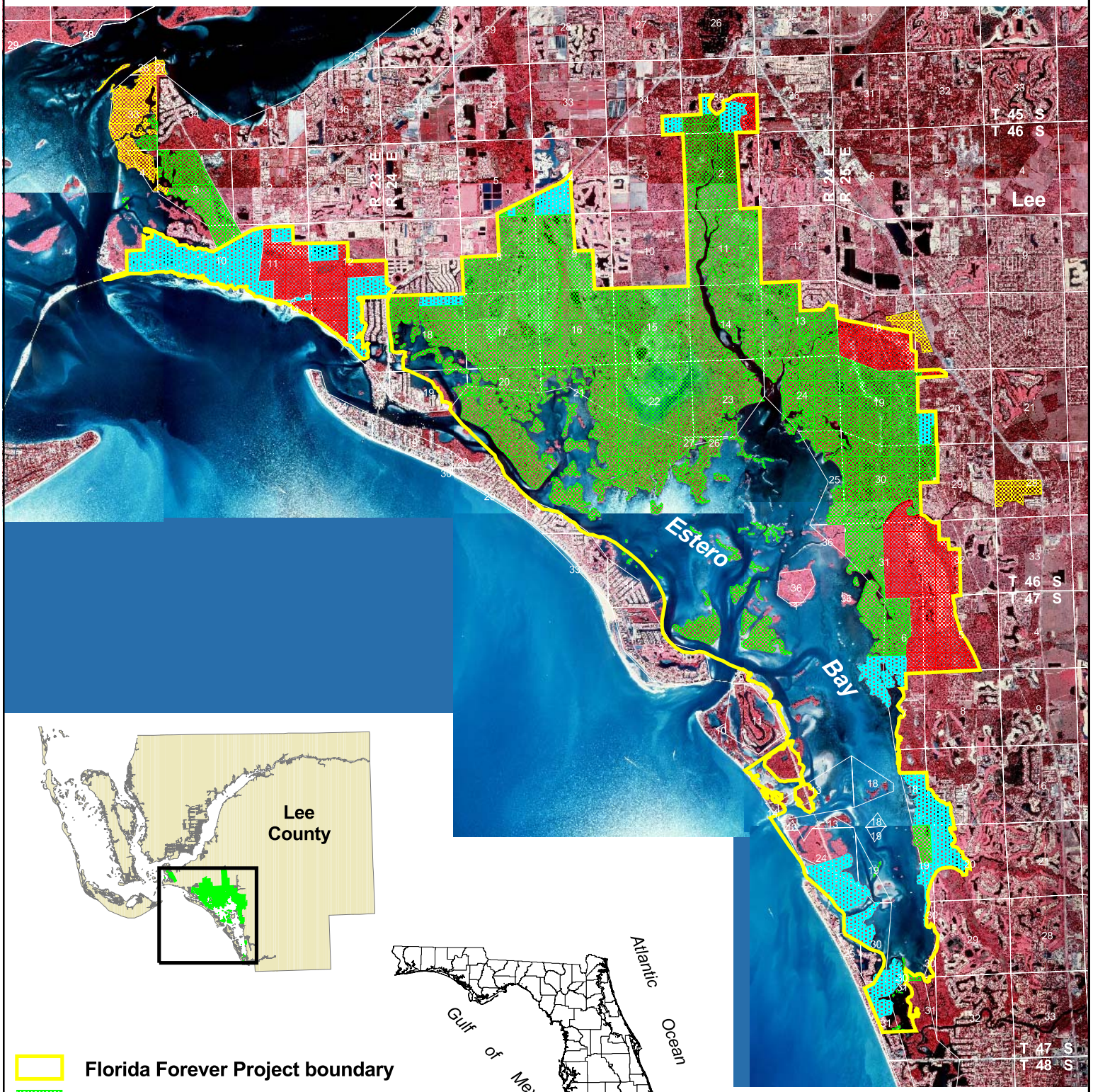
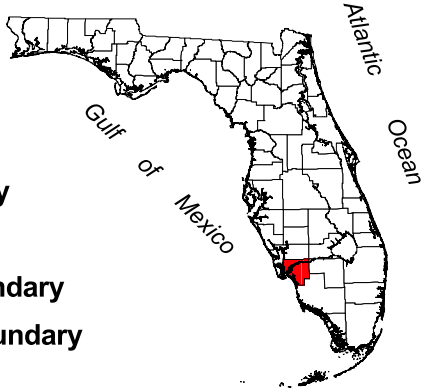
Department of Environmental Protection
July, 2004

Projection Albers
Datum NAD HPGN

Map 11 - Lands Still to be Acquired, Proposed Land Acquisitions and Deletions for the Estero Bay Preserve State Park





- Florida Forever Project boundary
- Preserve State Park
- Proposed Additions Within Boundary
- Proposed Additions Outside Boundary
- Proposed Deletions

2 0 2 4 Miles

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Division of Recreation and Parks
Department of Environmental Protection
July, 2004
Aerial photography from 2000

Projection Albers
Datum NAD HPGN

IV. Management Issues, Goals and Objectives

Central to the management of this state park are the purposes of the land acquisition program(s) through which the original buffer preserve was acquired, and the intent for acquiring the specific project. These are described, followed by a summary of accomplishments under management by CAMA as a state buffer preserve during the past five years. Goals and objectives for the state park over the next 10 years are addressed in the next section. Each management subject area is addressed, starting with a brief description of pressing issues, if any. A discussion of needs for the subject area follows, and the intended management direction and activities are described. At the end of each section the pertinent goals and objectives are listed. Many of the goals and objectives apply to more than one subject area. In this case, the goals and objectives are placed in the subject area that seems most appropriate. Goals and objectives for all subject areas are also presented in one table in Appendix P.

Program Framework and Goals

The State Buffer Preserve Program began as an extension of the Florida Aquatic Preserve Program. Aquatic preserves are state-owned submerged lands that are legislatively designated and directed to be maintained in their natural or existing conditions. However, protection of aquatic preserves is difficult because they only provide for limited control of activities on the submerged lands and the water body. The greatest influence on the condition of most water bodies is the type and extent of land use in the watershed of those waters. Acquisition of remaining natural lands surrounding aquatic preserves and other significant coastal waters is essential to the protection of the aquatic preserves. The State Buffer Preserve Program was initiated to provide additional control over lands that directly influence aquatic preserves.

Florida Forever Management Prospectus

The properties were acquired to conserve significant habitats around the Estero Bay Aquatic Preserve. Originally a CARL project and now as a Florida Forever project, the purposes for public ownership are outlined in Chapters 259.032(3) and 259.105, FS respectively. The intent of the CARL statute is "to conserve and protect environmentally unique and irreplaceable lands that contain native, relatively unaltered flora and fauna representing a natural area unique to, or scarce within, a region of Florida or a larger geographic area and to provide areas, including recreational trails, for natural resource based recreation and other outdoor recreation on any part of any site compatible with conservation purposes." The intent of the Florida Forever statute is to acquire environmentally sensitive lands, restore damaged environmental systems, assist with water resource development and supply, increase natural resource-based public recreational and educational opportunities, manage and maintain public lands, and provide increased protection of land by acquisition of conservation easements.

According to the management prospectus for the acquisition project, the primary goals of management of the Estero Bay Preserve State Park are: to conserve and protect environmentally unique and irreplaceable lands that contain native, relatively unaltered flora and fauna representing a natural area unique to, or scarce within, a region of this state or a larger geographic area; to conserve and protect significant habitat for native species or endangered and threatened species; to conserve, protect, manage, or restore important ecosystems, landscapes, and forests, in order to enhance or protect significant surface water, coastal, recreational, timber, fish or wildlife resources which local or state regulatory programs cannot adequately protect; and to preserve significant archaeological or historical sites (2003 Florida Forever Report).

Manager

The Florida Department of Environmental Protection, Office of Coastal and Aquatic Managed Areas (CAMA) was assigned management authority for the Estero Bay State Buffer Preserve on February 22, 1996. Management was reassigned to the DEP Division of Recreation and Park on January 1, 2004.

Desired Future Conditions

The area surrounding the preserve and the aquatic preserve are some of the most desirable lands for continued development in Lee County. During the next fifty years, the remaining parcels not acquired for preservation will undoubtedly see some type of construction. Older communities surrounding the preserves are likely to be torn down and redeveloped. Acquisition of any available parcels to add to the preserve and private development of the remaining parcels in accordance with best environmental management practices will maximize the long term health of the buffers and aquatic preserves.

Desired future natural resource conditions include restoration of natural communities and improving degraded water quality to increase dissolved oxygen levels, reduce turbidity, increase clarity and reduce pollutant levels. Resource management techniques currently being utilized such as exotic species removal and prescribed fire will be essential to achieving the goals of the future conditions. Exotic species should be reduced to and maintained at less than 5% cover. Periodic prescribed burning will encourage organisms that are currently low in abundance or not found on the preserve to thrive and exist as sustainable populations. The preserve should be restored as much as possible to its original flow patterns and hydrology.

Desired future recreational conditions are to maintain the trails and increase interpretive opportunities along these trails. Where appropriate, additional trails could be established in upland areas. A central interpretive area would provide the visitor an overall understanding of the importance of preserved land and the need for water shed protection. The archaeological and historical importance of the preserve could also be detailed in an interpretive center.

Major Accomplishments for the EBSBP During 1997 - 2003

Table 10 summarizes the major accomplishments during the period covered by the original land management plan.

Table 10: Major Accomplishments for the EBSBP During 1997-2003

Accomplishment	Year(s)
Formed Citizen Support Organization (CSO)	1999
CSO scheduled workdays begin	1999
CSO Quarterly Newsletter (Ebb Tide) produced	2001
Professional trail guides for both public access points	2002-2003
Improved public access point & created hiking trails at Winkler Point	1999-2000
Created public access point & hiking trails at Estero River Scrub	2000
Permit, design, engineering, and construction of two observation platforms at Winkler Point	1998-2001
2 Kiosks & various educational signage installed @ both public access points	2001-2002
9 Benches installed along trails @ ERS	2001, 2003
4 Benches installed along trails @ WP	2001
82 % of invasive non-native plants received an initial treatment	1997-2003
USDA/BIPM research & monitoring biological control project “melaleuca weevil” begins @ Cow Point	2002-2003
Habitat restoration (mitigation & public interest) projects completed 62 acres of invasive plant removal	2002-2003
Invasive non-native animal control program implemented (feral hog & Cuban tree frog)	2002-2003
Hydrological restoration - 2 culverts installed along an FPL r-o-w through a mitigation project	2002
Permit, design, engineering, and installation of culverts to allow vehicular access (TNC west area)	2002-2003
Updated Florida Ecological Restoration Inventory (FERI)	2003
Removed 36.3 tons of trash from various buffer preserve habitats	2001-2003
Fulfilled required CAMA list of prescribed fire equipment and supplies (various pumps, PPE gear, hand tools, hoses, Polaris Ranger, etc.)	2000-2003
Prescribed Fire Management Plan created	2002
~ 17 miles of fire line improvement/installation and ~ 30 acres of roller chopping/mulching performed	1999, 2002-3
Implementation of FMP & prescribed fire program	2003
Facilities maintenance shed & pole barn @ WP	2000-1, 2003

Facilities maintenance shed compound @ ERS	2001
Installation of fence & gates on 4 miles of boundary	1999-2003
Purchase JD tractor & various types of land management attachments	2000-2002
Added 4 FTE staff positions	2000-1, 2003
1-2 "temporary" OPS positions through grant and mitigation projects	2002
Obtained (3) $1 million USFWS coastal wetlands grants for land acquisition & habitat restoration	1999-2003
Land acquisition program increases buffer preserve land coverage by 39%	1999-2003
Developed inventory of plants found on buffer preserve and started virtual herbarium	2002
Developed inventory of animals found on buffer preserve	2002
Various research &/or monitoring programs implemented: (i.e. bald eagle nesting, photo point stations (62), frog & toad surveys, small mammal trapping surveys, bird rookery surveys)	1997-2003
Cultural resources inventory and assessment	1997
Began yearly visits to listed/managed Archaeological, Cultural & Historical Resource sites	1999
Coordinated with state archaeologists to visit and add new cultural sites	1999, 2001
Began weekly Matanzas Pass Anchorage Monitoring survey	1998
Assisted/began with the monthly Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network (CHEVWQMN)	1998
Assisted FMRI with boat ramp usage surveys	2003
Listed as SWIM water body	2003

Goals and Objectives for the EBPSP During 2004 - 2013

The following park goals and objectives express the Division's long-term intent in managing the Estero Bay Preserve State Park. At the beginning of the process to update this management plan, the Division reviewed the goals and objectives of the previous plan to determine if they remain meaningful and practical and should be included in the updated plan. This process ensures that the goals and objectives for the park remain relevant over time.

Estimates are developed for the funding and staff resources needed to implement the management plan based on these goals, objectives and priority management activities. Funding priorities for all state park management and development activities are reviewed each year as part of the Division's legislative budget process. The Division prepares an annual legislative budget request based on the priorities established for the entire state park system. The Division also aggressively pursues a wide range of other funds and staffing resources, such as grants, volunteers and partnerships with agencies, local governments and the private sector, for supplementing normal legislative appropriations to address unmet needs. The ability of the Division to implement the specific goals, objectives and priority actions identified in this plan will be determined by the availability of funding resources for these purposes.

Management issues related to the resource categories described in Chapter II, as well as other important management topics, are discussed below in separate sections. Within each section, approaches for dealing with these issues are described. At the end of each section, goals and objectives related to those issues are listed, as well as other objectives essential to the section. Appendix P presents all the goals and objectives in a table, along with timelines and, if available, estimated costs to accomplish management actions on the preserve, as required by Florida Statutes. Objectives are listed in priority order under each goal. The ability to implement the specific goals and objectives identified in this plan is dependent upon the availability of funding resources for these purposes.

Resource Management and Protection

The natural areas surrounding the preserve are quickly disappearing and becoming developed. Conserving and protecting the habitats and inhabitants of the preserve is a challenging and monumental task, whereas it is critical to the health and sustainability of the aquatic preserve's waters and estuarine life. All elements of resource management are interconnected with one another; hence they are "in a sense" an ecosystem's lifeline – essential

components to ensure life. Management activities must be carefully considered in order to protect, maintain and/or improve the biodiversity represented by the preserve.

Soil Management

Issue: The vast majority of soil types found on the preserve are wetland soils. Because of many alterations within the Estero Bay watershed through drainage (i.e. berms, culverts, mosquito ditches), development, dredging for navigation, and unrestricted watercraft speed limits in some areas, soil conservation is an important component of resource management. Man-made canals and navigational channels along the Estero River and Hurricane Bay have created situations for spoil pile breaching and natural bank erosion from medium energy wakes (boats and personal watercraft), canoeists and kayakers foot traffic, and storm surges from tropical storms. The spoil pile locations contain a mixture of native and invasive non-native plants, while the natural bank locations contain pine flatwoods vegetation. Several steps have been made to resolve these issues, such as evaluating and identifying problem areas and areas where invasive non-native plant control work has been completed. The planning and coordination efforts to resolve the natural bank erosion along the river and searching for potential grants or mitigation projects to improve habitats impacted by past dredging projects has already begun.

Goal 1: Manage soil to reduce erosion by enhancement/restoration efforts in disturbed areas.
Objective 1A: Identify and obtain funding sources for permit, design & engineering.
Objective 1B: Restore/enhance known areas of dredged spoil pile material.
Objective 1C: Implement erosion control measures such as rip-rap, creation of littoral shelves, and/or wetland plants.
Objective 1D: Create educational signage at restored project locations.

Hydrology/Water Management

Issue: Estero Bay and its tributaries, along with the isolated ponds within the preserve, have been listed as Outstanding Florida Waters (OFW) in order "to prevent the lowering of existing water quality" (Proposed Designation of EB Tributaries, 1990). However, it is apparent that the water quality of Estero Bay has declined and will continue to decline as development pressure increases within the watershed. Previous activities such as river dredging and the development of mosquito ditches and drainage canals have significantly changed the freshwater inflows into the estuary and altered the hydrology of the area. Hydrological issues such as water quantity (increased fresh water flow) and water quality (nutrient loading and increased turbidity) have led to a state of accelerated eutrophication throughout the bay.

As listed in Table 4, all of Estero Bay's tributaries have been placed on Florida's 303(d) list of Impaired Waters, mostly for nutrients or low dissolved oxygen (DO) levels. Particular attention should be paid to these listed "impaired" waters, as well as to the cause for their impairment. Ground water quality on the preserve also needs to be addressed. Saltwater intrusion into local aquifers has resulted from inadequate recharge of groundwater. This has been attributed to modifications such as drainage canal construction, which have increased surface water flow such that aquifers do not recharge and allow saltwater to infiltrate (USACOE). To address this issue, groundwater wells should be installed on the preserve to establish a baseline data and monitoring system. The addition of groundwater wells would allow for documenting surface and groundwater water quality, as well as changes in ground water elevation.

Primary restoration efforts should include filling in mosquito ditches where feasible throughout the preserve and returning them to natural grade. Due to the fact that many of the former railroad lines on the preserve coincide or run parallel to FPL easements, restoration efforts in these areas may necessitate the installation of culverts or geo-webbing in order to restore historic hydrologic flow across the entire area, helping to re-establish the natural drainage patterns within the preserve. Additionally, acquisition of pertinent land parcels and the reestablishment of native vegetation will further help to restore historical flow way patterns within the preserve.

All of the agency and other water quality monitoring results are documented in the annual State of the Bay Report produced by the Estero Bay Agency on Bay Management. The Charlotte Harbor National Estuary Program also collates these data sets. Land management efforts including hydrological restoration goals and objectives take into account this water quality data.

Goal 2: Maintain/restore natural flow ways and protect water quality.
Objective 2A: Restore/enhance known areas of dredged spoil pile material where feasible and appropriate.
Objective 2B: Assess corrective measures needed for ditched areas on the preserve.
Objective 2C: Install geo-webbing along FPL easements where feasible and appropriate.
Objective 2D: Continue shoreline stabilization using riprap where needed along the north side of Estero River, at ERS parcel.

Goal 3: Increase knowledge of preserve hydrology and determine needed research and monitoring efforts.
Objective 3A: Determine the extent of hydrologic needs on newly acquired parcels of the preserve.
Objective 3B: Implement Ground and Surface Water Monitoring Plan on the TNC Parcel, as outlined in the Coastal Engineering report.
Objective 3C: Maintain water quality testing from groundwater and surface water wells on TNC property.
Objective 3D: Inventory hydrological changes to the preserve (ditching, plugging, dams, spoil deposition etc.) and their impacts and formulate restoration actions.
Objective 3E: Seek funding for a comprehensive hydrological restoration plan.

Goal 4: Manage water resources through coordination with other governmental agencies, universities, scientific foundations, and private consultants.
Objective 4A: Retain familiarity with the jurisdiction, personnel, and monitoring programs of other organizations, as well as with data collected and compiled by those institutions.
Objective 4B: Lend cooperative assistance to other agencies monitoring water resources within the preserve and promote coordination among agencies involved in evaluating monitoring data.
Objective 4C: Retain familiarity with the activities and users that regularly or potentially contribute pollutants to the preserve.

Natural Communities Management

Issue: The preserve contains a multitude of natural communities, most that have been impacted and damaged by activities such as roads, ditches, run-off from developments and infrastructure, illegal dumping, off-road vehicular use, fire plow lines, introduction of invasive non-native plants and animals, and exclusion and suppression of fire. Various land management activities such as invasive non-native plant and animal removal, research and monitoring, removal of cattle fencing, implementation of prescribed burning, removal of 36.3 tons of trash, restoration of old fire plow lines, installation of fences, gates, and signs for boundary security have already occurred or are continuing throughout many of these natural communities. Many of these restoration efforts will require funds to hire environmental consultants to draft certifiable engineer drawings, complete appropriate permit(s) application(s) and pay the fees, contractor costs and/or materials, etc.

Shell Mound: (5 acres) These sites have experienced damage from artifact-seekers, unauthorized campers, quarry mining, and erosion. Invasive non-native plant control efforts have been successfully performed on the islands to eradicate Brazilian pepper, seaside mahoe, life plant, and night blooming cereus. Maintenance efforts will be perpetual because the primary nature of seed introduction is now from seeds being washed ashore. Additional management efforts include plans to seek out grant opportunities for archaeological and historical restoration on the islands.

Wet Flatwoods: (1,040 acres) Wet flatwoods contain the highest density of invasive non-native melaleuca plant and therefore has been greatly impacted. These areas will take several more years to be restored. Nearly all of this plant community has undergone initial exotic plant control efforts, but will require prescribed burns and replanting of native vegetation in some locations. The bulk of future invasive non-native plant control efforts will need to be spent in this habitat.

Tidal Marsh: (1,213 acres) Invasive non-native plant control work against melaleuca, Brazilian pepper, and old world climbing fern has been performed within the tidal marsh community. Again, the management of this community will involve on-going exotic plant and animal maintenance, prescribed burns, and the control of the invasive “native” cattail plant where possible.

Estuarine Tidal Swamp/Forest: (5,185 acres) This community represents over 60% of the preserve. The tidal swamp communities are significant because they function as nursery grounds for most of the state's commercially and recreationally important fish and shellfish and are also the breeding grounds for substantial populations of wading birds, shorebirds, and other animals. Comparatively, this community is probably in the best overall condition, although a recent research group has noted several red mangroves within Matanzas Pass area of Estero Bay that have been identified as “albino” in nature (see Research and Monitoring).

Unconsolidated Substrate: (442 acres) Most of the management units have unconsolidated substrate or salt flats. At a couple of locations, this community continues to be assaulted by unauthorized vehicular access, which have cut or crashed fences and gates to obtain entry. Violations have been reported to Park Patrol, who assists in enforcement issues on the preserve; however, some improvement from the unauthorized access has been seen. All trash and cattle fencing has been removed from this habitat.

Coastal Rock Barren: (1 acre) This unique community is adjacent to a hiking trail and salt flats and thus far,

impacts haven't been noted since acquisition occurred three years ago.

Coastal Berm: (9 acres) Most of this habitat has received initial invasive non-native plant control work and will receive continued efforts to complete and maintain this community exotic free. This is not a fire dependent plant community.

Maritime Hammock: (2 acres) A small amount of maritime hammock is found at the preserve. It was hidden away by an encompassing "melaleuca forest" that recently received invasive non-native plant control efforts. This community requires future invasive non-native plant control work by hand crews as melaleuca and Brazilian pepper are noted there at lighter levels.

Mesic Flatwoods: (413 acres) Mesic Flatwoods areas that have undergone invasive non-native plant control work (melaleuca and downy rose myrtle) will experience reintroduction of prescribed fires. On-going plant control efforts will continue as funds become available.

Prairie Hammock: (2 acres) This community has completed initial invasive non-native plant control work and is not scheduled to specifically receive prescribed fire since fire intervals are at 20-80 years.

Depression Marsh: (38 acres) This habitat is threatened by hydrological alterations, pollution, fire suppression, and invasive non-native plant species. Portions of these areas have received invasive non-native plant work, but need to be completed before prescribed burns can be scheduled.

Scrub: (2 acres) Remnant scrub exists and will not be managed for scrub jays since none have been identified on-site and there is not enough contiguous acreage of this natural community to support a viable population. An existing hiking trail is next to this habitat; therefore it is incumbent upon visitors to "stay on the trails" (as the hiking brochures state) to avoid walking on fragile vegetation and lichens. Invasive non-native plant work has been completed.

Scrubby Flatwoods: (61 acres) A small amount of scrubby flatwoods is present on the preserve and (for the most part) is not too overgrown. A lightning induced wildfire swept through a portion of this habitat and trash and invasive non-native plant removal work has been completed.

Wet Prairie: (4 acres) Invasive non-native plant work has begun, but is not completed within the wet praire habitat. Once invasive plants are removed, prescribed burns should begin.

Strand Swamp: (5 acres) This habitat has recently undergone extensive restoration efforts, which uncovered weakened cypress trees and other persevering native wetland plants from the clutches of invasive melaleuca trees. Two culverts were installed under the FPL roadway to assist with hydrological restoration by reconnecting the bisected strand. Thousands of plants were also installed to reestablish wetland vegetation.

Ruderal/developed areas: (64 acres) Several locations have been impacted by various development measures. Whether it be roadways, drainage ditches, mosquito ditches, navigational channels, borrow pits (prior cattle use), or utility easements, all have some level of impact and are considered hydrological alterations. Performing habitat restoration on these sites will be an expensive, if not an improbable, undertaking. Despite this, there are restoration plans to accept such a challenge at some of these locations. Current DEP members may perform borrow pit restoration. FPL right-of-way drainage and/or mosquito ditches, cannot be "completely" removed, although there is potential for some alterations via "geo-webbing," culvert installation, and/or selectively "refilling and plugging or blocking" ditched locations.

Goal 5: Identify and document natural communities.
Objective 5A: Research historical photographs and/or other relevant documentation to establish actual natural communities for future habitat restoration projects.
Objective 5B: Review any Environmental Site Assessment surveys, environmental consultant reports, DEP site assessment surveys and create GIS overlay maps with pertinent information.
Objective 5C: After securing required funds, hire FNAI field personnel to delineate and create a GIS natural communities inventory map.

Goal 6: Restore/enhance disturbed areas to promote native plant and animal species.
Objective 6A: Secure required funds for permit, design, engineering and implement restoration in areas with dredged spoil pile material along man-made canals and navigational channels.
Objective 6B: Complete invasive non-native plant removal work in order to restore fire frequencies in fire dependent plant communities.
Objective 6C: Restore borrow pit locations, DOF plow lines, FPL roadways, and mosquito control ditch locations where feasible and permitted.
Objective 6D: Plant native vegetation at locations requiring extra assistance (dense dead exotic plant monoculture locations, littoral shelf reconstruction along canal banks and channels, rip-rapped erosion area, and/or mosquito ditch restoration).

Objective 6E: Continue to educate the public through newsletters, interpretive walks, and educational signage pertaining to areas with completed restoration projects.
Objective 6F: Remove any remaining trash/debris that may be located within the various management units.

Goal 7: Continue to review and provide recommendations to minimize impacts associated with planned and existing developments adjacent to the preserve.
Objective 7A: Address impacts associated with existing and future development concerning drainage patterns, retention systems, and drainage easement management.
Objective 7B: Coordinate with permitting agencies and development representatives to address implementation of corrective measures necessary to restore impacted adjacent preserve habitats.

Native Species Management

Issue: Much of the preserve is along an urban interface. This allows for the migration of native and exotic species onto the preserve. Most of the types of plants and some of the animals occurring on the preserve have been documented. Although many organisms have been documented within the aquatic and park preserves, the plant and animal inventories will likely be expanded as additional survey methods are employed for the first time. Vegetation sampling will continue on current parcels, and will be conducted on new acquisitions and future acquisitions. Small mammal trapping using Sherman traps will continue on several different sites within the preserve. Each site will be sampled at least once per year. We are severely lacking in information regarding bird, herpetofauna and fish species. We hope to conduct bird surveys starting in 2004, employing seasonal residents for this. However, we will need to find volunteers who can conduct surveys in the off season to reduce information gaps. Herpetofauna arrays will be established to survey reptiles and amphibians in dry communities after they become accessible through the use of fire. Evening frog call surveys will continue to occur at depression marshes and other wetland sites in conjunction with nights where small mammal trapping occurs. Terrestrial species surveys in general will be more fruitful after prescribed fire has decreased fuel load and complexity. Exotic removal efforts will also greatly benefit native species. The staff hopes to conduct fish sampling in the spring and fall of future years, but this project will need volunteer support. We hope to collect tidal stage data in the future years as well.

Goal 8: Survey, maintain and protect native species and habitats on the EBPSP.
Objective 8A: Continue the surveying and inventory of plants and animals found on the preserve and assess their population requirements.
Objective 8B: Set up partnerships with environmental organizations and recruit volunteers to assist in the surveying of animal species.

Goal 9: Restore and maintain NCs for native species.
Objective 9A: Restore/enhance urban encroachment areas.
Objective 9B: Conduct prescribed burns to benefit native plant and animal species.
Objective 9C: Reduce and maintain exotic species to a low percentage cover level and promote reestablishment of native species.

Listed Species Management

In general, DRP manages natural resources at the ecosystem level, with the assumption that proper management of ecosystems will provide for the needs of the myriad of species that are part of each ecosystem. However, in certain situations this may not be true. An example is a natural community in poor condition, perhaps in conjunction with extreme circumstances such as drought. In this case, some species may not fare well and the continued survival of a species in the preserve may require specific efforts. For listed species, DRP manages specifically for listed species as needed, in conjunction with ecosystem management activities.

Issue: Nineteen plant species listed as Endangered or Threatened with one tracked by FNAI but not listed, are known to occur on the both the aquatic and park preserves and others that are documented within the region might remain undiscovered (Table 6 and Appendix I). Species found in the scrub and scrubby flatwoods, such as Curtiss' milkweed (*Asclepias curtissii*), will fare much better once the introduction of fire reduces some biomass and provides openings for expansion. Reducing the fuel load will also allow for staff to conduct various sampling techniques for both plants and organisms that may result in the discovery of other listed species. Staff is collecting GPS points for all listed plants found on the preserve. GPS locations will be kept at the office for staff use and plants will be surveyed annually for changes in population size or health.

Plants found in wet flatwood and mesic flatwood communities will benefit from the continued removal of exotic

plants such as melaleuca (*Melaleuca quinqenervia*), Brazilian pepper (*Schinus terebinthefolius*), Australian pine (*Casuarina* sp) and downy rose myrtle (*Rhodomyrtus tomentosus*), which compete with native plants for resources and restrict light availability. Terrestrial orchid species (*Bletia purpurea, Calopogon multiflorus, Eulophia alta* and *Pteroglossapsis ecristata*), pine lily (*Lilium catesbaei*), and yellow butterwort (*Pinguicula lutea*) will also benefit from the introduction of fire, which will occur once the exotic plants, especially melaleuca, have been removed. Exotic plant removal will also benefit geiger tree (*Cordia sebestena*), a shell mound inhabitant.

Cinnamon fern (*Osmunda cinnamonea*) and royal fern (*Osmunda regalis*) are found throughout the preserve floodplain communities in relatively great abundance. These species will benefit from hydrologic restoration because natural hydroperiod will be reestablished. Some portions of fern populations might be affected by fire where sloughs are utilized as firebreaks. The response to fire will be documented for these species. The remaining listed species occur as epiphytes (bromeliads and orchids) throughout the preserve. *Encyclia tampensis* exists in several isolated populations and bromeliads (*Tillandsia* spp.) are found in great numbers throughout the preserve, mostly on oaks. Care must be taken to avoid the use of herbicide near this species.

Twenty-seven animal species listed as E, T, or SSC, with 5 monitored by FNAI but not listed, have been documented on the preserve, including several aquatic species. The population ranges of these species and their population sizes will be determined to the extent possible. Coastal land acquisition benefits the American alligator (*Alligator mississippiensis*) by protecting mangrove nesting habitat. Land acquisition indirectly benefits the alligator, West Indian manatee (*Trichechus manatus*), gulf sturgeon (*Acipenser oxyrinchus desotoi*) common snook (*Centropomus undecimalis*) and sea turtle species by protecting the quality of water that flows to the bay. Preserve land is designed to absorb some of the chemical and nutrient runoff that would otherwise harm these species and their aquatic environment. Staff participates in the yearly Monofilament Madness program, which cleans up monofilament lines that could otherwise harm manatees, sea turtles, shorebirds and wading birds. All of the bird and aquatic species will benefit from hydrologic restoration and the resultant increased hydroperiod of certain floodplain wetlands.

Upland species (*Gopherus polyphemus* and *Drymarchon corias couperi)* will benefit from prescribed fire by opening up ground habitats. Standard sampling techniques (e.g., tortoise burrows, herpetofauna arrays) will be utilized after fire has provided access. Also, staff has posted gopher tortoise signs and other educational material by the public access point where they occur, in an effort to educate the public about these species. Florida black bear (*Ursus americanus floridanus*) will also indirectly benefit from fire, but because they require a large home range, increased land acquisition will be necessary for their protection. Wildlife cameras have been posted in the past and will continue to be placed in areas where bears are likely to occur. During nesting season, the public is barred from entering the nesting site areas for the bald eagle (*Haliaeatus leucocephalus*).

As stated before, it is possible that many undocumented rare and endangered species occur on the aquatic preserve and preserve state park (Appendix I). Continued monitoring may uncover new species. The preserve state park hopes to have FNAI conduct a more thorough survey for listed species in the future.

Goal 10: Maintain and protect the preserve for listed species.
Objective 10A: Continue to survey listed plant and animal species, including gopher tortoise burrow mapping, and assess their population requirements and provide information to FNAI.
Objective 10B: Increase size of preserve through land acquisition to provide adequate protection for listed species.
Objective 10C: Hire FNAI to conduct a more thorough survey of listed species.
Objective 10D: Continue exotic plant and animal removal to benefit endangered species.

Invasive Non-Native Species Management
Issue: The preserve contains over thirty species of invasive non-native plants. To date, nearly $1.2 million has been spent controlling these exotic plants and replanting areas with native vegetation. The indisputable menace is melaleuca, not only for its ability to displace native plant communities and their inhabitants, but also for its ability to consume massive amounts of water. The plants' seed capsules may contain 200-300 seeds and will release their seeds as they become dry (due to freezing, stress, drought, fire, breakage or cuts, and natural death). A single tree is believed to release nearly 20 million seeds, although only 15-20% are said to be viable (EPPC, 1999). Consequently, melaleuca is recognized as a fire adapted plant and disrupts fire management activities, since it isn't prudent to burn live melaleuca trees, as it will only perpetuate the problem exponentially. Eradication/control efforts are also underway for other invasive exotic plants such as Brazilian pepper, Australian pine, carrotwood, old world climbing fern, downy rose myrtle, air potato and others. In addition, animal control efforts continue against feral hogs and Cuban tree frogs.

Control efforts for invasive non-native species are conducted utilizing several different methods such as aerial spraying, hack & squirt, cut stump, basal bark, foliar, introduction of biological insects (weevils and psyllids), mechanical, and trapping (hogs & frogs). Newer technologies, products, and methodologies to assist in accomplishing these goals will be investigated. Although over 80% of the preserve has received initial exotic plant control treatment, completing the other 20% will not be sufficient. These areas will have to be treated again and again and it will take additional funds to do it. Many funding resources and labor pools were used to achieve our current level of success. The buffer preserve received funding from CAMA, Bureau of Invasive Plant Management, SFWMD, several grants (USFWS: National Coastal Wetland Conservation, Charlotte Harbor National Estuary Program: Restoration Partners Fund, National Resources Conservation Service: Wildlife Habitat Incentive Program, DEP Division of Law Enforcement: Natural Resource Damage Restoration, DEP Florida Pollution Recovery Program: Ecosystem Management and Restoration Trust Fund), various mitigation projects, and a couple of public interest projects. The labor pool consisted of DEP personnel, Department of Corrections work crews, hired contractors, Americorps teams, volunteers, and a licensed state trapper (for hogs).

Goal 11: Continue to enhance natural communities through the removal of invasive non-native plants.
Objective 11A: Continue to search and obtain funding opportunities and/or labor resources to complete initial plant removal efforts as well as long-term maintenance needs.
Objective 11B: Complete GIS ArcView database documentation on areas treated and requiring additional treatment.
Objective 11C: Complete 100% initial treatment at all locations of the preserve.
Objective 11D: Complete 70% 1st retreatment/maintenance of dense/monoculture locations.
Objective 11E: Complete 45% 2nd retreatment/maintenance within various locations.

Goal 12: Identify and implement control measures at locations requiring invasive non-native animal control.
Objective 12A: Continue coordination with state licensed trapper to remove feral hogs.
Objective 12B: Develop effective methods to control Cuban tree frog or other problematic amphibian species.
Objective 12C: Continue vigilance against other invasive exotic animal species and implement control measures.

Problem Species Management

Issue: Aggressive native species are altering upland and wetland habitats. Cattails are spreading throughout wetland areas as wild grapevine climbs over fencing and up into tree canopies. Opportunistic pine beetles have been documented in stressed pines. Preserve personnel have spent many hours cutting and pulling vines from slash pine to prepare for prescribed burns. By definition, because these are native species, it has been tough to locate funding sources that will target indigenous problem species. Regrettably, several management issues (i.e. lack of funding, staffing, higher priority issues) have made it difficult to gather the appropriate resources to assertively target the preserve's problem species.

Goal 13: Reduce native problem species that impact natural communities and land management activities.
Objective 13A: Locate and coordinate with appropriate "external" management authorities and/or regulators to reduce high-level nutrient enriched run-off from adjacent developments or local infrastructures.
Objective 13B: Assess various control methods conducted at other locations for problematic species.
Objective 13C: Implement feasible control measures to reduce extent and spread of problematic species.
Objective 13D: Continue to seek creative or less restrictive funding sources that will allow targeting native species.

Forest Resources Management

Issue: Since the majority of the preserve is a wetland community, an insignificant amount of forestry resources are found on site. However, the restoration of those limited acres that support a pine flatwoods community is an important factor for improving wildlife habitat. Locations heavily impacted by long-term invasive non-native plant exploitation will be prepared for replanting activities, after it has been determined that hydrological alterations from adjacent developments have not drastically altered wet pine flatwoods requirements.

Goal 14: Replant wet flatwoods communities after invasive non-native plants have been controlled/removed.
Objective 14A: Complete initial and retreatment invasive exotic control measures within wet flatwoods communities.
Objective 14B: Enhance locations with dense dead melaleuca trees by removing biomass via chipping or burning.
Objective 14C: Assess hydrological conditions at all locations that are candidates for replanting efforts.
Objective 14D: Secure funding source and labor (volunteer?) to replant new slash pine seedlings and other native plants where needed.

Fire Management

Issue: Prescribed burning is intended to mimic the conditions provided by a natural burning regime. The desire is to maintain plant community structure and biodiversity within the natural communities. Thus far, the preserve is divided into 43 burn units (totaling 2,482 acres) and each unit will have a burn prescription written specifically for its various natural communities and current conditions. Additional burn zones need to be created for recent land acquisitions during the last year. Table 11 describes the completed burn zones planned for the preserve. The buffer preserve's initial fire management plan was completed in October 2002 (Appendix K) and will be updated as properties come under management, on a yearly basis.

In accordance with the preserve's fire management plan, some of the fire dependent areas have been prepared for prescribed burns by: achieving invasive non-native plant control, performing roller chopping activities, removing ladder fuels, improving fire lines around burn unit perimeters, completing prescription plans, and obtaining the required fire equipment. Despite the fact that all burn units have not completely received invasive non-native plant removal work, planning efforts are being made to accomplish this task before burning these units. All prescribed burns are dependent upon authorization from the Department of Agriculture and Consumer Services, Division of Forestry (DOF), the weather, and having a sufficient amount of trained personnel/assistance and equipment. Wildfire suppression activities are coordinated between DRP and DOF.

Table 11: Burn Zones for Fire-Dependent Natural Communities of the EBPSP

Burn Zone	Description	Acres	Intended Fire Frequency	Next Intended Burn
WP 1a	Tidal marsh w/ dead grass biomass mats; invasive plant control work (IPCW) completed	107	6-10 years	2003-04
WP 1b	A mixture of tidal marsh w/ dead grass biomass mats & salt flats; IPCW completed; an observation deck @ tidal pond	125	6-10 years	2004-05
WP 2	Wet flatwoods adjacent to a freshwater pond; IPCW on-going w/ dead standing melaleuca and heavy timber slash; future planting candidate	45	3-10 years	2005-06
WP 3	A mixture of wet flatwoods & tidal marsh; IPCW on-going w/ dead standing melaleuca; future planting candidate	69	3-10 years	2006-07
WP 4	Wet flatwoods w/ two freshwater ponds & an observation deck & an observation deck; IPCW on-going w/ dead standing melaleuca and heavy timber slash; future planting candidate	33	3-10 years	2004-05
WP 5	Wet flatwoods; IPCW on-going w/ dead standing melaleuca; potential hydrological issues; future planting candidate	48	3-10 years	2006-07
WP 6	Wet flatwoods w/ little remaining native vegetation; IPCW on-going w/ dead standing melaleuca; future planting candidate	74	3-10 years	2007-08
WP 7	Mixture of tidal marsh & wet flatwoods; IPCW on-going w/ dead standing melaleuca	68	3-10 years	2005-06
CP 8	Tidal marsh; IPCW on-going, but nearly completed	155	6-10 years	2003-04
CP 9	Wet flatwoods; IPCW completed w/ dead standing melaleuca; little native vegetation remaining; future planting candidate	9	3-10 years	2006-05
NNP 10	A mixture of wet flatwoods, tidal & depression marshes & salt flats; IPCW on-going w/ dead standing melaleuca; future planting candidate	110	3-25 years	2006-07
NNP 11	A mixture of wet flatwoods, depression marsh, & small pocket of maritime hammock; IPCW on-going w/ dead standing melaleuca	105	3-25 years	2010-11
NNP 12	Mixture of tidal marsh, salt flats, & wet flatwoods; IPCW on-going w/ dead standing melaleuca; future planting candidate	63	5-10 years	2008-09
HC 13	Mixture of tidal marsh, salt flats, & wet flatwoods; IPCW on-going w/ dead standing melaleuca; future planting candidate; requires access	91	3-10 years	2010-11
HC 14	Tidal marsh; requires access	251	6-10 years	2008-09
HC 15	Mixture of tidal marsh, salt flats, & wet flatwoods; IPCW on-going, but nearly complete w/ dead standing melaleuca; requires access	68	6-10 years	2008-09
HC 16a	Mixture of tidal marsh, salt flats, & wet flatwoods; IPCW completed w/ dead standing melaleuca; future planting candidate; requires access	48	6-10 years	2006-07
HC 16b	Tidal marsh; requires access	216	6-10 years	2010-11
HC 17a	Mixture of tidal marsh & wet flatwoods; IPCW on-going w/ dead standing melaleuca; requires access	17	3-10 years	2006-07
HC 17b	Mixture of tidal marsh, wet flatwoods, a small patch of coastal berm & freshwater pond; IPCW completed w/ dead standing melaleuca; future planting candidate	37	6-10 years	2005-06

HC 17c	Mixture of tidal marsh & salt flats; IPCW completed	11	6-10 years	2004-05
ERS 18	Scrubby/mesic flatwoods; IPCW completed	5	5-8 years	2003-04
ERS 19	Scrubby/mesic flatwoods; IPCW completed; burned 2003	5	5-8 years	2010-11
ERS 20	Scrubby/mesic flatwoods; IPCW completed	4	5-8 years	2003-04
ERS 21	Mixture of mesic flatwoods, coastal berm, & tidal marsh; habitat restoration & IPCW completed	9	6-10 years	2004-05
ERS 22	Scrubby/mesic flatwoods; freshwater outflow to tidal marsh; IPCW completed	14	6-25 years	2003-04
ERS 23a	Scrubby/mesic/wet flatwoods & coastal berm; IPCW completed w/ dead standing melaleuca	42	8-25 years	2008-09
ERS 23b	Scrub & Scrubby flatwoods; IPCW completed	9	8-25 years	2004-05
ERS 24a	A combination of scrubby/mesic/wet flatwoods; IPCW on-going w/ dead standing melaleuca; a portion burned during wildfire 2001.	103	8-25 years	2007-08
ERS 24b	Tidal marsh north of Estero River	48	6-10 years	2010-11
ERS 25	Mesic/wet flatwoods; hidden freshwater stream; IPCW completed	10	3-8 years	2005-06
ERS 26a	A mixture of scrubby/mesic flatwoods; IPCW on-going	92	6-25 years	2007-08
ERS 26b	Wet flatwoods & strand swamp; IPCW on-going	29	3-10 years (30-200)	2010-11
ERS 26c	Mesic/wet flatwoods; IPCW completed	10	3-8 years	2004-05
ERS 27a	Strand swamp; IPCW completed	10	30-200 years	
ERS 27b	Wet flatwoods: IPCW completed	26	3-10 years	2004-05
ERS 28	Mesic/wet flatwoods: IPCW completed	84	3-8 years	2005-06
ERS 29	Scrubby/mesic flatwoods: IPCW on-going	50	5-8 years	2007-08
ERS 30	Mixture of tidal marsh, salt flats, wet flatwoods, & freshwater pond; IPCW on-going w/ dead standing melaleuca; a portion burned during wildfire 2001	101	3-10 years	2009-10
ERS 31	Wet/mesic flatwoods; IPCW on-going w/ dead standing melaleuca	55	3-8 years	2008-09
ERS 32	Archaeological site-old railroad bed; Transformed into scrubby flatwoods; IPCW on-going	10	8-25 years	2007-08
SP 33	Coastal berm; IPCW completed; burned 2003	1	Rare	
SC 34	Tidal marsh, salt flats, wet flatwoods; IPCW required; requires access	15	3-10 years	2005-06

Burn Zones relate to each Fire Management Unit (FMU) outlined in Appendix K.

Goal 15: Restore and maintain fire-dependent plant communities.

Objective 15A: Complete all written prescriptions for existing burn zones.
Objective 15B: Assess additional land acquisitions and incorporate into FMP & burn schedule along with written prescriptions.
Objective 15C: Complete and maintain required fire line installations/improvements or other proper preparations for relevant burn zones.
Objective 15D: Improve "inaccessibility" obstacles through culvert installation, bridge building, or other potential alternatives.

Goal 16: Increase and improve prescribed fire resources.

Objective 16A: Keep fire equipment/supplies in a "ready-standby" status by requiring regular maintenance, replacing broken or obsolete gear/equipment, and staying aware of the latest technologies and methodologies available.
Objective 16B: Develop a localized "interagency" burn team through coordination with Lee County, local fire departments, DOF, and other DEP offices.
Objective 16C: Obtain additional fire training courses and experience for personnel.

Mineral Resources Management

Not applicable.

Cultural, Archaeological, and Historical Resources Management

Issue: The management of cultural resources is often complicated because these resources are irreplaceable and extremely vulnerable to disturbances. The advice of historical and archaeological experts is required in this effort. Approval from Department of State, Division of Historical Resources (DHR) must be obtained before taking any actions, such as development or site improvements that could affect or disturb the cultural resources on state lands. This has already been performed on several occasions. The preserve staff will continue to follow the procedures given in the DHR publication, "Management Procedures for Archaeological and Historical Sites and Properties on State-Owned or Controlled Lands," and will abide by the guidelines stated in the Division of Historical Resources

Compliance Review Process. Preserve staff will continue to conduct all ground-disturbing activities in accordance with DHR guidelines and with a certified Archaeological Resource Management monitor on-site. Two staff are currently certified.

Dog Key has been the target of looting activities in the past. Looting of the site was reported to DNR law enforcement in 1991. Site looting was also recorded in 1985 in the Master Site File for Starvation Key. Steps will be taken by preserve staff to protect and preserve archaeological resources, and to prevent looting. This includes continued monitoring of each recorded site on a regular basis to check for site vandalism and/or looting and to regularly assess the condition of each site, especially sites that are severely disturbed or in poor condition. If evidence of vandalism or looting is detected, appropriate law enforcement agencies will be notified. Seven photo point stations have been established near known sites to enhance staff capability to determine natural and/or man-made changes over time.

Preserve staff has already notified DHR of recently acquired property in an attempt to coordinate with state archaeologists for a visit to search for potential unknown archaeological or historic sites. Unfortunately, with recent DHR budget cuts and after their quick review of USDA topographic maps, an on-site visit wasn't warranted for these latest parcels. DEP staff will continue to notify DHR representatives of any credible sites that may be located.

Goal 17: Monitor, preserve, protect, and restore archaeological and historical resources under management of the preserve.
Objective 17A: Patrol/visit all managed FMSF locations at least once every two weeks to assess their condition.
Objective 17B: Report any discernable changes to DHR via "Change in Status" form and/or law enforcement, if appropriate.
Objective 17C: Search for grant opportunities that aim to preserve, protect, and restore known damaged or impacted FMSF locations.
Objective 17D: Install interpretive/regulatory signs on the isolated islands with archaeologically significant sites.

Goal 18: Investigate potential to locate unknown archaeological and historical sites.
Objective 18A: Retain an archaeologist to conduct archival research, locate and bound the location of cultural sites, conduct site assessments, document and record significance, and prescribe management recommendations with OPS funds, grant funds or other alternative sources.

Scenic Resources Management
Issue: In addition to Estero Bay Preserve State Park's two public entrances, at the western end of Broadway in Estero and at the southern end of Winkler Rd, a third public access, near Pine Ridge Road, at the west end of the "Zemel" parcel, will be evaluated. This area has wetlands as well as handsome pinewoods, and is a potential hiking area. A public access point here would probably require the development of an existing easement, as well as construction of a visitor kiosk and pedestrian gate, including trail counters, at an estimated cost of $100,000. If this funding is made available, this access should be ready in four years.

Existing public access trails are used by staff when working on exotic removal and other regular tasks, and are maintained using normal operating funds. Maintenance consists of mowing and clearing of vegetation on a seasonal basis.

Estero Bay Preserve State Park is host to a single state-designated scenic resource, the Estero River Canoe Trail, part of Florida's Statewide System of Greenways and Trails. This trail begins at Koreshan State Historic Site and then continues along the Estero River Scrub and past mangrove islands of the preserves to Lover's Key State Park. During the next two years, park staff will review the feasibility of adding one or more picnic and discovery sites along the south bank of the Estero River for people on canoes and other boaters. If it is determined that these sites are feasible and desirable, they will be cleared and protected with rip rap as needed, at a cost of approximately $35,000 per site.

Goal 19: Enhance visitation opportunities.
Objective 19A: Investigate the feasibility of creating another public access point through the Zemel Parcel.
Objective 19B: Establish picnic and discovery sites along Estero River.

Security Management

Issue: Establish security measures sufficient to protect the preserve's integrity and to restrict unauthorized access and
use. Currently, approximately 40 percent of existing fenced boundary needs boundary signs. The signs that need to be posted are scheduled for installation in the next year. Boundary signs are to be inspected and repaired quarterly, at a minimum, more often as other operations are conducted on preserve property.

Approximately seven to eleven miles of boundary fencing needs to be erected. New fencing will be erected depending on management funding made available for that task. Assuming a reasonable level of funding and a minimum installation of all remaining fencing needed, completion can be estimated at 3 years. No additional boundary gates are required on the preserve, subject to change if additional lands are acquired. Boundary gates are to be inspected and repaired monthly, at a minimum, more often when problems are brought to the attention of staff.

The preserve works in cooperation with the Florida Park Patrol, which is responsible for law enforcement on preserve lands. Quarterly meetings are held with Florida Park Patrol to discuss law enforcement issues. Florida Park Patrol sporadically tours the preserve in off-road vehicles. Note that emergency requests for police assistance is and will be done via 911 dispatch, which will likely result in response by the Lee County Sheriff's Department.

Goal 20: Establish security measures sufficient to protect the preserve's integrity and to restrict unauthorized access and use.
Objective 20A: Install boundary signs as needed.
Objective 20B: Complete necessary fencing of preserve boundaries.
Objective 20C: Continue to maintain boundary gates, added others as needed when land is acquired.
Objective 20D: Continue to work in cooperation with Florida Park Police and Lee County Sheriff, to assure law enforcement on preserve lands.

Research and Monitoring

Issue: During 2002, most of the research and monitoring protocols utilized by buffer preserve staff were incorporated into CAMA's Upland Monitoring Manual. Any research or other activity that involves the collection of plant or animal species on state preserve property requires coordination with the preserve manager. Permits from the Florida Fish and Wildlife Conservation Commission, the Department of Agriculture and Consumer Services, or the U.S. Fish and Wildlife Service may be required. The preserve has several research projects underway and additional projects to include other taxonomic groups are desired. The ability of the staff to continue existing projects and to create new research and monitoring projects is dependant on funding sources, visiting scientists and volunteers.

Several research and monitoring projects are currently in place. An initial attempt to install photo points began in 1996, but with insufficient staffing, this project was terminated. In 2000, photo point monitoring surveys were reestablished, with additional stations dispersed throughout several of the preserve's natural communities. These stations allow the staff to monitor such events as invasive non-native plant removal projects, prescription burns, hydrology, water quality (nutrient run-off), erosion, and archaeological sites. To date, sixty-two (62) photo point stations have been installed, including nineteen (19) at recent land acquisition locations.

In 1999, buffer preserve staff began a monitoring program for native frogs and toads. These nightly "audible frog calling" surveys have been conducted at three of the management units (Winkler Point, Hendry Creek, and Estero River Scrub) and are performed at least twice a year. Amphibians have long been considered an indicator species to determine the health of ecosystems. It appears that due to exotic plant control efforts, a remarkable change has occurred within the last year. An increase in the quantity and diversity of amphibians has been noted. Moreover, these surveys keep resource management staff informed on exotic animal species, such as the Cuban treefrog, greenhouse treefrog, and marine toad. More frog and toad surveys are needed throughout the preserve.

Additionally in 1999, staff began small mammal trapping efforts, which typically correspond with the frog surveys. Thirty-two (32) Sherman traps are set out in a grid of 8 traps x 4 rows @ 10 meters distances. Trapping success has been limited. Only two species, 1 Norway rat captured at the Estero River Scrub and 2 hispid cotton rats captured at Estero River Scrub and 1 at Winkler Point have been trapped and released. None of the captured small mammals were marked because the staff is interested in learning about species diversity, not population estimations. Although staff continues to experiment with baiting techniques, the lack of small mammals may be an indication of the impact on their population caused by long-term monoculture melaleuca forests and/or higher levels of predation as a result.

In 2002 a comprehensive plant list was created to monitor the diverse biota that occurs on aquatic and buffer preserves habitats. This list combined the plant surveys performed by contractors on the Estero River Scrub and two The Nature Conservancy parcels in 2001 with plants identified by staff and visiting biologists. The list is continually being updated with newly identified plants, including the discovery of several threatened and endangered species. Many plants have been digitally photographed, originally for identification purposes, but this has progressed into a plant database. Several threatened and endangered plant species have been confirmed as existing on the preserve since this comprehensive plant list started due in part to the photographs. Unfortunately, several listed bromeliad species are in danger of being feasted on by an exotic weevil, which would further decrease their numbers. Digital photographs allow the staff to seek confirmation of the identification of plants, and provide an added visual reference for FNAI to confirm staff findings. A virtual herbarium was also created in 2001 due to lack of space to house pressed plant specimens. The virtual herbarium is currently on hold because of the difficulties in getting plant samples to the office before wilting takes place.

Yearly monitoring is performed on all active and some abandoned American bald eagle nests and is reported to the Lee County Planning Division and the Eagle Technical Advisory Committee. A regional list is then compiled from several land management agencies/organizations and provided to other governmental agencies such as FWC and USFWS. DEP staff insures that there is no disruptive land management activities performed within the primary and secondary zones during nesting season. This may become an issue if prescription burns need to be performed during nesting season (October 1-May 15).

Unfortunately, there is currently a lack of data for several animal taxa groups, so there is a need for additional research and monitoring of resources. Animals were surveyed in 2001 by the same consulting firm that performed the plant surveys at The Nature Conservancy parcels and the Estero River Scrub parcel, but very few species were recorded. Few other studies or surveys have been conducted on fishes, birds, and aquatic invertebrates. Due to lack of staffing and/or knowledge, bird rookery monitoring is only sporadically performed when it is possible to coordinate with an expert ornithologist. It should be possible to coordinate with expert birders in the area, so bird rookery surveys need to be implemented routine basis. Because of the biological integrity of the Estero Bay, its tributaries, and the reliance of the local economy on the fishing industry, an inventory of freshwater fish and aquatic invertebrates should be initiated. Also, with the addition of several new parcels of land, current monitoring efforts regarding small mammals, reptiles, and amphibians will need to be expanded.

Research and monitoring needs exist beyond plant and animal taxa. Water has an enormous effect on the management of the preserve, but little information exists to help with the management of the preserve. The hydrologic needs of newly acquired parcels have yet to be determined and will need to be addressed in the future. Additional research and monitoring efforts will be needed in the future as a part of hydrologic and fire-dependent community restoration. Currently, water quality monitoring has been one focus that has received a great deal of attention due to the development of Total Maximum Daily Loads (TMDL), a requirement of the Impaired Waters Rule. Estero Bay data from the ongoing Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network has been used in the determination of impaired waters for Estero Bay and its tributaries. In addition, a water quality sampling program has been initiated with the cooperation of the Lee County Environmental Lab with the purpose of addressing issues of fresh water versus salt water. These data will be used in the TMDL development process to determine where delineations exist within the Estero Bay tributaries. All of these water quality data will be utilized as the SFWMD begins to develop Pollutant Load Reduction Goals (PLRGs), a stipulation of Estero Bay's newly acquired SWIM waterbody status. Furthermore, additional water quality monitoring stations are forthcoming as part of the CAMA-wide continuous water quality program that is currently being implemented.

To address areas where more research and monitoring are needed, the staff has proposed several future projects. The University of Florida's Entomology and Nemotology Department is interested in monitoring sites within the State of Florida for the Mexican bromeliad weevil (*Metamasius callizona*) and its effects on the native bromeliad population. This weevil has been reported in Fakahatchee Strand in Collier County and, more closely, in Koreshan State Historic Site in Lee County. Scientists involved with this project could set up initial monitoring sites that staff could monitor in the future. Also tied into this project could be the collection of bromeliad seeds to perpetuate bromeliad populations as weevils attack. Staff would like to hire FNAI scientists to document rare and endangered species and to assist staff with developing methods consistent with current management practices for protecting these species. The Native Orchid Restoration Project (NORP) seeks to harvest seeds from listed orchid species from the preserve, which are planted on the preserve after germination. Lastly, the hope is to recruit residents that live near the public access points to perform bird surveys. Residents that have shown an interest in bird surveys are seasonal, so surveys will occur when residents are present in Florida.

In addition to staff studies and monitoring programs, there should be future opportunities for visiting scientists and

students to assist with research projects that will further understanding and enhance management of the preserve. Examples include a recent visit from USGS scientists that surveyed the northern portion of Estero Bay in search of genetically modified mangrove propagules. They have expressed interest in further studying the area. Nearby Florida Gulf Coast University (FGCU) students would provide invaluable help in conducting appropriate and needed research on the preserve. The creation of projects for university undergraduates will also help fulfill the service learning hours requirement for graduation. After the preserve is positioned to support undergraduate projects, the next step will be to work with graduate professors from FGCU to encourage graduate students to conduct appropriate research. Another current project partnership includes assisting FMRI with boat ramp usage studies.

Goal 21: Expand research and monitoring projects to encompass a better understanding of the health and functionality of EBPSP habitats.
Objective 21A: Locate grants or reliable volunteers/groups/organizations to assist with research and monitoring needs.
Objective 21B: Further expand the inventory of plants found on the preserve.
Objective 21C: Increase the frequency of bird rookery monitoring dates.
Objective 21D: Evaluate needs for research of additional taxonomic groups, hydrological needs, and water quality standards.
Objective 21E: Increase frequency of existing monitoring programs and incorporate other management units.
Objective 21F: Hire FNAI to conduct a more thorough survey of listed species.
Objective 21G: Pursue future research and monitoring projects as opportunities come about.
Objective 21H: Setup partnerships with environmental organizations and recruit volunteers to assist in the surveying of animal species.

Goal 22: Educate the public and local governments concerning preserve issues and management goals/objectives.
Objective 22A: Continue existing partnerships with other scientists and pursue additional partnerships for new studies.
Objective 22B: Investigate opportunities for partnering with other agencies to assist with monitoring efforts.
Objective 22C: Initiate program with students from local universities to help assist in research and monitoring projects.
Objective 22D: Develop a thorough history of the preserve lands' acquisition to include political and community efforts at the time.

Education and Training

Issue: Educating locals, visitors, and staff regarding the unique and sensitive habitats found on the preserve are essential to conserving the natural resources. The natural resources found within the preserve are in constant danger of impact from visitor and neighbor abuse, proposed and existing adjacent development, and activities that are inconsistent with preserve rules and management intent. As a result, additional efforts are necessary to educate visitors, neighbors, and local governments concerning the sensitive nature of the natural resources and the laws and rules governing their management.

Education programs have centered on watershed and ecosystem management issues in order to promote the interaction of aquatic preserves and state preserves. Various educational outreach programs have been utilized, including some developed by DEP staff. Staff conducts interpretive talks and tours on the buffer and aquatic preserves and presents slide presentations to community organizations and school groups. Staff and members of the CSO regularly interact with the general public at environmental community events, where they distribute brochures related to natural communities in the preserve as well as seagrass, red tide, boater's guides and other brochures pertaining to the aquatic preserve. Staff distributed fire-related literature and brochures regarding the preserve to neighboring communities, a "Dear Neighbor" letter describing the importance of prescribed fire on the preserve to all communities bordering the preserve, and passed out fire brochures and answered questions to neighbors concerned about a prescribed fire taking place on the wildland-urban interface. Educational efforts must be continued and expanded to educate adjacent neighbors regarding the preserve and their impacts on it. The preserve contains some educational signs but others can be added. Staff currently assists the local Envirothon board with technical assistance and, at this time, writes the wildlife section of the test for this region.

Most of the office staff has received necessary fire training to protect and manage the preserve. Additional training will be required with staff turnover. Training is also needed to fully utilize GIS/GPS capabilities, archeological techniques, exotic plant control, wildlife research and monitoring techniques and plant identification. Staff also provides training to many agencies, including DEP and SFWMD permitting staff, to assist them with natural resource assessment methods and local issues.

Goal 23: Educate the public and local governments concerning issues and management goals/objectives.
Objective 23A: Coordinate with and provide technical assistance to permitting agencies.

Objective 23B: Further interaction with adjacent landowners via phone, mail, and direct contact regarding management issues.
Objective 23C: Encourage the CSO to create volunteer led guided walks and other new programs to enhance public education.

Goal 24: Provide further education/training opportunities for staff.
Objective 24A: Increase communication with other agencies to learn of education/training opportunities.

Public Access and Visitor Use

Public Access / Parking / Handicap Facilities

Issue: Because the preserve is comprised of sensitive habitats and associated organisms, access must be carefully planned and controlled in order to minimize impacts to resources. At this time, current parcels on the preserve can only support foot traffic in certain non-sensitive areas. The preserve contains two access areas with parking for visitors (see Map 8 - Current Public Uses and Facilities). The Winkler Point and Estero River Scrub sites are primitive trail systems with unobtrusive markers to label the way. The public access points contain kiosks with professionally designed trail guides, plant and bird guides, chalkboards for visitor comments, trail counters to record visitation, and some educational signage, though more is needed along the trails (see Planned Public Uses and Assessment of Impacts section in Chapter III). The trails found at these two access areas are also used as firebreaks, and are not handicap accessible. Staff hopes to receive funding for the installation of a boardwalk on one section of trail at Winkler Point. Winkler Point is primarily wet in nature and discourages visitors from taking advantage of the trail system in the wet season. Bicycling is not approved at this location. Only a much more extensive boardwalk system would allow visitors to access the trail system year-round, and would provide a handicap accessible trail. Permitting such a boardwalk would be costly and problematic. Staff has offered to provide a ride through the preserve to individuals in need on occasion. Future land acquisitions might allow for additional access opportunities.

Goal 25: Educate the public and local governments concerning issues and management goals/objectives.
Objective 25A: Encourage the CSO to create volunteer led guided walks and other new programs to enhance public education.

Goal 26: Allow secondary compatible uses where appropriate that do not detract from the conservation and management goals and objectives (single-use concept).
Objective 26A: Look into funding opportunities for the creation of boardwalks at the trail systems that would enhance visitor access, but not impact natural communities or interfere with native species or fire management activities.

Goal 27: Complete acquisitions of Estero Bay Florida Forever project parcels.
Objective 27A: Assess the management needs of remaining parcels and determine which parcels should be accepted by CAMA for management.

Education Facilities

Issue: The preserve currently utilizes kiosks and signs as educational facilities. These structures contain information about preserve resources and access. The kiosks provide visitors with an opportunity to take a trail guide, plant guide and bird guide to use on their walk. A chalkboard, located at each kiosk, allows visitors to document what they have seen. This is useful for staff to keep track of visitor observations, and alerts future visitors to what they might see. Signs identifying some of the plants seen on the trails, as well as signs that describe different natural communities, prescribed fire and life cycles are planned.

Goal 28: Educate the public and local governments concerning issues and management goals/objectives.
Objective 28A: Create trail signage that identifies plants, natural communities, prescribed fire and life cycles.
Objective 28B: Develop a brochure that discusses CAMA, the Florida Forever project, the state park system, land acquisition and the aquatic preserve.

Hiking / Biking

Issue: Hiking is allowed on both trails, but bicycle riding is allowed only at the Estero River Scrub, where soils tend to be drier for most of the year. The trails found at these two access areas are also used as firebreaks, and are not handicap accessible. Winkler Point is primarily wet in nature and discourages visitors from taking advantage of the trail system in the wet season.

Goal 29: Allow secondary compatible uses where appropriate on the preserve that do not detract from the conservation and management goals and objectives (single-use concept).
Objective 29A: Continue to provide hiking and bicycling opportunities at the preserve.

Goal 30: Complete acquisitions of Estero Bay Florida Forever boundary parcels.
Objective 30A: Assess the hiking/biking opportunities of remaining parcels and determine which parcels should be accepted by DRP for management.

Operations and Facilities

Issue: The buffer has been managed along with the aquatic preserve from a leased field office located off site, but on Estero Bay. This location has worked extremely well for the management of both the aquatic and buffer preserves. There is a boat slip at the office and a fenced compound for storage of one boat and other smaller equipment just around the corner from the office. These support facilities are included within the lease of the building. The new management office is located at Koreshan State Historic Site, just south of the Estero River Scrub access. There is a 12' X 24' shed within a chain link/barbed wire fenced compound at the Estero River Scrub parcel. Land management equipment is kept here as well as at the Winkler Point access. At Winkler, we have another 12'X 24' shed and a 24' X 60' pole barn within the Lee County Mosquito Control's chain link/barbed wire fenced compound/heliport. Most of the field equipment and heavy equipment is kept at this location.

There has been a recent theft of some field equipment from the shed on the Estero River Scrub parcel. There has been no other theft of equipment from any of the three compound locations or the office where the vehicles are kept since opening the office in 1996. An office on the buffer may make management of that portion of the buffer more efficient, but travel to other parts of the buffer and management of the aquatic preserve would be less efficient. Another issue regarding locating an office on the buffer is the wetland character of most of the buffer. The Estero River Scrub parcel, with more uplands, was acquired through eminent domain due to the imminent threat of development and the importance of the intact natural communities such as coastal scrub and listed species on the parcel. There are no highly disturbed areas of any size on this parcel. Siting any buildings/facilities here may prove to be controversial since the local community greatly supported the use of eminent domain to protect the property. Additional acquisitions may prove helpful in siting an office.

There are currently four full time staff (3 Career Service and 1 OPS). They are part of the Koreshan State Historic Site staff.

Cost Estimates and Funding Sources for Conducting Management Activities

The Estimated Annual Land Management Budget (Table 12) shows the activities planned for the next ten years and the annual cost estimate of each activity. Funds needed to protect and manage the property, and to achieve the objectives for the preserve, are derived primarily from the CARL Trust Fund. Funds from the Land Acquisition Trust Fund also assist with management of the preserve. Private conservation organizations may be cooperators for funding of specific projects. Alternative funding sources, such as grants and mitigation funds, will be sought to supplement existing funding.

The following represents the actual and unmet budgetary needs for managing the lands and resources of the Estero Bay Preserve State Park. This budget was developed using data from CAMA and other cooperating entities, and is based on actual costs for land management activities, equipment purchase and maintenance. The budget below exceeds the funds CAMA has been receiving through the state appropriations process, but is consistent with the direction necessary to achieve the goals and objectives (see Appendix P). Budget categories are those currently recognized by DEP and the Land Management Uniform Cost Accounting Council.

Goal 31: Increase management capability and efficiency for the buffer.
Objective 31A: Continue to justify and request career service positions for the management of the buffer.
Objective 31B: Pursue OPS positions through mitigation, grant, or other opportunities.
Objective 31C: Investigate opportunities for locating the office on the buffer, including the purchase of land for this reason.

Table 12: Estimated Annual Land Management Budget for the EBPSP. (Amount in thousands of dollars; includes staff time.)

Activity	2004	'05	'06	'07	'08	'09	'10	'11	'12	'13
Resource Management										
Soil management	1	1	1	1	0	0	0	0	0	0
Hydrological management	31.74	.89	.89	.89	.89	30.5	30.5	78.5	78.5	48.9
Natural communities	3	5	4	2.5	1.5	1	1	1	.5	.5
Native species	8	8	10	8	8	8	8	8	8	8
Listed species	6	7	8	7	7	7	7	7	7	7
Invasive non-native species control	40	40	35	30	25	20	15	15	15	15
Problem species control	.5	.75	2.5	2	1.5	1	1	.5	.5	.5
Timber management	1	2	5	8.5	7	2	1	.5	.5	.5
Fire management	12	10	9	9	7	6	6	5	5	5
Cultural resource management	3	2.5	2	1.5	1	1	1	1	1	1
Scenic Resources Management	2	2	12	2	17	17	2	5	3	2
Security Management	3	3	3	2	2	2	2	2	2	2
Research & monitoring	15	17	18	20	19	17	15	15	15	15
Subtotal	**126.24**	**99.14**	**110.39**	**94.39**	**96.89**	**112.5**	**89.5**	**138.5**	**136**	**105.4**
Administration										
Units/Projects	69	70	71	72	73	74	75	76	77	78
Subtotal	**69**	**70**	**71**	**72**	**73**	**74**	**75**	**76**	**77**	**78**
Support										
Land management planning										
Land management reviews	0	1	0	0	0	0	1	0	0	0
Training/staff development	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3
Vehicle purchase	20	0	0	23	0	0	0	0	0	23
Vehicle operation and maintenance	4	3	3	3	3	4	4	3	3	3
Subtotal	**31.3**	**11.3**	**10.3**	**33.3**	**10.3**	**11.3**	**12.3**	**10.3**	**10.3**	**33.3**
Capital Outlay										
Fencing	3	2	1	0	0	0	0	0	0	0
Facility maintenance	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
Subtotal	**3.5**	**2.5**	**1.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**
Visitors services/Recreation										
Information/Education programs	12	14	13	14	12	12	12	10	10	10
Operations	3	4	6	4	4	4	4	4	4	4
Subtotal	**15**	**18**	**19**	**18**	**16**	**16**	**16**	**14**	**14**	**14**
Law enforcement										
Law enforcement services	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
Subtotal	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**
Total	**245.54**	**201.44**	**212.69**	**218.69**	**197.19**	**214.8**	**193.8**	**239.8**	**238.3**	**231.7**

Table 13 shows the current staffing level for the Estero Bay Preserve State Park. "FTE" refers to full-time equivalent permanent staff members. "OPS" refers to other personnel services, which are temporary staffing positions. The number of FTEs or OPS refers to the number of full-time permanent or temporary staff members in each position title.

Table 13: Current Staffing Level for the Estero Bay Preserve State Park		
Position Title	**# FTEs**	**# OPS**
Environmental Specialist I	1.0	0
Environmental Specialist I	1.0	0
Resource Mgmt Specialist	0	1.0
Administrative Assistant I	1.0	0
Total	3.0	1.0

Analysis of Potential for Contracting Restoration and Management Activities by Private Vendors

The following restoration and management activities have been considered for outsourcing to private entities. *Issue:* In general, most day-to-day operations of the preserve can be handled more efficiently and at a lesser cost with DEP staff. Projects requiring excavation and engineering must be outsourced. In the past five years, outsourced labor has included construction of a pole barn, observation decks, boardwalks, fire lines and kiosks. Trash removal, exotic species control, species inventories, and hydrologic needs assessment have also been outsourced. Table 14 contains potentially outsourced activities with categories as follows: "approved" designates items that DEP does not have expertise to complete and/or those that can be done at less cost with equivalent results by outside sources; "conditional" designates items that can be done by DEP or outside sources for equivalent cost and results; "rejected" designates items that can be done with DEP expertise and/or at less cost than outside sources.

Goal 32: Consider outsourcing those preserve operations that outside sources can conduct at less cost and with equivalent or better results than preserve staff.

Objective 32A: On a continuing basis, analyze preserve operations and identify those activities for which preserve staff do not have the expertise or that can be completed at less cost with equivalent or better results by outside sources.

Table 14: Potential Contracting for Activities on the EBPSP			
Activity	**Approved**	**Conditional**	**Rejected**
Prescribed burning		X	
Minor fireline installation	X		
Fireline, fence, and trail maintenance			X
Fence installation	X		
Roller chopping	X		
Organism inventory and monitoring		X	
Listed species mapping and needs assessment		X	
Restore/enhance encroachment and ruderal areas	X		
Determine extent of hydrologic needs of preserve		X	
Restore hydrology via fill and excavation	X		
Reduce exotic species		X	
Education facilities, programs, and literature development and printing		X	
Education signs development and installation		X	
Trail and boardwalk installation		X	
Law enforcement and patrol			X

Partnerships and Regional Coordination

Cooperating Agencies

Issue: The preserve is managed in accordance with all applicable Florida Statutes and administrative rules. Agencies having a major or direct role in the management of the preserve are discussed in relevant portions of this plan. The Department of Agriculture and Consumer Services, Division of Forestry (DOF) provides the authorization required for prescribed burning and may assist DRP personnel, along with local fire districts' department personnel, with prescribed burns. The CAMA offices of Estero Bay and Charlotte Harbor may provide assistance at performing prescribed burns. The Florida Fish and Wildlife Conservation Commission (FFWCC) assists DEP personnel in the enforcement of state laws pertaining to wildlife, freshwater fish and other aquatic life existing within preserve

boundaries.

The Department of State, Division of Historical Resources (DHR) assist preserve personnel to assure protection of archaeological and historical sites. Emphasis is placed on protection of existing resources as well as the promotion of compatible outdoor recreational uses. The Department of State, Division of Law Enforcement, Florida Park Patrol assists preserve personnel with the protection and enforcement of Florida Statutes as they pertain to buffer preserves. Preserve personnel regularly attends law enforcement meetings with regional DEP managers and law enforcement Officers to discuss problems and upcoming events requiring an Officer's presence. The buffer preserve has made some progress with attempting to coordinate with another state agency, Koreshan State Historic Site, to assist with prescribed burns.

The Lee County Mosquito Control District (LCMC) staff occasionally interacts with DEP personnel to coordinate several land management activities and share resources. LCMC must call the park preserve office to inform them of any planned mosquito larvicide spray activities on the preserve. On a yearly basis, LCMC provide DEP members the opportunity to fly over areas of the preserve to monitor, photograph, and inspect the status of various land management activities that have occurred. A yearly meeting is held with Mosquito Control to review application plans, pesticides, and methodologies as well as to provide updated maps concerning changes to state land boundaries from recent land acquisitions. Park staff may monitor larvaciding "drift" on the park where and when warranted.

The Southwest Florida Invasive Species Working Group (SWFISWG) is an interagency group of regional land managers that coordinate with Bureau of Invasive Plant Management (BIPM) and Lee County Department of Corrections (DOC) for both funding and labor resources. Invasive non-native plant control projects are submitted and prioritized by group members, which in due time with necessary funding are completed. Buffer preserve personnel has worked with Lee County Parks & Recreation employees on several occasions to share invasive non-native plant management methods and equipment resources, with future plans to coordinate efforts on prescribed burning.

Goal 33: Increase coordination with existing and new agencies to provide assistance with various land management activities.
Objective 33A: Improve participation, coordination and sharing of resources (equipment and labor) with various fire/land management agencies.
Objective 33B: Continue to expand attendance at various land management workshops, meetings and present/submit additional projects for latest land acquisitions needs as well as ongoing needs for existing lands.
Objective 33C: Improve protection of resources by increasing law enforcement presence around problem areas of the preserve.

Cooperating Organizations

Issue: The Estero Bay Agency on Bay Management (ABM) is a non-regulatory advisory body whose charge is to make comments and recommendations for the management of Estero Bay and its watershed. The ABM is dedicated to the preservation and sustained productivity of this natural resource. The membership of the ABM includes local, state, and federal government officials, representatives of special interest groups such as developers, civic associations, builders, environmental groups, chambers of commerce and marine trade associations, and citizen representatives. The EAP Manager participates in monthly meetings of the ABM and various subcommittee meetings.

The Charlotte Harbor National Estuary Program is a partnership of governmental agencies, elected officials, commercial businesses, and concerned citizens that work together to address area water quality concerns and surrounding watershed issues. It focuses on estuaries from Estero Bay up to Venice, and strives to demonstrate to the public the importance of local environments through activities and grants. This organization has provided funding through grant money for the creation of trail guides, a power point presentation, the purchase of outreach/education materials, the acquisition of prescribed fire equipment, and a tractor, as well as funding for Estero Bay wading trips.

Goal 34: Continue and improve cooperation with all agencies and organizations that have the protection of the EBA&SBP as a goal.
Objective 34A: Seek out additional opportunities for cooperation.

Land Use Coordination

Issue: Staff is involved in the permitting processes of the DEP, SFWMD, ACOE and the permitting, rezoning and the Lee County Comprehensive Land Use Plan change process. Depending on the need or request, we may perform a site inspection or provide technical information about the natural and cultural resources in and around the buffer, land acquisition information, or clarification of the Buffer Preserve Rule.

We also provided comments to the new city of Bonita Springs during their Comprehensive Land Use Plan process. Land use coordination with the Town of Fort Myers Beach is extensive as the Buffer Manager was appointed to the Town's Marine Resources Task Force in 1996 and remains on the Task Force today. Issues addressed by the committee range from beach and dune protection to storm water retrofitting.

Goal 35: Continue and improve coordination with permitting agencies and local governments.
Objective 35A: Continue appointment on the Fort Myers Beach Marine Resources Task Force.
Objective 35B: Participate in monthly interagency permitting meetings.
Objective 35C: Provide technical assistance, including written comments to permitting agencies when needed.
Objective 35D: Provide input in the Land Use Plan process and zoning issues to local governments when needed.

Compliance with State and Local Government Requirements

This land management plan is in compliance with the Lee County, Fort Myers Beach and Bonita Springs Local Government Comprehensive Plans (Appendix Q, Verification of Compliance with Local Comprehensive Plans). The plan is intended to be in compliance with the State Lands Management Plan, adopted March 17, 1981 by the Board of Trustees of the Internal Improvement Trust Fund and considering balanced public utilization, specific agency statutory authority, and other legislative or executive constraints.

Goal 37: Ensure that use and management of the preserve complies with state and local government requirements.
Objective 37A: Ensure that each planned use of the preserve complies with the State Lands Management Plan adopted by the Trustees.
Objective 37B: Ensure that each planned use of the preserve complies with the Local Government Comprehensive Plan.

Land Management Review

Land management review teams were established by Section 259.036, Florida Statutes, to evaluate management of conservation, preservation, and recreation lands titled in the name of the Board of Trustees of the Internal Improvement Trust Fund. The teams determine whether the lands are being managed for the purposes for which they were acquired and in accordance with a land management plan adopted pursuant to s. 259.032 by the Board of Trustees, acting through the Department of Environmental Protection. The managing agency is to consider the findings and recommendations of the land management review team in finalizing the required 10-year update of its management plan.

The Estero Bay State Buffer Preserve was evaluated by a land management review team on April 27, 2000. The review team made the following determinations:

- The next update to the management plan should include better-defined goals and objectives.
- EBSBP should seek cooperative opportunities for ground water monitoring in critical areas.
- Career service positions, equipment and supplies necessary to restore and manage the property should be provided.
- The following areas should be addressed in more detail in the next update to the management plan: debris cleanup, hydrological restoration, listed species protection, surface water monitoring, environmental education outreach, prescribed fire, equipment/staff/funding, and illegal dumping and poaching.
- The EBSBP was commended for their efforts in progressive use of partnerships, creative funding sources, public education, CSO and community outreach. Management actions were exceptional in the areas of cultural resources surveys and resource protection.

The review team found that the land is being managed for the purpose for which it was acquired, and the actual management practices, including public access, were in compliance with the management plan for this site. The land management review team report, including CAMA's response to that report, is contained in Appendix R. The

appendix lists the page numbers where the land management plan addresses the “need to be addressed” issues from the review.

Priority List of Management, Research, and Information Needs

- additional acquisition within the Florida Forever boundary
- continued exotic plant eradication and maintenance
- public education and outreach
- additional resource inventories
- more frequent law enforcement patrols
- habitat restoration
- hydrological restoration
- fire management
- survey and control plans for exotic and feral animals
- additional staff
- FNAI inventory of new parcels
- Florida Forever boundary amendment.

V. Literature Cited

Animal Industry. Chapter 585 Florida Statute. [WWW document] URL http://www.flsenate.gov/statutes/index.cfm?App_mode=Display_Statute&URL=Ch0585/ch0585.htm

Bureau of Surface Water Management. July 1990. Report to the Environmental Regulation Commission on the Proposed Designation of the Estero Bay Tributaries.

Charlotte Harbor National Estuary Program. 1998. The Story of the Greater Charlotte Harbor Watershed. Imperial Publishing: Bartow, Florida.

Coastal Engineering Consultants, Inc. June 26, 2001. Ground and Surface Water Monitoring Plan.

Estero Bay Agency on Bay Management. 2000. State of the Bay Report. Fort Myers: Southwest Florida Regional Planning Council.

Ferriter, Amy, ed. Lygodium Management Plan of Florida. Florida Exotic Pest Plant Council Lygodium Task Force, 2001. (1st ed.).

Florida Department of Agriculture and Consumer Services – Division of Forestry. Timber Assessment for Estero Bay State Buffer Preserve, Prepared by Butch Mallett, Senior Forester, Other State Lands Region 3, October 2002.

Florida Department of Environmental Protection. 1997. Land Management Plan for the Estero Bay State Buffer Preserve.

Florida Department of Environmental Protection. North Fork St. Lucie River State Buffer Preserve Five Year Land Management Plan. Prepared by Office of Coastal and Aquatic Managed Areas, November 2002.

Florida Department of Environmental Protection. November 2001. Basin Status Report: Everglades West Coast.

Florida Department of Environmental Protection. Total Maximum Daily Loads. [WWW document] URL http://www.dep.state.fl.us/water/tmdl/index.htm

Florida Department of Natural Resources and Florida Natural Areas Inventory. Guide to the Natural Communities of Florida. Tallahassee: Department of Natural Resources, February 1990.

Florida Exotic Pest Plant Council's 2003 List of Invasive Species. [Brochure], (2003, May 20). [WWW document] URL http://www.fleppc.org/Plantlist/03list.htm

Florida Fish and Wildlife Conservation Commission. Florida's Endangered Species, Threatened Species and Species of Special Concern. Publication Date: 1 August 1997. [WWW document] URL http://floridaconservation.org/pubs/ endanger.html#plan

Florida Natural Areas Inventory. Explanation and ranking. [WWW document] URL http://www.fnai.org/ranks.cfm

Florida Natural Areas Inventory. Species and Natural Community Summary for Lee County. [WWW document] URL http://www.fnai.org/LEE-SUM.HTM

Florida Natural Areas Inventory. June 2000. Tracking List of Rare, Threatened and Endangered Plants and Animals and Natural Communities of Florida. 80p.

Forest Management, Chapter 253 Florida Statute. [WWW document] URL http://www.flsenate.gov/statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=Ch0253/SEC036.HTM&Title=->2002->Ch0253->Section%20036

Henderson, W.G. Jr. Soil Survey of Lee County, Florida. USDA Soil Conservation Service. December 1984.

Johnson Engineering. May 1990. Lee County Interim Surface Water Management Plan Vol. IV- Working Plan. Ft. Myers, Florida.

Laroche, Francois, ed. Melaleuca Management Plan. Florida Exotic Pest Plant Council, May 1999. (3rd ed.).

Puri, H.S., and Vernon, R.O., 1964, Summary of the geology of Florida and a guidebook to the classic exposures: Tallahassee, Fla., Florida Geological Survey, Special Publication No. 5, 312 p.

Scott, Thomas M., Kenneth M. Campbell, Frank R. Rupert, Jonathan D. Arthur, Thomas M Missimer, Jacqueline M. Lloyd, J. William Yon, and Joel G. Duncan 2001. [WWW document] URL http://sofia.usgs.gov/

South Florida Water Management District. Estero Bay and Watershed Assessment Plan. Prepared by PBS&J, Inc. Tampa, FL. November 1999.

Tabb, Durebin C., Raoul G. Reher, Paul Larsen, Stephen Berkeley, Eric J. Heald, Martin A. Rossler, and Taylor R. Alexander. 1974. Final Report: Ecological Inventory of Coastal Waters and Adjacent Uplands of Lee County, Florida, in the vicinity of the Estero Bay Marine Preserve. University of Miami.

U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and U.S. Environmental Protection Agency. July 1999. Environmental Impact Statement on Improving the Regulatory Process in Southwest Florida: Lee and Collier Counties.

Appendix A

Lease Agreement, Title and Legal Description

Board of Trustees of the Internal Improvement Trust Fund Lease No. 4083 is not included in the web version of the Estero Bay management plan. It can be obtained by contacting the Department of Environmental Protection, Division of State Lands

Appendix B

Recommended Acquisition Priorities for the Estero Bay Florida Forever Project

Table 10: Recommended Acquisition Priorities for the Estero Bay Florida Forever Project (in priority order)			
Parcel Strap Number	**Acres**	**Property Description**	**Acquisition Reason**
20-46-25-01-00009.0000 20-46-25-01-00009.1020	59.64	Mullock Creek Slough	Continuity, ease of management, development pressure, hydro connection
05-46-24-00-00003.0000	8.6	N of Zemel between two Lee County donated parcels, Cow Slough	Continuity, ease of management, hydro connection
04-46-24-00-00008.0000	26	N of Zemel	High quality pine flatwoods, continuity, ease of management, development pressure, hydro connection
04-46-24-00-00007.0000	53.4	N of Zemel	Continuity, ease of management, development pressure
04-46-24-00-00007.0000	10.5	N of Zemel	Continuity, ease of management, development pressure
18-47-25-B3-00003.0000	29.2	Spring Creek	Rare and Unique uplands, continuity, ease of management, development pressure
20-47-25-B1-00001.0000	~~48.9~~ 63.4	Spring Creek	Rare and Unique uplands, continuity, ease of management, development pressure
20-47-25-B1-00001.1000	~~19.7~~ 24.55	Spring Creek	Rare and Unique uplands, continuity, ease of management, development pressure
20-47-25-B1-00001.2000	~~18.2~~ 24.55	Spring Creek	Rare and Unique uplands, continuity, ease of management, development pressure
17-47-25-B4-00001.0070	~~22.8~~ 45	Spring Creek	Active eagle nest w/ fledged young down in storm, Rare and Unique uplands, continuity, ease of management, development pressure
35-45-24-00-00007.0010	23.1	N of TNC, Hendry Creek	Continuity, ease of management, development pressure
35-45-24-00-00025.0000 35-45-24-00-00024.0000	34.7	N of TNC, Hendry Creek	Continuity, ease of management, development pressure
35-45-24-00-00023.0000	36.8	N of TNC, Hendry Creek	Continuity, ease of management, development pressure
35-45-24-00-00026.0010	0.03	N of TNC, Hendry Creek	Continuity, ease of management
09-46-23-00-00003.0000 09-46-23-00-00004.0000 10-46-23-00-00004.0010 10-46-23-00-00004.0030 10-46-23-00-00004.1000 10-46-23-00-00004.2000 10-46-23-00-00005.0000 10-46-23-00-00006.0000 11-46-23-00-00001.0010 11-46-23-00-00002.0000	500	San Carlos Bay Addition	Only large parcel, quality of habitat, listed species, continuity, hydro connection

09-46-23-00-00004.0010	7	San Carlos Bay Addition	Continuity, only after Callan acquisition
10-46-23-00-00004.0020	5	San Carlos Bay Addition	Continuity, only after Callan acquisition
USFWS	71	San Carlos Bay Addition	Continuity, only after Callan acquisition
USFWS	77	San Carlos Bay Addition	Continuity, only after Callan acquisition
USFWS	5	San Carlos Bay Addition	Continuity, only after Callan acquisition
12-46-23-00-00009.0000	35	San Carlos Bay Addition	Continuity, development pressure
12-46-23-00-00009.0010 12-46-23-00-00009.0020 12-46-23-00-00009.0030 13-46-23-00-00003.0010 13-46-23-00-00004.1000 13-46-23-00-00004.1010 13-46-23-11-0000B.00CE	95	San Carlos Bay Addition	Continuity, development pressure
31-47-25-B2-002L0.0260	6.7	SW Estero Bay	Wetland buffer
31-47-25-B1-00017.0000	35.6	SW Estero Bay	Wetland buffer
19-47-25-B3-00001.0000 19-47-25-B3-00005.0000 30-47-25-B3-00003.0000 31-47-25-B1-00003.0060 30-47-25-B3-00006.0000	91	SW Estero Bay	Wetland buffer, development pressure
25-47-24-B2-00013.0000 19-47-25-B4-00009.0000 30-47-25-B1-00005.0010	90.8	SW Estero Bay island	Continuity
24-47-24-B3-01006.0000 19-47-25-B4-00007.0010	92	SW Estero Bay island	Continuity
19-47-25-B4-00007.0000 24-47-25-B3-01006.1000	152.1	SW Estero Bay island	Continuity
	1.29	Matanzas Pass island	Continuity, possible donation
18-46-24-00-00001.0030	47	Adjacent to Zemel	Continuity, ease of management
18-46-24-00-00000.00CE	0.8	Adjacent to Zemel	Continuity, ease of management
18-47-25-B3-00002.0000	~~1.7~~ 29ac	Spring Creek island	Continuity
25-B4-0010D.0190 17-47-25-B4-0010D.0200	0.1	Spring Creek island	Continuity
17-47-25-B4-0010D.0210	?	Spring Creek island	Continuity

31-47-25-B3-00001.0000	20	S Estero Bay island	Continuity
	5	S Estero Bay island	Continuity
34-45-24-00-00009.0000	40	W of Bigelow, Hendry Creek	Wetland/upland buffer, development pressure, but no ease in management
	29.06	Mullock Creek Slough	Hydro restoration and connection
17-46-25-00-00002.0010	23.59	Mullock Creek Slough	Hydro restoration and connection
18-46-25-00-00038.0000	25	Mullock Creek Slough	Hydro restoration and connection
18-46-25-00-00035.0000	6.7	Mullock Creek Slough	Hydro restoration and connection
18-46-25-00-00037.0030	12.25	Mullock Creek Slough	Hydro restoration and connection
18-46-25-00-00037.0000	4	Mullock Creek Slough	Hydro restoration and connection
17-46-25-00-00002.001A	13.7	Mullock Creek Slough	Hydro restoration and connection
33-45-23-00-00002.0020 33-45-23-00-00002.0010 04-46-23-00-00003.0000 04-46-23-00-00004.0000	185	Adjacent to Shell Point	Wetland buffer, continuity
33-45-23-00-00002.0000	72	Adjacent to Shell Point	Wetland buffer, continuity
33-45-23-00-00001.0000	59	Adjacent to Shell Point	Wetland buffer, continuity
28-45-23-00-00004.0000	35	Adjacent to Shell Point	Wetland buffer, continuity
	11	Adjacent to Shell Point	Wetland buffer, continuity
17-46-25-00-00002.001C	43560 sq. ft.	Mullock Creek Slough	Hydro restoration and connection
17-46-25-00-00002.001B	78843.6 sq. ft.	Mullock Creek Slough	Hydro restoration and connection

Appendix C
Public Involvement

Summary of Public Workshop
Estero Bay Preserve State Park
August 9, 2004

The public workshop to present the proposed land management plan for the Estero Bay Preserve State Park was held on August 9, 2004 at the South Lee County Regional Library. Heather Stafford and Stephanie Erickson represented the Office of Coastal and Aquatic Managed Areas (CAMA). Robert Baker, Karen LaCivita, Sherryl Furnari, Laura Estabrook, Carol Perfit, Robert Wilhelm and Ken Alvarez represented the Division of Recreation and Parks (DRP). A total of thirty-two (32) individuals other than CAMA and DRP staff attended the meeting, including representatives from the Estero Bay Buddies (CSO for the Estero Bay Preserves), Lee County Department of Parks and Recreation, the Estero Chamber of Commerce, USFWS, Florida Gulf Coast University, Wilson-Miller Environmental Consultants, adjacent developments and the Fort Myers News Press.

Carol Perfit explained the planning process. Heather Stafford briefly reviewed the draft plan, acquisition history, natural and cultural resources and reviewed progress during the last planning cycle. Bob Baker discussed future management needs and objectives, and identified proposed improvements related to public access. The meeting was then opened for public comment.

Summary of Public Comments

CAMA/DRP Change

Q. What is the difference between the two agencies?
A. Aquatic preserves focus on water areas, parks more on uplands.

Q. What type of changes will necessitate an amendment to the plan?
A. A major purchase of land or change in the use pattern.

Q. How was the preserve first purchased? And how will it be managed?
A. It was first purchased as a buffer to the aquatic preserve and will be managed as a preserve state park. Bob Baker read the definition of a “preserve” in the state park system.

Q. What are you buffering against?
A. Water quality degradation, impacts from upland development, storm surges

Recreation and Public Access

Q. Would it be a good idea to put the trail maps at the Lee County Visitor Information Building?
A. We will be developing a park brochure and that should be placed at the information area. The trail maps do not indicate where the park entrances are.

Q. Is there any connection with the county greenways and trails system?
A. There is not a physical connection with the county greenways at present.
The blue ways connections are included.

Q. Will there be paddling opportunities at the preserve?
A. Paddling occurs on the waterways and there is a canoe landing. There will not be a launch.

Q. Why was the rip-rap placed at the beach? It is now difficult to land a canoe/ kayak there. Would a no wake zone be a better idea?
A. The intent for placing the rip-rap over a portion of the Estero River shoreline was to protect against ongoing shoreline erosion. Providing for a canoe landing at this location was also the intent of the project. Staff will work with the paddling community to insure the landing is appropriate and usable. In addition, staff will consider proposing a no wake zone to Lee County.

Q. Are there any plans to change from the preserve designation? Any plans for camping or a canoe launch in the plans?
A. No

Q. Is the public free to walk anywhere?
A. Yes, but it is safer to stay on the designated trails. There are concerns about protection of sensitive areas and getting lost. The public cannot walk on the Florida Power and Light property.

Q. Are the trails for foot traffic only?
A. Biking is allowed on the Estero Scrub but not on the Winkler property due to how wet most of the habitats stay for most of the year and concern for impacts to those wetlands.

Q. Is there motorized vehicle use? Equestrian use?
A. No

Q. Could there be more opportunities for access from the water to the preserve and from the preserve to the water?
A. There are so few acres of upland and the majority of water's edge is extensive wetlands (mangrove forest) that opportunities are few. The water trails now have access to Koreshan, Mound Key, and Lovers Key. We will explore more opportunities.

Q. Is overuse of the waterways a concern?
A. This is a statewide problem and is being looked at by the division. It is also not just a park problem. It may come down to a quality of life issue. How much and what kind of use does the public want to live with?

Q. How many visitors do you have to the park each year?
A. About 2,000-3,000, most through the Estero River Scrub public access point.

Q. Is it legal to park on the ROW at the Winkler property?
A. Yes

Land Acquisition
Q. Will the Boomer property be included in this project?
A. Yes, the 104 acres are part of the Florida Forever boundary.

Natural and Cultural Resources
Q. Is the eagles' nest being monitored?
A. Yes

Q. How bad is the pine borer on the preserve?
A. They have been found at a couple locations north of the FPL sub station at the Scrub. They are part of a natural process and many pines are stressed due to overplanting in areas.

Q. Is the melaleuca being removed or left on site once killed?
A. Both processes are being used depending on the area. If it is removed it is hand removed and carried away by equipment at the nearest access point.

Q. What kind of restoration projects are planned?
A. Removing melaleuca and all other invasive exotic plants, installing culverts and geowebbing at Hendry Creek for hydrological restoration, acquisition and restoration in the FPL easement, working with residents with hydrological flow at Mullock Creek slough, habitat restoration (using money from the Bureau of Invasive Plant Management). Some of these restoration projects will use grant or mitigation funding.

Q. Is there any time line for removal of spoil sites on the Estero River?
A. The invasive plants have been removed and we need money and permits to remove the spoil piles.

Q. Is the area patrolled for protection of archaeological sites?
A. Yes and we have written a more frequent monitoring schedule into the plan.

Q. Has this area been considered as a Wilderness Preserve by the national government?
A. No

Q. Are there panthers on the preserve?
A. None have been documented.

Q. Are there any concerns about more bridges being built over Estero Bay?
A. The negative environmental impacts of a bridge would be large. No bridges are planned as of now but we are constantly aware of the potential.

It was noted that CAMA and the parks work as a team and will continue to manage the aquatic preserve and park preserve to benefit the properties.

Summary of Advisory Group
Estero Bay Preserve State Park
August 10, 2004

The Advisory Group appointed to review the proposed land management plan for the Estero Bay Preserve State Park was held at the South Lee County Regional Library on August 10, 2004. Mr. Wayne Daltry represented Lee County Commissioner Ray Judah. Mr. Mike Bauer representing SFWMD and Estero Bay Buddies, Mr. Matt Bixler representing the Conservancy of Southwest Florida, and Ms. Kim Fikoski representing the Bonita Bay development group and adjacent property owner were all in attendance. Mr. Tim Eckert representing USDA NRCS did not attend, but called before the meeting started, indicated he reviewed the plan and had no comments. Attending staff were Heather Stafford, Bob Baker, Karen LaCivita, Sherryl Furnari, Laura Estabrook, Carol Perfit, Ken Alvarez and Robert Wilhelm.

Ms. Stafford began the meeting by briefly explaining the recent transfer of management authority for the preserve from the Office of Coastal and Aquatic Managed Areas (CAMA) to the Division of Recreation and Parks (DRP). She confirmed that the Advisory Group members had been able to review the plan, then asked each member to express his or her comments on the plan.

Summary Of Advisory Group Comments

Wayne Daltry representing Lee County

- Would like to see the acquisition history detailed in the plan. Mr. Alvarez is currently working on this history.
- Details would make people more aware of the grass roots efforts and make it part of the community vision of itself
- A focus on the purchase of the individual pieces that became the whole preserve
- Enhance the existing land acquisition partnership program with Lee County. Ongoing and stated in Goals and Objectives section
- Emphasize the link to water shed protection and the ABM (Estero Bay Agency on Bay Management). There is a watershed link shown in the Goals and Objectives section of the plan. Ms. Stafford has been an active member of the ABM since its inception in the mid 1990's. There is a strong link between the Estero Bay Preserves and the ABM.
- Mention public access to other parks in the area. Nearby public lands are pointed out in the plan.
- Estero Bay Preserve SP should be combined as one park with Koreshan and Mound Key. There are no plans to do this.

Mike Bauer representing the Estero Bay Buddies, CSO

- Are research efforts mentioned? Referred to pages 62-63
- More research opportunities may be available from schools such as FGCU.

Matt Bixler representing The Conservancy of Southwest Florida

- Cooperation with the state in land acquisition (Lee County)
- County is willing to work with the state and has money. Ms. Stafford has been very involved with acquisition within the Estero Bay Florida Forever boundary and has been included in many discussions between the County and State regarding any potential partnering. Each requires ownership of the lands they fund for acquisition. Staff will continue to work towards more simplified partnering with the County.
- Page 15 – mentions water (Classification) testing in 1991, has any testing happened since then?
  No. DEP's Shellfish Environmental Assessment section conducts this testing, and it appears that either funds are not available and/or it is generally known that the water quality in Estero Bay has not improved, so no need to test at this point.

- Is the bay posted to warn of contamination of shellfish?
  No. There are no plans to do this posting.
- Recommends additional testing. Staff indicated that this would be more appropriate in the Aquatic Preserve plan.
- Page 15 paragraph 7– "Several" should read "some segments of all." Staff will make the change.
- Is the management of the property co-purchased with USFWS different? No. Generally, protection and restoration of habitats and wildlife is the focus of the USFWS' National Coastal Wetlands grant program used in the purchase of several large parcels within the Estero Bay Preserve. This focus fits with the way the State manages this land.
- Does this plan meet the approval of USFWS? USFWS has not reviewed management plans in the past and they were not contacted in this amendment process.
- Have the abandoned Rail Road beds been considered for recreation? It was discussed at the planning meeting but it only goes for about a mile and is heavily populated by gopher tortoises.
- Are we connected to the future Greenways of Lee County plan? We are not but could be aware of the development for future connections.
- Will amendments to this plan come before the public? It will depend on the level of change that occurs.

Kim Fikoski representing adjacent property owners

- Would like to see a statement that all roads will be pervious.
- Understands the importance of prescribed burning and glad to see it mentioned in plan
- Should there be a schedule for hydrological restoration? Staff indicated that it is difficult to state a time frame because it is dependent on state funding, grants, and mitigation projects. It is listed as budgeted for a period of years but not specifically for what areas. That is dependent on mitigation and grants.
- Could rails to trails money be used to develop recreation on the old rail line? Staff indicated hesitancy to let people in that area because of gopher tortoises and proximity to FPL easement. There are existing trails running parallel to the area already and it would not add to the recreation greatly. The area is historically important though.

Staff acknowledged all those that contributed to the plan and closed by thanking the advisory group members for their role as supportive partners of the preserve.

Appendix D
Soil Type Description

Appendix D. Soil Type Descriptions

The Natural Resource Conservation Service, U.S. Department of Agriculture, characterizes soils of the preserve as extensive areas of poorly drained sandy soils of about ten different types. Dominating this group, especially below the five foot elevation contour (most of the Buffer lands) are muck and sand types typical of coastal estuaries (USDA, 1994).

- **HALLENDALE FINE SAND . . . . . .Lee Map Unit #6**

This is a nearly level, poorly drained soil on low, broad flatwood areas. The available water capacity is low. Natural fertility is low. Permeability is moderate or moderately rapid. Natural vegetation consists of saw palmetto, pineland threeawn, bluestem, panicums, and south Florida slash pine.

- **MATLACHA-URBAN LAND COMPLEX. . . . . .Lee Map Unit #7**

This complex consists of nearly level Matlacha gravely fine sand and areas of urban land. The depth of the water table varies with the amount of fill material and the extent of artificial drainage. Most of the natural vegetation has been removed. The existing vegetation consists of scattered slash pine and various weeds.

- **HALLENDALE FINE SAND, TIDAL . . . . . Lee Map Unit #8**

This is a nearly level, poorly drained soil on the outer edges of tidal flats. The water table fluctuates with the tide. This soil is subject to tidal flooding. The available water capacity is low. Natural fertility is low. Permeability is moderately rapid. Natural vegetation consists of seashore saltgrass, black mangrove, batis, and sea daisy. When in good or excellent condition, the saltwater marsh is dominated by smooth cordgrass, seashore saltgrass, and other grasses and forbs. Burning management is required to maintain these sites in their most desirable condition.

- **POMPANO FINE SAND . . . . . Lee Map Unit #10**

This is a nearly level, poorly drained soil on sloughs. The available water capacity is very low. Natural fertility is low. Permeability is rapid. natural vegetation consists of pineland threeawn, scattered south Florida slash pine, bluestem, maidencane, and scattered saw palmetto.

- **MYAKKA FINE SAND . . . . . .Lee Map Unit #11**

This is a nearly level, poorly drained soil on broad flatwood areas. The available water capacity is medium in the subsoil and very low in the surface and subsurface layers. natural fertility is low. Permeability is rapid in the surface and subsurface layers and moderate to moderately rapid in the subsoil. Natural vegetation consists of saw palmetto, fetterbush, pineland threeawn, and south Florida slash pine.

- **BOCA FINE SAND . . . . . Lee Map unit#13**

This is a nearly level, poorly drained soil on flatwoods. The available water capacity is low in the surface and subsurface layers and medium in the subsoil. Natural fertility is low. Permeability is rapid in the surface and subsurface layers and moderate in the

subsoil. Natural vegetation consists of saw palmetto, pineland threeawn, south Florida slash pine, and wax myrtle.

- **ESTERO MUCK . . . . . .Lee Map Unit #15**

This is the local organic-dominant soil of the slough bottoms and black mangrove basins around the Cow Slough and Hendry Creek drainage. The water table in this soil fluctuates with the tide and at most of the Buffer elevations will flood at high spring tides. The high water table and high salinities of this soil support Spartina grasses, batis, oxeye daisies and black mangrove. When in good or excellent condition, the saltwater marsh is dominated by various cord grasses, saltgrass, and numerous other grasses and forbs. Burning is required to maintain these sites in their most desirable condition.

- **PECKISH MUCKY FINE SAND . . . . . Lee Map Unit #16**

This is the sandy counterpart to #15 at the five-foot-and-less contour areas of the Buffer. Found across the "crests" of the relic dune contours at slightly lower elevations than #15, this soil has a high, fluctuating water table and very high salt content. Natural vegetation consists of black mangrove, American mangrove, and batis.

- **DAYTONA SAND . . . . . Lee Map Unit #17**

This is a nearly level to gently sloping, moderately well drained soil on low ridges on the flatwoods. The available water capacity is very low, except in the subsoil where it is medium. Natural fertility is low. Permeability is very rapid in the surface layer and moderately rapid in the subsoil. The native vegetation consists of oaks, saw palmetto, south Florida slash pine, and gallberry.

- **WULFERT MUCK . . . . . Lee Map Unit #23**

This is a nearly level, very poorly drained soil on broad tidal swamps. Areas are subject to tidal flooding and water table fluctuates with the tide. Natural vegetation consists of mangroves, needle rush, cordgrass, and saltgrass. Burning is required to maintain these sites in their most desirable condition.

- **KESSON FINE SAND . . . . . Lee Map Unit #24**

This is a nearly level, very poorly drained soil in broad tidal swamps. Areas are subject to tidal flooding. The water table fluctuates with the tide. Natural fertility is low. Permeability is moderately rapid. This soil has a high salt and sulfur content. Natural vegetation consists of black mangrove, batis, oxeye daisy, and American mangrove.

- **PINEDA FINE SAND . . . . . .Lee Map Unit #26**

This is a nearly level, poorly drained soil on sloughs. Natural fertility is low. Permeability is rapid in the surface and subsurface layers and the upper sandy part of the subsoil and slow, or very slow in the lower, loamy part of the subsoil. Natural vegetation consists of pineland threeawn, panicums, sedges, maidencane, wax myrtle, south Florida slash pine, and scattered clumps of saw palmetto.

- **POMPANO FINE SAND, DEPRESSIONAL . . . . . .Lee Map Unit #27**

This is a nearly level, poorly drained soil in depressions. The available water capacity is low. Natural fertility is low. Permeability is rapid. A large part of the acreage is in natural vegetation: St. Johnswort and wax myrtle.

- **IMMOKALEE SAND . . . . . Lee Map Unit #28**

This is a nearly level, poorly drained soil in flatwood areas. The available water capacity is medium in the subsoil and very low in the surface and subsurface layers. Natural fertility is low. Permeability is rapid in the surface and subsurface layers and moderate to moderately rapid in the subsoil. Natural vegetation consists of saw palmetto, fetterbush, pineland threeawn, and south Florida slash pine.

- **SATELLITE FINE SAND . . . . . Lee Map Unit #37**

This is a nearly level, somewhat poorly drained soil on low knolls and ridges. The available water capacity is very low. Natural fertility is low. Permeability is very rapid. Natural vegetation consists of Florida rosemary, sand liveoak, saw palmetto, south Florida slash pine, and pineland threeawn.

- **ISLES FINE SAND, DEPRESSIONAL . . . . . Lee Map Unit #39**

This is a nearly level, poorly drained soil in depressions. The available water capacity is low. Permeability is rapid in the surface and subsurface layers and moderate in the subsoil. Natural fertility is low. Natural vegetation consists of cabbage palm, cypress, fern, water oak, and popash. Non-native vegetation consists of melaleuca.

- **WABASSO SAND, LIMESTONE SUBSTRATUM. .Lee Map Unit #42**

This is a nearly level, poorly drained soil on broad flatwoods. The available water capacity is low in the surface and subsurface layers and the upper part of the subsoil and medium in the lower part of the subsoil. Natural fertility is low. Permeability is rapid in the surface and subsurface layers and the upper part of the subsoil. It is slow in the lower part of the subsoil. Natural vegetation consists of saw palmetto, south Florida slash pine, dwarf huckleberry, cabbage palm, gallberry, and pineland threeawn.

- **SMYRNA FINE SAND . . . . . Lee Map Unit #43**

This is a nearly level, poorly drained soil on flatwoods. The available water capacity is very low in the surface and subsurface layers and medium in the subsoil. Natural fertility is low. Permeability is rapid in the surface and subsurface layers and moderate to moderately rapid in the subsoil. Natural vegetation consists of saw palmetto, south Florida slash pine, wax myrtle, inkberry, dwarf huckleberry, and pineland threeawn.

- **MYAKKA FINE SAND, DEPRESSIONAL . . . . . Lee Map Unit #53**

This is a nearly level, poorly drained soil in depressions. The available water capacity is very low in the surface and subsurface layers and medium in the subsoil. Natural fertility is low. Permeability is rapid in the surface and subsurface layers and moderate to moderately rapid in the subsoil. Natural vegetation consists of scattered cypress, St. Johnswort, sedges, maidencane, sand cordgrass, and wax myrtle. Non-native vegetation includes melaleuca.

- **ISLES MUCK . . . . . .Lee Map Unit #56**

This is a nearly level, very poorly drained soil in tidal swamps. Areas are subject to tidal flooding and water table fluctuates with the tide. Natural vegetation consists of red and

black mangrove, batis, and sea purslane. When in good or excellent condition, the saltwater marsh is dominated by various cordgrasses, saltgrass, and other grasses and forbs. Burning is required to maintain these sites in their most desirable condition.

- **MALABAR FINE SAND, HIGH . . . . . Lee Map Unit #63**

This is a nearly level, poorly drained soil in the flatwoods. The available water capacity is low in the surface and subsurface layers and medium in the subsoil. Natural fertility is low. Permeability is rapid in the surface and subsurface layers and the sandy part of the subsoil and moderately slow in the lower, loamy part of the subsoil. Natural vegetation consists of saw palmetto, cabbage palm, South Florida slash pine, wax myrtle, and pineland threeawn.

- **MATLACHA GRAVELLY FINE SAND . . . . . .Lee Map Unit #69**

This is a nearly level, somewhat poorly drained soil formed by filling and earthmoving operations. The available water capacity is variable, but it is estimated to be low. Permeability is variable within short distances, but it is estimated to be moderately rapid to rapid in the fill material and rapid in the underlying material. Natural fertility is estimated to be low. Most of the natural vegetation has been removed. The existing vegetation consists of South Florida Slash Pine and various scattered weeds.

Appendix E

Explanation of FNAI, FDACS and USFWS Rankings

Appendix E. Explanation of FFWCC, USFWS and FNAI ranking systems.

FLORIDA'S ENDANGERED SPECIES, THREATENED SPECIES AND SPECIES OF SPECIAL CONCERN

Official Lists

Publication Date: 1 August 1997

This document consolidates the state and federal official lists of endangered species, threatened species, and other species categorized in some way by the respective jurisdictional agencies as meriting special protection or consideration. The state lists of animals are maintained by the Florida Game and Fresh Water Fish Commission and categorized as endangered, threatened and of special concern, and constitute Rules 39-27.003, 39-27.004 and 39-27.005, respectively, Florida Administrative Code (F.A.C.). The state lists of plants are categorized into endangered, threatened and commercially exploited, and are administered and maintained by the Florida Department of Agriculture and Consumer Services via Chapter 5B-40, F.A.C. The federal lists of animals and plants are administered by the U.S. Fish and Wildlife Service and categorized into endangered and threatened, and are published in 50 CFR 17 (animals) and 50 CFR 23 (plants). The abbreviations used in part one are:

- FWC = Florida Fish and Wildlife Conservation Commission
- FDA = Florida Department of Agriculture and Consumer Services
- USFWS = United States Fish and Wildlife Service
- E = Endangered
- T = Threatened
- T(S/A) = Threatened/Similarity of Appearance
- T(E/P) = Threatened/Experimental Population
- SSC = Species of Special Concern
- C = Commercially Exploited

Tom H. Logan
Endangered Species Coordinator

FNAI Ranking system

Using a ranking system developed by The Nature Conservancy and the Natural Heritage Program Network, the Florida Natural Areas Inventory assigns two ranks to each element. The **global rank** is based on an element's worldwide status; the **state rank** is based on the status of the element in Florida. Element ranks are based on many factors, the most important ones being estimated number of element occurrences, estimated abundance (number of individuals for species; area for natural communities), range, estimated adequately protected EOs, relative threat of destruction, and ecological fragility.

Appendix E. Explanation of FFWCC, USFWS and FNAI ranking systems.

FNAI GLOBAL RANK DEFINITIONS

G1 = Critically imperiled globally because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
G2 = Imperiled globally because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
G3 = Either very rare and local throughout its range (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
G4 = Apparently secure globally (may be rare in parts of range)
G5 = Demonstrably secure globally
GH = Of historical occurrence throughout its range, may be rediscovered (e.g., ivory-billed woodpecker)
GX = Believed to be extinct throughout range
GXC = Extirpated from the wild but still known from captivity or cultivation
G#? = Tentative rank (e.g., G2?)
G#G# = Range of rank; insufficient data to assign specific global rank (e.g., G2G3)
G#T# = Rank of a taxonomic subgroup such as a subspecies or variety; the G portion of the rank refers to the entire species and the T portion refers to the specific subgroup; numbers have same definition as above (e.g., G3T1)
G#Q = Rank of questionable species - ranked as species but questionable whether it is species or subspecies; numbers have same definition as above (e.g., G2Q)
G#T#Q = Same as above, but validity as subspecies or variety is questioned.
GU = Due to lack of information, no rank or range can be assigned (e.g., GUT2).
G? = Not yet ranked (temporary)

FNAI STATE RANK DEFINITIONS

S1 = Critically imperiled in Florida because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
S2 = Imperiled in Florida because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
S3 = Either very rare and local throughout its range (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
S4 = Apparently secure in Florida (may be rare in parts of range)
S5 = Demonstrably secure in Florida
SH = Of historical occurrence throughout its range, may be rediscovered (e.g., ivory-billed woodpecker)
SX = Believed to be extinct throughout range
SA = Accidental in Florida, i.e., not part of the established biota
SE = An exotic species established in Florida may be native elsewhere in North America
SN = Regularly occurring, but widely and unreliably distributed; sites for conservation hard to determine

FEDERAL LEGAL STATUS

Provided by FNAI for information only.

For official definitions and lists of protected species, consult the relevant federal agency.

Definitions derived from U.S. Endangered Species Act of 1973, Sec. 3. Note that the federal status given by FNAI refers only to Florida populations and that federal status may differ elsewhere.
LE Endangered: species in danger of extinction throughout all or a significant portion of its range.
LT Threatened: species likely to become Endangered within the foreseeable future throughout all or a significant portion of its range.
E(S/A) Endangered due to similarity of appearance to a species which is federally listed such that enforcement personnel have difficulty in attempting to differentiate between the listed and unlisted species.
T(S/A) Threatened due to similarity of appearance (see above).
PE Proposed for listing as Endangered species.
PT Proposed for listing as Threatened species.
C Candidate species for which federal listing agencies have sufficient information on biological vulnerability and threats to support proposing to list the species as Endangered or Threatened.
XN Non-essential experimental population.
MC Not currently listed, but of management concern to USFWS.

N Not currently listed, nor currently being considered for listing as Endangered or Threatened.

STATE LEGAL STATUS

Provided by FNAI for information only.
For official definitions and lists of protected species, consult the relevant federal agency.

Animals: Definitions derived from "Florida's Endangered Species and Species of Special Concern, Official Lists" published by Florida Fish and Wildlife Conservation Commission, 1 August 1997, and subsequent updates.
LE Endangered: species, subspecies, or isolated population so few or depleted in number or so restricted in range that it is in imminent danger of extinction.
LT Threatened: species, subspecies, or isolated population facing a very high risk of extinction in the future.
LS Species of Special Concern is a species, subspecies, or isolated population which is facing a moderate risk of extinction in the future.
PE Proposed for listing as Endangered.
PT Proposed for listing as Threatened.
PS Proposed for listing as Species of Special Concern.
N Not currently listed, nor currently being considered for listing.
Plants: Definitions derived from Sections 581.011 and 581.185(2), Florida Statutes, and the Preservation of Native Flora of Florida Act, 5B-40.001. FNAI does not track all state-regulated plant species; for a complete list of state-regulated plant species, call Florida Division of Plant Industry, 352-372-3505 or see: **http://doacs.state.fl.us/~pi/5b-40.htm#.0055**.
LE Endangered: species of plants native to Florida that are in imminent danger of extinction within the state, the survival of which is unlikely if the causes of a decline in the number of plants continue; includes all species determined to be endangered or threatened pursuant to the U.S. Endangered Species Act.
LT Threatened: species native to the state that are in rapid decline in the number of plants within the state, but which have not so decreased in number as to cause them to be Endangered.
PE Proposed for listing as Endangered.
PT Proposed for listing as Threatened.
N Not currently listed, nor currently being considered for listing.

Appendix F
Summary of FNAI Natural Communities

Appendix F - Summary of FNAI Natural Communities

Natural communities found within the Estero Bay State Buffer Preserve are described below based on the Florida Natural Areas Inventory's Guide to the Natural Communities of Florida. Each community has a different composition of flora, fauna, and fire regime.

Coastal Uplands –substrate and vegetation influenced primarily by such coastal processes as erosion, deposition, salt spray and storms.

Coastal Berm - generally a ridge of storm-deposited marine debris that is parallel to the shore, occasionally occurring in a series with alternating swales, usually found along low-energy coastlines, and are often surrounded by mangrove or salt marsh communities.

Coastal Rock Barren – characterized as flat rocklands with much exposed and eroded limestone and are sparsely vegetated with stunted, xeric and halophytic shrubs, cacti, algae, and herbs. Fire is highly unlikely.

Maritime Hammock – a narrow band of hardwood forest lying just inland of the Coastal Strand community. Mesic conditions and insular locations of well-developed communities inhibit natural fires, which occur no more frequently than once every 26-100 years.

Shell Mound – usually among the biological communities in that it is largely a result of the activities of Indians, instead of natural physical factors. Their coastal location generally protects them from fire, but are subject to marine influences, high winds, salt spray, high insulation, and storm surge.

Xeric Uplands – very dry, deep, well drained hills of sand with xeric-adapted vegetation.

Scrub – old dune with deep fine sand substrate; scrub oaks, rosemary and lichens; occasional or rare fire (20-80 years).

Mesic Flatlands – flat, moderately well drained sandy substrates with a mixture of organic material, often with a hard pan.

Mesic flatwoods – flatland with sand substrate; slash pine with saw palmetto, gallberry, and grass understory; frequent fire (3-7 years). Light-medium levels of exotic plants occur within this habitat.

Prairie hammock – flatland with sand/organic soil over marl or limestone substrate; live oak and cabbage palm; occasional or rare fire (20-80 years).

Scrubby flatwoods – flatland with sand substrate; slash pine with scrub oak and grass understory; occasional fire (8-25 years).

Wet flatlands – flat, poorly drained sand, marl or limestone.

Wet flatwoods – flatland with sand substrate; slash pine and cabbage palm with mixed grasses and herbs; frequent fire (3-7 years). Medium-high levels of exotic plant invasion have occurred within this habitat.

Wet prairie – flatland with sand substrate; maidencane, beakrush, spikerush, St. John’s wort and mixed herbs; annual or frequent fire (1-7 years).

Basin wetlands – shallow, closed basin with outlet usually only in times of high water; peat or sand substrate, usually inundated; wetland woody and/or herbaceous vegetation.

Depression marsh – small rounded depression in sand substrate with peat accumulating toward center; maidencane, fire flag, pickerelweed and mixed emergents; frequent or occasional fire (3-25 years). Heavy exotic plant (melaleuca) invasion.

Strand Swamp - shallow, forested, usually elongated depressions or channels dominated by bald cypress. Soils are peat and sand over limestone. Fire occurs on a cycle of perhaps 20-300 years (with the largest trees on the deepest peat towards the center of the strand burning least frequently). Initial exotic plant removal projects have been completed.

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

Unconsolidated Substrate – expansive, relatively open areas of subtidal, intertidal, and supratidal zones, which lack dense populations of sessile plant and animal species. Unsolidified material and include coralgal, marl, mud, mud/sand, sand or shell.

Tidal Marsh – expanses of grasses, rushes and sedges along coastlines of low wave-energy and river mouths; occasional fires. Medium levels of exotic plant invasion have occurred within this habitat.

Tidal Swamp – expansive intertidal and supratidal area occupied primarily by woody vascular macrophytes (mangroves); may include epiphytes and epifauna.

Appendix G

List of Plant and Animal Species Found in EBSBP

Appendix G - List of Potential and Known Native Species

Scientific Name	Common Name
Mammals	
Blarina carolinensis	Southern short-tailed shrew
Corynorhinus rafinesquii	Southeastern big-eared bat
Cryptotis parva	Least shrew
Didelphis virginiana	Opossum
Eptesicus fuscus	Big brown bat
Felis concolor coryi	Florida panther
Felis rufus	Bobcat
glacomys volans	Southern flying squirrel
Lasiurus intermedius	Yellow bat
Lasiurus seminolus	Seminole bat
Lutra canadensis	River otter
Mephitis mephitis	Striped skunk
Mus musculus	House mouse
Mustela frenata peninsulae	Florida long-tailed weasel
Mustela vison	Mink
Neotoma floridana	Eastern woodrat
Nycticeius humeralis	Evening bat
Odocoileus virginianus	Whitetailed deer
Oryzomys palustris	Marsh rice rat

Scientific Name	Common Name
Mammals	
Peromyscus gossypinus	Cotton mouse
Pipistrellus subflavus	Eastern Pipistrelle bat
Procyon lotor	racoon
rattus rattus	Black rat
Scalopus aquaticus	Eastern mole
Sciurus carolinensis	Gray squirrel
Sciurus niger avicenna	Big cypress fox squirrel
Sciurus niger shermani	Sherman's fox squirrel
Sigmodon hispidus insulicola	Insular cotton rat
Spilogale putorius	Spotted skunk
Sylvagus floridanus	Eastern cottontail rabbit
Sylvagus palustris	Marsh rabbit
Tadarida brasiliensis	Brazilian free-tailed bat
Trichechus manatus	Manatee
Tursiops truncatus	Bottle-nosed dolphin
Urocyon cinereoargenteus	Gray fox
Ursus americanus floridanus	Florida black bear
Vulpes vulpes	Red fox

Total = 37 species

Scientific Name	Common Name
Birds	
Accipiter cooperii	Cooper's hawk
Accipiter striatus	Sharp-shinned hawk
Actitis macularia	Spotted sandpiper
Agelaius phoeniceus	* Red-winged blackbird
Aimophila aestivalis	Bachman's sparrow
Aix sponsa	* Wood duck
Ajaia ajaja	* Roseate spoonbill
Anas americana	American widgeon
Anas discors	Blue-winged yeal
Anas fulvigula	* Mottled duck
Anhinga anhinga	* American anhinga
Aphelocoma coerulescens	Florida scrub-jay
Aramus guarauna	Limpkin
Ardea alba	Great egret
Ardea herodias	* Great Blue heron
Ardea herodias occidentalis	Great white heron
Arenaria interpres	Ruddy turnstone
Aythya affinis	Lesser scaup
Bombycilla cedrorum	Cedar waxwing
Bubo virginianus	* Great-horned owl
Buteo brachyurus	Short-tailed hawk
Buteo jamaicensis	* Red-tailed hawk
Buteo lineatus	* Red-shouldered hawk
Buteorides striatus	* Green-backed heron
Calidris alba	Sanderling
Calidris alpina	Dunlin
Calidris canutus	Red knot
Calidris mauri	Western sandpiper
Calidris minutilla	Least sandpiper
Cardinalis cardinalis	* Northern cardinal
Carduelis tristis	American goldfinch
Casmerodius albus	* Great egret
Cathartes aura	*Turkey vulture
Catoptrophorus semipalmatus	* Willet
Ceryle alcyon	Belted kingfisher
Charadrius alexandrinus tenuirostris	Southeastern Snowy plover
Charadrius melodus	Piping plover
Charadrius semipalmatus	Semi-palmated plover
Charadrius vociferus	Killdeer
Charadrius wilsonia	Wilson's plover
Chordeiles minor	* Common nighthawk
Circus cyaneus	Northern harrier
Coccyzus americanus	* Yellow-billed cuckoo
Coccyzus minor	* Mangrove cuckoo
Colaptes auratus	Northern flicker
Colinus virginianus	Northern bobwhite
Columbina passerina	* Common Ground dove

Scientific Name	Common Name
Birds	
Coragyps atratus	*Black vulture
Corvus brachyrhynchos	* American crow
Corvus ossifragus	*Fish crow
Cyanocitta cristata	* Blue jay
Dendroica coronata	Yellow Rumped warbler
Dendroica discolor paludicola	Florida prairie warbler
Dendroica palmarum	Palm warbler
Dendroica pinus	* Pine warbler
Dryocopus pileatus	* Pileated woodpecker
Dumetella carolinensis	Gray catbird
egretta caerula	Little blue heron
egretta rufescens	Reddish egret
egretta thula	Snowy egret
egretta tricolor	* Tricolored heron
Elanoides forficatus	* American Swallow-tailed kite
Eudocimus albus	* White ibis
Falco columbarius	Merlin
Falco peregrinus	Peregrine falcon
Falco sparverius paulus	Sotheastern American kestrel
Fregata magnificens	Magnificent frigatebird
Fulica americana	American coot
Gallinago gallinago	Common snipe
Gallinula chloropus	* Common moorhen
Gavia immer	Common loon
Geothlypis trichas	Common yellowthroat
Grus canadensis pratensis	Florida sandhill crane
Haematopus palliatus	American oystercatcher
Haliaeetus leucocephalus	* Bald eagle
Ixobrychus exilis	Least bittern
Lanius ludovicianus	Loggerhead shrike
Larus argentatus	Herring gull
Larus atricilla	Laughing gull
Larus delawarensis	Ring-billed gull
Laterallus jamaicensis	Black rail
Limnodromus griseus	Short-billed dowitcher
Lophodytes cucullatus	Hooded merganser
Melanerpes carolinus	* Red-bellied woodpecker
Melospiza georgiana	Swamp sparrow
Melospiza melodia	Song sparrow
Mergus serrator	Red-breasted merganser
Mimus polyglottos	* Northern mockingbird
Mniotilta varia	Black and white warbler
Molothrus ater	* Brown-headed cowbird
Mycteria americana	* Wood stork
Myiarchus crinitus	* Great creasted flycatcher
Nyctanassa violacea	* Yellow-crowned night-heron
Nycticorax nycticorax	* Black-crowned night-heron

Appendix G - List of Potential and Known Native Species

Scientific Name	Common Name
Birds	
Pandion haliaetus	* Osprey
Parus bicolor	Tufted titmouse
Passerina cyanea	Indigo bunting
Pelecanus erythrorhynchos	White pelican
Pelecanus occidentalis	* Brown pelican
Phalacrocorax auritus	Double-crested cormorant
Picoides borealis	Red-cockaded woodpecker
Picoides pubescens	* Downy woodpecker
Picoides villosus	Hairy woodpecker
Pipilo erythropthalmus	* Rufous-sided towhee
Plegadis falcinellus	* glossy ibis
Podilymbus podiceps	Pied-billed grebe
Polioptila caerulea	Blue-gray gnatcatcher
Porzana carolina	Sora
Quiscalus major	* Boat-tailed grackle
Quiscalus quiscula	* Common grackle
rallus elegans	King rail
rallus limicola	Virginia rail
rallus longirostris	Clapper rail
rallus longirostris scottii	Florida clapper rail
Regulus calendula	Ruby-crowned kinglet
Rostrhamus sociabilis	Snail kite
Rynchops niger	Black skimmer
Sayornis phoebe	Eastern phoebe

Scientific Name	Common Name
Birds	
Srerna maxima	Royal tern
Sterna antillarum	* Least tern
Sterna caspia	Caspian tern
Sterna foresteri	Forester's tern
Sterna maxima	Royal tern
Sterna sandvicensis	Sandwich tern
Sturnella magna	Eastern meadowlark
Tachycineta bicolor	Tree swallow
Thryothorus ludovicianus	* Carolina wren
Tringa flavipes	Lesser yellowlegs
Tringa melanoleuca	Greater yellowlegs
Troglodytes aedon	House wren
Turdus migratorius	American robin
Tyrannus tyrannus	Eastern kingbird
Vireo altiloquus	Black-whiskered vireo
Vireo griseus	* White-eyed vireo
Zenaida macroura	* Mourning dove

Total = 135 species

All of these species are common to occasionally present in the appropriate EBSBP habitats. Others can and will occur seasonally or irregularly.

* = Confimed and probable nesting species

Scientific Name	Common Name
Amphibians	
**Acris gryllus dorsalis*	Florida Cricket frog
Amphiuma means	Two-toed amphiuma
**Bufo quercicus*	Oak toad
**Bufo terrestris*	Southern toad
**Eleutherodactylus planirostris*	Greenhouse frog
**Gastrophryne carolinensis*	Eastern narrowmouth toad
**Hyla cinerea*	Green treefrog
**Hyla femoralis*	Pine woods treefrog
Hyla gratiosa	Barking treefrog
**Hyla squirela*	Squirrel treefrog
Notophtalmus viridescens piaropicola	Peninsula newt
Pseudacris nigrita verrucosa	Florida chorus frog

Scientific Name	Common Name
Amphibians	
Pseudacris ocularis	Little grass frog
Pseudobrachus striatus	Dwarf siren
rana capito	Florida gopher frog
**rana catesbeiana*	Bullfrog
**rana grylio*	Pig frog
rana heckscheri	River frog
**rana utricularia*	Southern leopard frog
**Scaphiopus holbrookii*	Eastern Ssadefoot
Siren lacertina	Greater siren

Total = 21 species

* Amphibian species heard on EBSBP

Scientific Name	Common Name
Reptiles	
Agkistrodon piscivorus conanti	Florida cottonmouth
Alligator mississippiensis	American alligator
Anolis carolinensis carolinensis	Green anole
Apalone ferox	Florida softshell turtle
Caretta caretta	Loggerhead turtle
Cemphora coccinea coccinea	Scarlet snake
Chelonia mydas mydas	Atlantic green turtle
Chelydra serpentina	Florida snapping turtle
Cnemidophorus sexlineatus	Six-lined racerunner
Coluber constrictor priapus	Southern black racer
Crocodylus acutus	American crocodile
Crotalus adamanteus	Eastern diamondback rattlesnake
Deirochelys reticularia chrysea	Florida chicken turtle
Dermochelys coriacea	Leatherback turtle
Diadophis punctatus punctatus	Southern ringnecked snake
Drymarchon corais couperi	Eastern indigo snake
Elaphe guttata guttata	Red rat snake
Elaphe obsoleta quadrivittata	Yellow rat snake
Eretmochelys imbricata	hawksbill turtle
Eumeces egregius lividus	Bluetail mole skink
Eumeces egregius onocrepis	Peninsualr mole skink
Eumeces inexpectatus	Southeastern five-lined skink
Farancia abacura abacura	Mud snake
Gopherus polyphemus	Gopher tortoise
Heterodon platirhinos	Eastern hognose snake

Scientific Name	Common Name
Reptiles	
Kinosternon baurii palmarum	Striped mud turtle
Kinosternon subrubrum stenindachneri	Florida mud turtle
Lampropeltis getula	Florida kingsnake
Lampropeltis triangulum elapsoides	Scarlet kingsnake
Lepidochelys kempi	Kemp's ridley turtle
Malaclemys terrapin macrospilota	Diamondback terrapin
Masticophis flagellum flagellum	Eastern coachwhip
Micrurus fulvius fulvius	Eastern coral snake
Nerodia clarkii compressicauda	Mangrove salt marsh snake
Nerodia erythrogaster erythrogaster	Redbelly snake
Nerodia fasciata pictiventris	Florida banded water snake
Nerodia taxispilota	Brown water snake
Ophisaurus attenuatus longicaudus	Eastern slender glass lizard
Ophisaurus compressus	Island glass lizard
Ophisaurus ventralis	Eastern glass lizard
Pituophis melanoleucus mugitus	Florida pine snake
Pseudemys floridana peninsularis	Peninsula cooter
Pseudemys nelsoni	Florida redbelly turtle
Regina alleni	Striped swamp snake
Rhineura floridana	Worm lizard
Sceloporus undulatus undulatus	Southern fence lizard
Sceloprus woodi	Florida scrub lizard
Scincella lateralis	Ground skink
Seminatrix pygaea pygaea	Black swamp snake
Sistrurus miliarius barbouri	Dusky pigmy rattlesnake

Appendix G - List of Potential and Known Native Species

Scientific Name	Common Name
Reptiles	
Sternotherus odoratus	Stinkpot turtle
Storeria dekayi victa	Brown snake
Tantilla relicta	Crowned snake
Terrapene carolina major	Gulf coast box turtle

Scientific Name	Common Name
Reptiles	
Thamnophis sauritus sackeni	Ribbon snake
Thamnophis sirtalis sirtlais	Garter snake
Total = 56 species	

Scientific Name	Common Name
Fish	
Achirus lineatus	Lined sole
Acipenser oxyrinchus desotoi	Gulf sturgeon
Adinia xenica	Diamond killifish
Albula vulpes	Bonefish
Aluterus schoepfi	Orange filefish
Ameiurus catus	White catfish
Anchoa hepsetus	Striped anchovy
Anchoa mitchilli	Bay anchovy
Ancylopsetta quadrocellata	Ocellated flounder
Anguilla rostrata	American eel
Archosargus probatocephalus	Sheepshead
Arius felis	Hardhead catfish
Astroscopus y-graecum	Southern stargazer
Bagre marinus	Gafftopsail catfish
Bairdiella chrysoura	Silver perch
bathygobius soporator	Frillfin goby
Brevoortia spp.	Menhaden
Calamus arctifrons	Grass porgy
Caranx hippos	Crevalle Jack
Centropomus undecimalis	Snook
Centropristis striata	Black sea bass
Chaetodipterus faber	Atlantic spadefish
Chasmodes saburrae	Florida blenny
Chloroscombrus chrysurus	Atlantic bumper
Citharichthys macrops	Spotted whiff
Cynoscion arenarius	Sand seatrout
Cynoscion nebulosus	Spotted seatrout
Cyprinodon variegatus	Sheepshead minnoe
Dasyatis americana	Southern stingray
Dasyatis sabina	Atlantic stingray
Dasyatis say	Bluntnose stingray
Diodon holocanthus	Baloonfish
Diplectrum formosum	Sand perch
Diplodus holbrooki	Spottail pinfish
Dormitator maculatus	Fat sleeper
Echeneis naucrates	Shraksucker
Elops saurus	Ladyfish
Epinephelus morio	Red grouper
Etropus crossotus	Fringed flounder
Eucinostomus gula	Silver jenny
Eucinostomus harengulus	Tidewate mojara
Floridichthys carpio	Goldspotted killifish
Fundulus confluentus	Marsh killifish
Fundulus grandis	Gulf killifish
Fundulus majalis	Striped killifish
Fundulus seminolis	Seminole killifish
Ginglymostoma cirratum	Nurse shark
Gobiesox strumosus	Skilletfish
Gobionellus boleosoma	Darter goby
Gobiosoma bosc	naked goby
Gobiosoma robustum	Code goby
Gymnachirus melas	Naked sole
Gymnura micrura	Smooth butterfly ray
Haemulon plumieri	White grunt
Halichoeres bivittatus	Slippery dick
Harengula jaguana	Scaled sardine
Hilomycterus schoepfi	Striped burfish
Hypoatherina harringtonensis	Reef silverside
Hyporhamphus nifasciatus	Halfbeak
Hypsoblennius hentzi	Feather blenny
Ictalurus punctatus	Channel catfish
Jordanella floridae	Flagfish

Scientific Name	Common Name
Fish	
Lactophrys quadricornis	Scrawled catfish
Lactophrys trigonus	Trunkfish
Lagocephalus laevigatus	Smooth puffer
Lagodon rhomboides	Pinefish
Leiostomus xanthurus	Atlantic spot
Lepisosteus osseus	Longnose gar
Lepisosteus platyrhincus	Florida gar
Lepomis macrochirus	Bluegill
Lepomis microlophus	Redear sunfish
Lepomis punctatus	Spotted sunfish
Lophogobius cyprinoides	Creasted goby
Lucania goodei	Bluefin killifish
Lucania parva	Rainwater killifish
Lutjanus griseus	Gray snapper
Lutjanus synagris	Lane snapper
Megalopsatlanticus	Tarpon
Membras martinica	Rough silverside
Menidia spp.	Silversides
Menticirrhus americanus	Southern kingfish
Menticirrhus littoralis	Gilf kingfish
Menticirrhus saxatilis	Northern kingfish
Microgobius gulosus	Clown goby
Microgobius thalassinus	Green goby
Micropogonias undulatus	Atlantic croaker
Micropterus salmoides	Largemouth bass
Monacanthus ciliatus	Fringed filefish
Monacanthus hispidus	Planehead filefish
Mugil cephalus	Striped mullet
Mugil curema	White mullet
Mugil gyrans	Fantail mullet
Mustelus norrisi	Florida smoothound
Mycteroperca microlepis	Gag
Myrophis punctatus	Speckled worm eel
Negaprion brevirostris	Lemon shark
Nicholsina usta	Emerald parrotfish
Notemigonus crysoleucas	Golden shiner
Notropis spp.	Fresh water minnow
Ogcocephalus radiatus	Polka dot catfish
Oligoplites saurus	Leatherjacket
Ophichthus gomesi	Shrimp eel
Ophidion welshi	Crested cusk eel
Opisthonema oglinum	Atlantic thread herring
Opsanus beta	Gulf toadfish
Orthopristis chrysoptera	Pigfish
Paraclinus marmoratus	Marbled blenny
Paralichthys albigutta	Gulf flounder
Peprilus burti	Gulf butterfish
Poecilia latipinna	Sainfin molly
Prionotus rubio	Blackfin searobin
Prionotus scitulus	Lopard searobin
Prionotus tribulus	Bighead searobin
Pristis pectinata	Smalltooth sawfish
raja eglanteria	Clearnose skate
Rhinobatos lentiginosus	Atlantic guitarfish
Rhinoptera bonasus	Cownose ray
Sardinella aurita	Spanish sardine
Sciaenops ocellatus	Red drum
Scorpaena brasiliensis	Barbfish
Serraniculus pumilio	Pygmy sea bass
Serranus subligarius	Belted sandfish
Sphoeroides nephelus	Southern puffer
Sphoeroides spengleri	Bandtail puffer

Appendix G - List of Potential and Known Native Species

Scientific Name	Common Name
Fish	
Sphyraena guachancho	Guaguanche
Sphyraena picudilla	Southern sennet
Strongylura marina	Atlantic needlefish
Strongylura notata	Redfin needlefish
Symphurus plagiusa	Blackcheek tonguefish
Syngnathus floridae	Dusky pipefish
Syngnathus louisianae	Chain pipefish

Scientific Name	Common Name
Fish	
Syngnathus scovelli	Gulf pipefish
Synodus foetens	Inshore lizardfish
Trachinotus carolinus	Florida pompano
Trachinotus falcatus	Permit
Trinectes maculatus	Hogchoker
Urophycis floridana	Southern hake

Total = 137 species

Appendix H
FNAI Managed Area Tracking Record

Scientific Name: *Alligator mississippiensis* **Common name:** American alligator **Grank/SRank/Fed/State:** G5/S4/T(S/A)/LS

TRS: 046S024E015 **Directions:**

Element Occurrence #: 134 **EO Rank:** **EO Rank Comments:**

Date Last Observed: 2001 **Element Occurrence Data:** 2001: observation reported.

Protection comments:

Management comments:

Habitat comments: mangrove and salt flats

Natural communities in which species may be found: estuarine tidal marsh, estuarine tidal swamp; basin marsh, bottomland forest, coastal interdunal swale, depression marsh, floodplain forest, floodplain marsh, floodplain swamp, freshwater tidal swamp, hydric hammock, marl prairie, slough, strand swamp, swale, wet flatwoods, wet prairie; clastic upland lake, sandhill upland lake, marsh lake, coastal dune lake, coastal rockland lake, flatwoods/prairie lake, river floodplain lake, sinkhole lake, swamp lake; alluvial stream, blackwater stream, spring-run stream

Species information: Fresh and brackish marshes, ponds, lakes, rivers, swamps, bayous, large spring runs. Basks on land next to water. Digs dens in river or lake margins or in marshes; spends cold winter and drought periods in den. Depends on access to air holes to survive in ice-covered ponds (Brandt and Mazotti 1990). ^Copulation occurs in shallow water. Lays eggs in large mounded nest made of leaves, mud, rotting vegetation, rocks, or other debris. Nests are built in marshes or at lake or river margins. In north-central Florida, nested in close proximity to permanent water, used a wide variety of available plant materials and soil in constructing nest (Goodwin and Marion 1978). Turtles (e.g., PSEUDEMYS NELSONI) often lay eggs in alligator nests.

Scientific Name: *Crotalus adamanteus* **Common name:** eastern diamondback rattlesnake **Grank/SRank/Fed/State:** G4/S3/N/N

TRS: 046S025E029 ;T#40 046S025E030 **Directions:**

Element Occurrence #: 289 **EO Rank:** **EO Rank Comments:**

Date Last Observed: 2001-07 **Element Occurrence Data:** observation reported

Protection comments:

Management comments:

Habitat comments: pine flatwoods

Natural communities in which species may be found: hydric hammock, marl prairie, wet flatwoods, wet prairie, baygall, seepage slope, bottomland forest, floodplain forest, floodplain swamp, freshwater tidal swamp, slough, strand swamp, swale, basin marsh, basin swamp, bog, coastal interdunal swale, depression marsh, dome swamp; sandhill, scrub, xeric hammock, beach dune, coastal berm, coastal grassland, coastal rock barren, coastal strand, maritime hammock, shell mound, slope forest, upland glade, upland hardwood forest, upland mixed forest, upland pine forest, pine rockland, rockland hammock, sinkhole, dry prairie, mesic flatwoods, prairie hammock, scrubby flatwoods

Species information: Pine and wiregrass flatwoods, longleaf pine-turkey oak hills, rosemary scrub, palmetto flatwoods, mesophytic hammocks, barrier islands and coastal scrub habitats, vicinity of wet savannas, mixed pine-hardwood successional woodland, abandoned farms and fields, and grown up pastures. Usually not in marshes or swamps but may pass through or occupy edges. Large tracts of habitat are most suitable. Favors areas with abundant cover. Basically terrestrial; rarely climbs into vegetation. Sometimes crosses fresh or salt water. When inactive (e.g., November-March), occupies stump holes, burrows of other animals, brush plles, or similar sites. Stumpholes in shortleaf/loblolly pine oldfield successional forest were utilized more frequently than burrows of the gopher tortoise (GOPHERUS POLYPHEMUS) (Means 1995). Eastern diamondbacks can tolerate inundation of their overwintering burrows, having the capability of remaining underwater for periods up to about one hour (Means 1982, 1995). According to Ernst (1992), most young are born in retreats such as gopher tortoise burrows or hollow logs.

Scientific Name: *Drymarchon corais couperi* **Common name:** eastern indigo snake **Grank/SRank/Fed/State:** G4T3/S3/LT/LT

TRS: 046S025E018 ;T#40 046S025E019 **Directions:**

Element Occurrence #: 486 **EO Rank:** **EO Rank Comments:**

Date Last Observed: **Element Occurrence Data:** observation reported

Protection comments:

Management comments:

Habitat comments: pine flatwoods

Natural communities in which species may be found: estuarine tidal swamp; hydric hammock, wet flatwoods; mesic flatwoods, upland pine forest, sandhill, scrub, scrubby flatwoods, rockland hammock

Species information: High pineland (sandhills, scrub, etc.), flatwoods, and most types of hammock in Florida and southeastern Georgia; often near wetlands; often in association with gopher tortoise burrows. Mature pine forests in central and northern Florida; flatwoods, dry glades, tropical hammocks, and muckland fields in southern Florida; sandhill regions dominated by mature longleaf pines, turkey oaks, and wiregrass in Georgia (Matthews and Moseley 1990). Pineland habitat is maintained by periodic fires. Requires relatively large tracts of suitable habitat. Mainly terrestrial. When inactive, often occupies tortoise burrow, stump hole, land crab burrow, etc., as available. Eggs may be laid in gopher (GEOMYS) burrows (Ashton and Ashton 1981). See USFWS (1998) for further information.

Scientific Name: *Gopherus polyphemus* **Common name:** **Grank/SRank/Fed/State:** G3/S3/N/LS

TRS: 046S025E030, 046S025E019 ;T#40 046S025E029 **Directions:**

Element Occurrence #: 112 **EO Rank:** **EO Rank Comments:**

Date Last Observed: **Element Occurrence Data:** observation reported

Protection comments:

Management comments:

Habitat comments: pine flatwoods; scrubby flatwoods; spiol area

Natural communities in which species may be found:

Species information:

Scientific Name: *Ardea alba* **Common name:** great egret **Grank/SRank/Fed/State:** G5/S4/N/N

TRS: 046S028E28 **Directions:** estero bay rookery subcolony b2, on a small islandin estero bay about 0.2 mi s.e. of julies island. map in u82nes01: 219, 427.

Element Occurrence #: 112 **EO Rank:** **EO Rank Comments:**

Date Last Observed: 1978-04 **Element Occurrence Data:** active rookery. nesting pairs seen 4/76, 6/76, none seen 4/77, 5-10 np 4/78, none 7/78.

Protection comments:

Management comments:

Habitat comments: colony site is nonbarrier coastal island surround-ed by water. nesting substrate is mangroves over high ground. less than 0.8 km from human disturbance.

Natural communities in which species may be found: estuarine unconsolidated substrate, estuarine tidal marsh, estuarine tidal swamp; hydric hammock, marl prairie, wet prairie, bottomland forest, floodplain forest, floodplain marsh, floodplain swamp, freshwater tidal swamp, slough, strand swamp, swale, basin marsh, basin swamp, coastal interdunal swale, depression marsh

Species information: Marshes, swampy woods, tidal estuaries, lagoons, mangroves, streams, lakes, and ponds; also fields and meadows. ^Nests primarily in tall trees, usually with other colonial water birds; in woods or thickets near water. See Spendelow and Patton (1988) for further details and information on geographic variation in nesting habitat. Returns to the same colony sites year after year.

Scientific Name: *Egretta rufescens* **Common name:** reddish egret **Grank/SRank/Fed/State:** G4/S2/N/LS

TRS: 046S024E015 **Directions:**

Element Occurrence #: 083 **EO Rank:** **EO Rank Comments:**

Date Last Observed: 2001-06 **Element Occurrence Data:** observation reported

Protection comments:

Management comments:

Habitat comments: tidal marsh
Natural communities in which species may be found: marine tidal swamp; estuarine tidal swamp, estuarine tidal marsh, estuarine unconsolidated substrate

Species information: FORAGING: Shallow water (usually less than 15 centimeters deep); saline, hypersaline, or brackish coastal habitats including barren sand or mud tidal flats, salt ponds, lagoons, and open red mangrove (RHIZOPHORA MANGLE) and black mangrove (AVICENNIA GERMINANS) communities (Paul 1991, Stevenson and Anderson 1994, Stiles and Skutch 1989). Occasionally feeds in other habitats including coastal beaches, sparsely-vegetated freshwater marshes, and the shores of lake and reservoirs (Paul 1991). ^NESTING: Typically nests on natural islands or man-made dredge spoil islands, but occasionally nests on the coastal mainland (Paul 1991). Nests are generally constructed in red, black, and white (LAGUNCULARIA RACEMOSA) mangroves, but also in terrestrial vegetation including Brazilian pepper (SCHINUS TEREBINTHEFOLIUS), cactus (OPUNTIA spp.), mesquite (PROSOPIS spp.), huisache (ACACIA spp.), ragweed (AMBROSIA ARTEMISIIFOLIA), sea oxeye daisy (BORRICHIA FRUTESCENS), sea purslane (SESUVIUM PORTULACASTRUM), camphor daisy (MACHAERANTHERA PHYLLOCEPHALA), and spanish bayonet (YUCCA spp.). Nests are generally constructed less than 3 meters above the ground or water, but can be as high as 6 meters (McMurray 1971, Stevenson and Anderson 1994). Sometimes nests are placed on the ground among low vegetation or on bare sand or shell beach ridges (Bent 1926, McMurray 1971, Paul 1991, Paul et al. 1979, Simersky 1971, Stevenson and Anderson 1994, Toland 1991).

Scientific Name: *Egretta thula*
Common name: snowy egret
Grank/SRank/Fed/State: G5/S3/N/LS

TRS: 046S028E28
Directions: estero bay rookery subcolony b2, on a small islandin estero bay about 0.2 mi s.e. of julies island. map in u82nes01: 219, 427.

Element Occurrence #: 060
EO Rank:
EO Rank Comments:

Date Last Observed: 1978-07
Element Occurrence Data: active rookery. 5++ nesting pairs 7/78.

Protection comments:

Management comments:

Habitat comments: colony site is nonbarrier coastal island surround-ed by water. nesting substrate is mangroves over high ground. less than 0.8 km from human disturbance.

Natural communities in which species may be found: estuarine unconsolidated substrate, estuarine tidal marsh, estuarine tidal swamp; hydric hammock, marl prairie, wet prairie, floodplain marsh, floodplain swamp, freshwater tidal swamp, slough, strand swamp, swale, basin marsh, basin swamp, coastal interdunal swale, depression marsh, dome swamp

Species information: Marshes, lakes, ponds, lagoons, mangroves, and shallow coastal habitats. ^Nests in trees or shrubs or, in some areas, on ground or in marsh vegetation. Often nests with other colonial water birds. Nests over water or ground. See references in Spendelow and Patton (1988) for further details.

Scientific Name: *Egretta tricolor*
Common name: tricolored heron
Grank/SRank/Fed/State: G5/S4/N/LS

TRS: 046S028E28
Directions: estero bay rookery subcolony b2, on a small islandin estero bay about 0.2 mi s.e. of julies island. map in u82nes01: 219, 427.

Element Occurrence #: 067
EO Rank:
EO Rank Comments:

Date Last Observed: 1978-07
Element Occurrence Data: active rookery. birds seen in flight lanes 4/78, nesting pairs seen 7/78.

Protection comments:

Management comments:

Habitat comments: colony site is nonbarrier coastal island surround-ed by water. nesting substrate is mangroves over high ground. less than 0.8 km from human disturbance.

Natural communities in which species may be found: estuarine unconsolidated substrate, estuarine tidal marsh, estuarine tidal swamp; hydric hammock, marl prairie, wet prairie, floodplain marsh, freshwater tidal swamp, slough, strand swamp, swale, basin marsh, basin swamp, depression marsh, dome swamp

Species information: Marshes, ponds, sloughs, bayous, rivers, mangrove swamps, saltwater lagoons, islands; salt and fresh water. ^Nests mainly near salt water in mangroves or buttonwood, in thickets of tidal marshes, willow thickets or rushes of freshwater marshes, on Texas island sites in dry thickets, large cane, and prickly pear, and on bare coastal islands in grass. Nests often with other herons/egrets.

Scientific Name: *Falco sparverius paulus*
Common name: southeastern American kestrel
Grank/SRank/Fed/State: G5T4/S3/N/LT

TRS: 046S025E030
Directions:

Element Occurrence #: 104 **EO Rank:** **EO Rank Comments:**

Date Last Observed: **Element Occurrence Data:** observation reported

Protection comments:
Management comments:

Habitat comments: pine flatwoods

Natural communities in which species may be found: sandhill, mesic flatwoods, dry prairie

Species information: Open or partly open habitat: optimal habitat is sandhill, although can adapt to clearings with dead trees; also prairies, coasts, wooded streams, burned forest, cultivated lands and farmland with scattered trees, open woodland, roadsides, suburbs, and some urban areas. In winter in Florida, males use less open habitats than do females (Smallwood 1987, Palmer 1988). ^Nests in natural holes in trees, abandoned woodpecker holes, holes in buildings or cliffs, and similar sites. Readily uses nest-boxes, which may dramatically increase density of nesting pairs in some areas (may use boxes put up for wood duck). Rarely returns to breed in vicinity where reared, but breeders tend to return to their previous territories (Palmer 1988).

Scientific Name: *Haliaeetus leucocephalus* **Common name:** bald eagle **Grank/SRank/Fed/State:** G4/S3/LT/LT

TRS: 046S024E17 **Directions:** estero bay, 0.7 mi n of hell peckish bay (see quad).

Element Occurrence #: 243 **EO Rank:** **EO Rank Comments:**

Date Last Observed: 1988 **Element Occurrence Data:** nest: 1978-1982, 1984-1988 active. fledged young 1978, 1981-1982, 1984-1986, 1988.

Protection comments:

Management comments:

Habitat comments:

Natural communities in which species may be found: estuarine tidal marsh, estuarine tidal swamp; hydric hammock, wet flatwoods, wet prairie, floodplain forest, floodplain marsh, floodplain swamp, freshwater tidal swamp, swale, basin marsh, basin swamp; clastic upland lake, coastal dune lake, coastal rockland lake, flatwoods/prairie lake, marsh lake, river floodplain lake, sandhill upland lake, swamp lake; alluvial stream, blackwater stream, spring-run stream

Species information: Breeding habitat most commonly includes areas close to (within 4km) coastal areas, bays, rivers, lakes, or other bodies of water that reflect the general availability of primary food sources including fish, waterfowl, and seabirds (Andrew and Mosher 1982, Green 1985, Campbell et al. 1990). Preferentially roosts in conifers or other sheltered sites in winter in some areas; typically selects the larger, more accessible trees (Buehler et al. 1991, 1992). Perching in deciduous and coniferous trees is equally common in other areas (e.g., Bowerman et al. 1993). Communal roost sites used by two or more eagles are common, and some may be used by 100 or more eagles during periods of high use. Winter roost sites vary in their proximity to food resources (up to 33 km) and may be determined to some extent by a preference for a warmer microclimate at these sites. Available data indicate that energy conservation may or may not be an important factor in roost-site selection (Buehler et al. 1991). In Saskatchewan lakes, density was positively correlated with abundance of large fishes (Dzus and Gerrard 1993). In winter, may associate with waterfowl concentrations or congregate in areas with abundant dead fish (Griffin et al. 1982); often roosts communally at night in trees that are used in successive years. Wintering areas are commonly associated with open water though in some areas eagles use habitats with little or no open water if other food resources (e.g. rabbit or deer carrion) are readily available. Avoids areas with nearby human activity (boat traffic, pedestrians) and development (buildings) (Buehler et al. 1991). BREEDING: Usually nests in tall trees or on cliffs near water. Nest trees include pines, spruce, firs, cottonwoods, oaks, populars, and beech. Ground nesting has been reported on the Aleutian Islands in Alaska, in Canada's Northwest Territories, and in Ohio, Michigan, and Texas. Nests located on cliffs and rock pinnacles have been reported historically in California, Kansas, Nevada, New Mexico and Utah, but currently are known to occur only in Alaska and Arizona. Same nest may be used year after year, or may alternate between two nest sites in successive years. In British Columbia, nests with overhead canopy of foliage were most successful (Palmer 1988). See Livingston et al. (1990) for model of nesting habitat in Maine, Wood et al. (1989) for characteristics of nesting habitat in Florida (most nests in live pine trees). In Oregon, most nests were within 1.6 km of water, usually in largest tree in stand (Anthony and Isaacs 1989). In Colorado and Wyoming, forest stands containing nest trees varied from old-growth ponderosa pine to narrow strips of riparian vegetation surrounded by rangeland (Kralovec et al. 1992).

Scientific Name: *Mycteria americana* **Common name:** wood stork **Grank/SRank/Fed/State:** G4/S2/LE/LE

TRS: 046S024E015 **Directions:**

Element Occurrence #: 157 **EO Rank:** **EO Rank Comments:**

Date Last Observed: **Element Occurrence Data:** observation reported

Protection comments:

Management comments:

Habitat comments: ephemeral pond

Natural communities in which species may be found: estuarine tidal marsh, estuarine tidal swamp; hydric hammock, marl prairie, wet flatwoods, wet prairie, floodplain forest, floodplain marsh, floodplain swamp, freshwater tidal swamp, slough, strand swamp, swale, basin marsh, basin swamp, coastal interdunal swale, depression marsh, dome swamp; clastic upland lake, coastal dune lake, coastal rockland lake, flatwoods/prairie lake, marsh lake, river floodplain lake, sandhill upland lake, sinkhole lake, swamp lake; alluvial stream, blackwater stream, seepage stream, spring-run stream
Species information: Chiefly freshwater situations: marshes, swamps, lagoons, ponds, flooded fields; depressions in marshes are important during drought; also occurs in brackish wetlands. Nests mostly in upper parts of cypress trees, mangroves, or dead hardwoods over water or on islands along streams or adjacent to shallow lakes. Feeds in freshwater marshes, swamps, lagoons, ponds, flooded pastures and flooded ditches, depressions in marshes (especially during drought).

Scientific Name: *Pelecanus occidentalis* **Common name:** brown pelican **Grank/SRank/Fed/State:** G4/S3/N/LS

TRS: 046S028E28 **Directions:** estero bay rookery subcolony b2, on a small islandin estero bay about 0.2 mi s.e. of julies island. map in u82nes01: 219, 427.

Element Occurrence #: 034 **EO Rank:** **EO Rank Comments:**

Date Last Observed: 1978-04 **Element Occurrence Data:** active rookery. many nesting pairs 4/76, 6/76, 4/77, 4/78, none 7/78.

Protection comments:

Management comments:

Habitat comments: colony site is nonbarrier coastal island surround-ed by water. nesting substrate is mangroves over high ground. less than 0.8 km from human disturbance.

Natural communities in which species may be found: marine unconsolidated substrate, marine tidal marsh, marine tidal swamp; estuarine unconsolidated substrate, estuarine tidal marsh, estuarine tidal swamp

Species information: Mainly coastal, rarely seen inland or far out at sea. Feeds mostly in shallow estuarine waters, less often up to 40 miles from shore. Makes extensive use of sand spits, offshore sand bars, and islets for nocturnal roosting and daily loafing, especially by nonbreeders and during the non-nesting season. Dry roosting sites are essential. Some roosting sites eventually may become nesting areas. ^BREEDING: Nests usually on coastal islands, on the ground or in small bushes and trees (Palmer 1962). Nests on middle or upper parts of steep rocky slopes of small islands in California and Baja California; usually nests on low-lying islands landward of barrier islands or reefs on Atlantic and Gulf coasts, where often nests in mangroves, sometimes in Australian "pines," red-cedars, live oaks, redbays, or sea grapes. In the subtropics and tropics, mangrove vegetation constitutes an important roosting and nesting substrate (Collazo and Klaas 1985, Schreiber 1979, Schreiber and Schreiber 1982). May shift between different breeding sites, apparently in response to changing food supply distribution (Anderson and Gress 1983) and/or to erosion/flooding of nesting sites.

Scientific Name: *Rostrhamus sociabilis plumbeus* **Common name:** snail kite **Grank/SRank/Fed/State:** G4G5T2/S2/LE/LE

TRS: 046S024E010 ;T#40 046S024E015 **Directions:**

Element Occurrence #: 023 **EO Rank:** **EO Rank Comments:**

Date Last Observed: 2001-05 **Element Occurrence Data:** observation reported

Protection comments:

Management comments:

Habitat comments: pine flatwoods

Natural communities in which species may be found: floodplain marsh, basin marsh, depression marsh, swale, slough; clastic upland lake, coastal dune lake, coastal rockland lake, flatwoods/prairie lake, marsh lake, river floodplain lake, sandhill upland lake, sinkhole lake, swamp lake

Species information: Florida: large, open freshwater marshes and lakes with shallow (< 4 ft) open waters; open water areas without emergent vegetation are required for foraging; nests usually 1-5 m above water in low tree or shrub (commonly willow, wax myrtle, pond apple, or cattails), also occasionally sawgrass, maidencane (especially during low water) used for support (Palmer 1988); usually builds (mainly male) a new nest for each nesting attempt, though may build over old nest or in same location as old nest (Johnsgard 1990).

Scientific Name: *Vireo altiloquus* **Common name:** black-whiskered vireo **Grank/SRank/Fed/State:** G5/S3/N/N

TRS: 046S024E13

Directions: birds heard in the unnamed creek that runs north-south, 0.5 mile north of where this creek empties into estero bay. this creek is immediately east of hendry creek.

Element Occurrence #: 047

EO Rank:

EO Rank Comments:

Date Last Observed: 1997-04-18

Element Occurrence Data: 2 males heard calling from the mangroves at 11:00 am in the hendry creek drainage. may have been nesting or migrating.

Protection comments: in the estero bay carl project which should be completed to protect this habitat.

Management comments:

Habitat comments:

Natural communities in which species may be found: marine tidal swamp; estuarine tidal swamp; maritime hammock, rockland hammock

Species information: Mangroves, open woods, mango and avocado groves, residential areas. In migration and winter also lowland forest, woodland, scrub, and partly open situations with scattered trees. Mostly in mangroves in Florida. In upper canopy at El Verde, Puerto Rico. Sometimes in pine plantations in Puerto Rico (Collazo and Bonilla 1988). Jamaica: common in most of lowland and midlevel forest, fairly common in lower montane forest, uncommon at higher elevations; present but scarce in mangroves and ruinate lowland woodland, fairly common in wooded cultivation (Lack 1976); highest densities in dry and wet limestone forests (Cruz 1980). Nests in fork of slender twigs in tree or shrub about 2-4 m above ground or water.

Scientific Name: *Trichechus manatus*

Common name: manatee

Grank/SRank/Fed/State: G2/S2/LE/LE

TRS: 053S029E0

Directions: sw gulf coast from east cape to s end of san carlos bay, including whitewater bay, shark r., harney r., broad r., rodgers r., lostmans r., chatham r., huston r., ten thousand islands and estero bay.

Element Occurrence #: 020

EO Rank: BA

EO Rank Comments:

Date Last Observed: 1990-08-27

Element Occurrence Data: relatively common particularly in ten thousand islands area; feed on sea grasses and algae; ca. 150 manatees inhabit this area in summer and 190 in winter.

Protection comments: restirct boat traffic and speeds.

Management comments: maintain water quality.

Habitat comments: gulf coast and associated bays, rivers, passes and inlets from east cape to s end of san carlos bay; submerged spermatophytes plentiful, freshwater readily available.

Natural communities in which species may be found: marine algal bed, marine grass bed, marine tidal swamp; estuarine unconsolidated substrate, estuarine grass bed, estuarine tidal marsh, estuarine tidal swamp; alluvial stream, blackwater stream, spring-run stream

Species information: Shallow coastal waters, estuaries, bays, rivers, and lakes; throughout most of the range, appears to prefer rivers and estuaries to marine habitats (Lefebvre et al. 1989). Not averse to traveling through dredged canals or using quiet marinas. Apparently not able to tolerate prolonged exposure to water colder than 20 C. In the north during October-April, congregates in warmer water bodies (spring-fed rivers, outfalls from power plants). Prefers waters at least 1-2 m in depth; along coast often in water 3-5 m deep; usually avoids areas with strong current. Except in Greater Antilles, consistently associated with freshwater sources (Lefebvre et al. 1989). In Brevard County, Florida, cul-de-sac shelter type was the most ecologically valuable of all shelter types (Burke 1994). ^Young are born in the water. Sheltered bays, coves, and canals are important for reproductive activities (O'Shea and Ludlow 1992).

Scientific Name: *Ursus americanus floridanus*

Common name: Florida black bear

Grank/SRank/Fed/State: G5T2/S2/N/LT*

TRS: 046S025E020, 046S025E030, 046S024E010, 046S025E029 ;T#40 046S024E015

Directions:

Element Occurrence #: 074

EO Rank:

EO Rank Comments:

Date Last Observed:

Element Occurrence Data:

Protection comments:

Management comments:

Habitat comments:

Natural communities in which species may be found: hydric hammock, wet flatwoods, baygall, bottomland forest, floodplain forest, floodplain marsh, floodplain swamp, freshwater tidal swamp, slough, strand swamp, swale, basin marsh, basin swamp, bog, coastal interdunal swale, depression marsh, dome swamp; sandhill, scrub, xeric hammock, beach dune, coastal berm, coastal grassland, coastal strand, maritime hammock, shell mound, slope forest, upland hardwood forest, upland mixed forest, upland pine forest, pine rockland, rockland hammock, sinkhole, dry prairie, mesic flatwoods, prairie hammock, scrubby flatwoods

Species information: Large undeveloped wooded tracts; pine flatwoods, hardwood swamp, cypress swamp, cabbage palm forest, sand pine scrub, mixed hardwood hammock; usually in areas that include multiple forest types; habitat use varies with food availability (Maehr and Wooding 1992, which see for further details). Inhabits areas of dense cover, such as those referred to as "bay-galls" in south Florida, "swamps" in middle Florida, and titi swamps in the panhandle (Layne 1978). Dens usually are in thick shrub/vine cover in remote swamps or thickets, sometimes in hollow trees (Maehr and Wooding 1992). ^Young are born in a den in dense cover or hollow tree, in hardwood swamp or dense thicket (Wooding and Hardisky 1992).

Scientific Name: *Bird rookery*

Common name:

Grank/SRank/Fed/State: //N/N

TRS: 046S024E28

Directions: estero bay rookery subcolony b2, on a small islandin estero bay about 0.2 mi s.e. of julies island. map in u82nes01: 219, 427.

Element Occurrence #: 071

EO Rank:

EO Rank Comments:

Date Last Observed: 1978-07

Element Occurrence Data: brown pelican (many nesting pairs seen 4/76, 6/76. 4/77 4/78 not 7/78). double-crested cormorant (many np 4/76, some 4/78, none otherwise). great egret(np 4/76, 6/76, 4/78, none otherwise). snowy egret (5 np 7/78). tricolored heron seen 4/78, np 7/78.

Protection comments:

Management comments:

Habitat comments: colony site is nonbarrier coastal island surround-ed by water. nesting substrate is mangroves over high ground. less than 0.8 km from human disturbance.

Natural communities in which species may be found:

Species information:

Appendix I

Listed Plant and Animal Species Known to Occur in Lee County

Appendix I. Listed plants and animals known to occur in Lee County.

Scientific Name	**Common Name**	**FDACS/FWC**	**USFWS**	**FNAI**
Accipiter cooperii	Cooper's hawk			G4S3?
Aimophila aestivalis	Bachman's sparrow			G3S3
Aphelocoma coerulescens	Florida scrub-jay	T	T	G3S3
Aramus guarauna	Limpkin	SSC		G5S3
Ardea herodias occidentalis	Great white heron			G5T2S2
Asplenium serratum	Bird's nest spleenwort	E		G4G5S1
Burmannia flava	Fakahatchee burmannia	E		G5S1
Buteo brachyurus	Short-tailed hawk			G4?S3
Calopogon barbatus	Bearded grasspink	T		
Celtis iguanaea	Iguana hackberry	E		G5SH
Celtis pallida	Spiny hackberry	E		G4S1
Cereus gracilis	West coast prickly apple	E		
Cereus pentagonus	Dildoe cactus	E		
Chamaesyce cumulicola	Sand dune spurge	E		G2S2
Charadrius alexandrinus var. tenuirostris	Southeastern snowy plover		T	G4S2
Charadrius melodus	Piping plover	T	T	G3S2
Cheilanthes microphylla	Southern lip fern	E		G5S3
Cheiroglossa palmata	Hand fern	E		G5S3
Chelonia mydas mydas	Atlantic green turtle	E	E	G3S2
Chrysophyllum olivaeforme	Satinleaf	E		
Coccyzus minor	Mangrove cuckoo			G5S3
Crocodylus acutus	American crocodile	E	E	G2S1
Cyrtopodium punctatum	Cow-horned orchid	E		G5?S1
Deeringothamnus pulchellus	Beautiful pawpaw	E	E	G1S1
Dendroica discolor paludicola	Florida prairie warbler			G5T3S3
Dermochelys corias	Leatherback	E	E	G3S1
Elytraria caroliniensis var. angustifloia	Narrow-leaved Carolina scalystem			G4T2S2
Eragrostis tracyi	Sanibel lovegrass			
Ernodea littoralis	Beach creeper	T		
Eugenia confusa	Redberry stopper	E		G4G5S2S3
Eugenia rhombia	Red stopper	E		G5S1
Falco columbarius	Merlin			G5SU
Felis concolor coryi	Florida panther	E	E	G5T1S1
Forestiera segregata var. pinetorum	Florida pinewood privet			G4?T2S2
Fregata magnificens	Magnificent frigatebird			G5S1
Glandularia tampensis	Tampa vervain	E		G1S1
Gossypium hirsutum	Wild cotton	E		G4G5S3
Grus canadensis pratensis	Florida sandhill crane	T		G5T2T3S2S3
Gymnopogon chapmanianus	Chapman's skeletongrass			G2S2
Harrisia aboriginum	Aboriginal prickly apple	E		G2QS2
Ixobrychus exilis	Least bittern			G5S4
Jacquinia keyensis	Joewood	T		G4S3
Lantana depressa var. sanibelensis	Gulf coast Florida lantana	E		G2T1S1
Laterallus jamaicensis	Black rail			G4S3?
Lechea cernua	Nodding pinweed	T		G3S3
Lechea divaricata	Spreading pinweed	E		G2S2
Mustela frenata peninsulae	Florida long-tailed weasel			G5T3S3?
Myrcinthes fragrans var. simpsonii	Simpson's stopper	T		G4T3S3
Neofiber alleni	Round-tailed muskrat			G3S3
Nolina atopocarpa	Florida beargrass	T		G3S3
Nyctanassa violacea	Yellow-crowned night-heron			G5S3?
Nycticorax nycticorax	Black-crowned night-heron			G5S3?
Opuntia stricta	Prickly pear cactus	T		
Picoides borealis	Red-cockaded woodpecker	T	E	G4S3
Picoides villosus	Hairy woodpecker			G5S3?
Pituophis melanoleucus mugitus	Florida pine snake	SSC		G5T3S3
Plegadis falcinellus	Glossy ibis			G5S2
Polygala boykinii var. sparsifolia	Boykin's few-leaved milkwort			G3G4T2QS2
Rallus longirostris scottii	Florida clapper rail			G5T3?S3?
Rana capito	Florida gopher frog	SSC		G4S3
Scaevola plumeri	Inkberry	T		
Sceloporus woodi	Florida scrub lizard			G3S3

Sciurus niger avicenna	Big cypress fox squirrel	T		G5T2S2
Sciurus niger shermani	Sherman's fox squirrel	SSC		G5T2S2
Sigmodon hispidus insulicola	Insular cotton rat			G5T1T2S1S2
Spiranthes brevilabris var. floridana	Florida ladies tresses	T		
Sterna caspia	Caspian tern			G5S2?
Sterna maxima	Royal tern			G5S3
Sterna sandvicensis	Sandwich tern			G5S2
Stillingia sylvatica ssp. tenuis	Queen's delight			G4G5T2S2
Stylisma abdita	Scrub stylisma	E		G2G3S2S3
Suriana maritima	Bay cedar	E		
Zephyranthes simpsonii	Rain lily	T		G2G3S2S3

list provided by FNAI

Appendix J
Timber Management Assessment

Appendix J - Timber Management Assessment

TIMBER ASSESSMENT
ESTERO BAY STATE BUFFER PRESERVE
PREPARED BY
BUTCH MALLETT
SENIOR FORESTER, OTHER STATE LANDS REGION 3
DIVISION OF FORESTRY
OCTOBER 2002

PURPOSE

This document is intended to fulfill the timber assessment requirement for Estero Bay State Buffer Preserve (EBSBP) as required by Section 1. Section 253.036, Florida Statutes. The goal of this *Timber Assessment* is to evaluate the potential and feasibility of managing timber resources for conservation and revenue generation purposes.

BACKGROUND

The property encompassed by Estero Bay State Buffer Preserve was purchased in stages. Almost five years has past since the first and largest tract was acquired. It included almost 6,350 aces. With later acquisitions, the total is approaching 8,500 acres. Out of the total acreage only approximately 1,500 acres of mesic and scrubby flatwoods have or are capable of growing pine timber. Historically, most of the commercially valuable trees found on this tract would have been South Florida slash pine (*Pinus elliotti* var. *densa*) (SFSP).

Healthy flatwoods communities are characterized by open, uneven-aged pine stands that allow a considerable amount of sunlight to reach the forest floor. Ground cover is a diverse mixture of grasses, herbaceous plants, and dried pine needles that foster frequent lightning season fires. Saw palmettos (*Serenoa repens*) are scattered and low growing.

Early photographs and historical accounts describe Florida flatwoods as much more of a "grassland" or "savanna" with a large pine overstory than occurs today. Dried grasses supported frequent (every one to three years), low intensity lightning started fires. Fire burned accumulated leaf litter and exposed bare mineral soil. This bare ground combined with the light shading of emerging grasses was ideal for the germination and survival of seed and seedling pine trees.

All of the existing upland ecosystems on EBSBP have been degraded by the absence of natural fire regimes. As a result saw palmettos have proliferated. In addition, ditch line spoil banks, road shoulders, and other disturbed sites have been rapidly colonized by exotic plants such as Brazilian pepper (*Schinus terebinthifolius*), Punk trees (*Melaleuca quinquenervia*), and Australian pines (*Casuarina* spp.).

GOALS AND OBJECTIVES

Estero Bay State Buffer Preserve was established to protect sensitive coastal estuarine and marsh habitats from adverse effects of development. The primary management objective for EBSBP is to restore where necessary and maintain healthy flatwoods ecosystems to serve as buffers for these wetlands.

Large tracts of protected land with diverse habitat types provide the opportunity to manage for a wide variety of native plant and animal species. Estero Bay State Buffer Preserve has a variety of ecotypes from oak scrubs to tidal marshes.

Many unique and disappearing animal species rely on healthy pine stands for their livelihood. Included in this group are the gopher tortoise (*Gopherus polyphemus*), Sherman's fox squirrel (*Sciurus niger*), and eastern indigo snake (*Drymarchon corais*) to name a few. In addition to providing a buffer for aquatic habitats, measures implemented to insure healthy, flatwoods ecosystems will help promote the continued existence of these and other important species.

TIMBER MANAGEMENT

GENERAL TIMBER MANAGEMENT GUIDELINES

Timber management on EBSBP should be viewed as a tool to facilitate ecosystem restoration and maintenance. Revenues generated from timber sales can help fund management goals.

To better understand timber management methods, knowledge of a few silvicultural terms is useful. The cross sectional area (in square feet) of an individual tree measured four and one-half feet above the ground is its Basal Area. Basal Area per acre (BA) is the sum of the Basal Area of every tree within a stand divided the number of acres in the stand. It is used as a measure of a timber stand's tree stocking and density. The diameter of an individual tree taken at this height is referred to as its diameter breast height or DBH. This measurement is used in calculating the Basal Area and combined with height can determine volume of each tree.

Fully stocked pine stands have enough trees per acre of a size large enough to utilize the growing space without causing over-crowding. Pine stands with 70 to 100 sq. ft. BA are considered fully stocked. It requires more, smaller diameter trees than it does larger diameter trees to equal one square foot of basal area. (For example: It takes 357 evenly spaced, six-inch diameter breast height trees per acre to equal 70 sq. ft. BA. Whereas, only 89 twelve-inch DBH trees per acre equal the same 70 sq. ft. BA.)

Basal Area can be roughly correlated to crown coverage and therefore needle-cast. About 40 to 60 sq. ft. BA of pine trees should provide sufficient needles to carry prescribed fire and adequate sunlight for native grasses to be maintained.

In natural, pine dominated forest systems trees die because they become old and less able to withstand insect and disease attack. (The life expectancy of slash pine is only around 100 years.) Bark beetles invade a weakened tree then multiply and kill some of its neighbors. This creates holes in the canopy of various sizes that allow full sunlight to reach the forest floor. Lightning strikes and windstorms do the same thing. In addition, lightning caused fires burn away leaf litter and expose bare mineral soil. The bare soil and canopy openings permit large numbers of direct sunlight-dependent pine seedlings to become established and grow straight and tall.

Pine seedlings become established in these holes at very high densities. It is not uncommon to have ten to twenty thousand seedlings per acre in scattered openings. Recurrent wildfires and competition for sunlight, moisture, and nutrients favor the strongest, fastest growing pine saplings. The rest die off continually over the life of a stand of trees until the trees mature and another opening is created that replaces the survivors with young seedlings again. The result is an uneven aged stand where each group of trees created by a canopy opening is about the same age. However, the stand as a whole is a mosaic of clusters that have different ages and densities. The ultimate goal of ecologically based timber management is to mimic these natural processes and still be able to harvest trees that are destined to die anyway. The challenge is to capture the value of the timber while minimizing the impact on the system as a whole.

Plantation pine management is a special adaptation of the natural system described above. In it, larger openings or blocks (as small as ten acres with no upper limit) are created. Seedling pines are then planted at uniform spacing. This method does not have a natural appearance, but insures the best tree growth possible.

Thinning type harvests in pine plantations and natural stands help maintain the health and vigor of a stand by removing weak, diseased and deformed trees. Enough co-dominant trees are removed during thinning

to ensure crown retention and continued growth in the remaining trees. To create or maintain uneven aged pine stands, group selection openings are cut during thinning activities. These openings allow young trees to become established by seed falling from nearby trees or by planting seedlings. Since pine seedlings require direct sunlight to grow, all trees within the opening must be removed. However, openings can be as small as one-half acre. For natural regeneration, the ideal width of the openings is about two to three chains. Thinning the remnant trees to 40 to 60 sq. ft. BA while cutting the openings insures ample sunlight to the forest floor. It also eliminates the need to revisit these stands for 10 to 20 years. By that time, the natural regeneration or planted seedlings will have become sapling-sized or larger and they will need thinning.

Stands having an adequate number of mature pines but lacking in young trees should have natural regeneration encouraged. Those with an insufficient number of seed trees may require artificial regeneration methods. In either case, palmettos and other underbrush will have to be controlled to facilitate seedling establishment.

Planting activities, group selection openings, palmetto control measures, and natural regeneration in thin stands will produce young trees of various sizes. A well stocked stand of young pine trees will usually require the removal of weak, diseased, and some over crowded trees beginning by the age of 15 to 20 years. By this time, the crowns have grown together and ground cover begins to get shaded out. Harvesting a portion of the timber maintains healthy pine growth and provides sunlight to the forest floor. Trees removed in the thinning process can be sold to generate revenue to be used in other land management projects. Likely markets for early thinnings from pine stands currently include pulpwood, fence posts and landscape mulch.

Due to shading effects, trees grown in tight spacing produce fewer and smaller lower limbs. Trees with fewer limbs make more desirable timber products. Planting at least 400 seedlings per acre also helps insure the marketability of the pine trees and increases future management options.

The need for second and later thinnings will depend on how low the BA was taken in the first thin and the subsequent growth rate of leave trees. If the BA is reduced to 50 to 70 sq. ft. in the first cut, another harvest will probably be needed in ten to fifteen years. Trees removed from the second and succeeding operations produce ever more valuable products and therefore more money. Current market conditions have some second thinning products worth at least five times as much as wood that was cut during the original harvest. Third thinning trees can be worth twice as much as the second thin. All of this revenue can be generated and still have a stand of pine trees and a healthy ecosystem.

NOTE: ALL TIMBER MANAGEMENT ACTIVITIES MUST COMPLY WITH THE CURRENT VERSION OF THE SILVICULTURE BEST MANAGEMENT PRACTICES MANUAL (BMP'S) FOR PUBLIC LANDS AND OUTSTANDING FLORIDA WATERS (OFW).

EXISTING TIMBER RESOURCES

Typically this type of land in South Florida land was primarily managed for cattle production. Timber growing on the land was a secondary benefit. Probably most of the valuable timber was removed at least once or twice since Europeans settled in the region. Whenever the pine trees grew large enough to be useful and the landowners needed cash or building materials, the mature trees were cut. After these harvests the only trees left standing were too small, crooked, or deformed to be useful as sawtimber. No major cutting appears to have occurred within recent years. As a result, some of the previously uncut pine trees are again starting to reach maturity.

Basal areas of natural South Florida slash pine stands throughout EBSBP vary from 0 to over 100 sq. ft. per acre. Stand ages are mostly mixed with a limited number of trees over 60 years. Regeneration under 10 to 15 years of age is even more rare due to competition from unburned understory vegetation.

Recommendations –

For the following recommendations to be practical markets for the timber products produced must be available. Hauling distances from EBSBP to most traditional forest product markets are extreme. Because of this pulpwood usually costs more to haul to north Florida mills than it is worth when it gets there. Although, when north Florida is very wet and the south dry, mills sometimes pay enough to make it economical for loggers to drive longer distances. Other forest product mills such as fence posts and landscape mulch are located closer to the Preserve. These markets can fill the important gap in the timber management options created by the lack of a pulpwood outlet. Chip-n-saw and plywood veneer are higher value products. A substantial amount of either of these in a sale can increase buyer interest and enhance revenues considerably. Flexibility and timing can make the difference between success and failure of a timber sale. Finally, there is a limited volume of timber currently on this tract. Therefore, to attract bidders, it is likely that any planned timber harvests would have to be combined into one large sale or combined with other nearby state land timber sales.

Prescribed burning and possibly roller-drum chopping may be needed to control the understory vegetation (especially saw palmetto). If the palmettos are to be chopped, some pine trees may have to be removed to facilitate the operation. The current use of herbicides to control invasive exotic plants will probably have to be maintained until prescribed fire can safely be reintroduced.

BA < 10 - These areas have insufficient pine trees to regenerate themselves. Control the saw palmetto through the use of roller drum choppers and fire. Plant South Florida slash pine as described under *Artificial Regeneration* section below.

Many factors affect the need for and timing of future thinnings. These include initial planting density, number of trees surviving to merchantable size, crown closure (ground cover shading), and loss of crown. As soon as the trees achieve crown closure, thin the stand to 50 to 70 sq. ft. BA by removing first the weak, diseased, and suppressed trees. At the same time, enough of the co-dominant trees should be removed to reach the proper spacing.

The thinning process is repeated every time the stand approaches 100 sq. ft. BA or ground cover begins to be shaded out. Thinning to as low as 40 sq. ft. BA with re-treatment at 80 to 100 sq. ft. to insure open, grassy stands is reasonable in second or subsequent harvests.

10 to 30 BA – These stands may or may not have enough seed trees to regenerate themselves. Though for certain, any further loss of mature trees could preclude a healthy future. Stands with these marginally low basal areas should be included in the regeneration plan. See *Natural* and *Artificial Regeneration* sections below.

40 to 70 BA – These stands have an adequate number of pine trees to utilize the growing space without over crowding. No harvests are necessary in these stands unless thinning is required to allow access for roller drum chopping of palmettos. If chopping is needed, follow spacing recommendations as described in the *Natural Regeneration* section. In large stands with little regeneration, some group selection openings may be cut to promote seedling establishment.

80 BA & UP – Pine stands with levels of stocking are probably beginning to shade out the ground cover. These stands should be thinned to 40 to 60 sq. ft. BA. If chopping for palmetto control is needed, follow spacing recommendations as described in the *Natural Regeneration* section. Group selection openings should be scattered throughout these stands to promote seedling establishment.

REGENERATION

NATURAL (USED IN AREAS WITH MATURE, CONE BEARING TREES)

Control saw palmettos, sabal palms, hardwoods, and dense understory vegetation. This can be accomplished by burning the stand in late winter or early spring to reduce the biomass. Then roller drum chop the area prior to the summer rainy season with a chopper heavy enough to sever saw palmetto stems (probably a medium or heavy, single or tandem, but not offset). A second burn in the summer after the chopping is complete would be beneficial if a fire will carry. Close mowing with a heavy-duty brush cutter is another method sometimes used to reduce and control the height of saw palmettos.

In natural stands with BA exceeding 30 sq. ft. per acre, some trees may have to be removed prior to chopping the understory. This will facilitate equipment movement. Spacing between leave trees or clusters of leave trees should be at least 30 feet to give room for the tractor and roller-drum chopper to operate without damaging residual trees.

If for any reason an adequate number of young seedlings are not established by the second summer following the initial chopping, burn the stand again prior to end of the rainy season. This will allow some grasses to re-grow enough to protect the seeds and fragile seedlings.

Once 1,000 or more seedlings per acre are established and growing, withhold fire from the stand for at two to three years. Fire should be reintroduction to the system by following the directions contained in the *Prescribed Fire* section below.

ARTIFICIAL –

Hand Planting – Hand planting of either bare-root or containerized (tubeling) SFSP seedlings is one option for reestablishment in areas where an inadequate number of seed trees exists. Bare-root trees are planted in the winter. Tubelings can be planted in winter or summer, thereby extending the planting season.

Plant approximately 600 seedlings per acre at varying spacing, but averaging 6’ X 12’ overall. Due to the increased likelihood of survival and higher cost of containerized seedlings, as few as 400 seedlings per acre can be planted.

A word of caution about planting seedlings. Adequate site preparation is essential to seedling survival. Dense saw palmettos must be controlled as previously described. Other brushy vegetation may require broadcast spraying of an appropriate herbicide. Also, competition from grasses for soil moisture during hot, dry weather can cause severe losses of young seedlings. Where grasses are a problem apply a contact herbicide such as Roundup either in 2’ wide strips or in spots. The herbicide should be applied far enough in advance of planting time (at least one month) so that the grasses have time to “brown up” and indicate where to plant the seedlings.

Machine Planting –

Meander planting bare-root or containerized SFSP seedlings at an average spacing of 6’ X 12’ yields about 600 trees per acre. It is more difficult to vary the spacing and make the planting look random with machine planting. This is due primarily to the inability of tree planters to make sharp turns and still pack the soil around the seedlings roots. Tight turns are also hard on the planter’s bearings. The desired effect can be obtained by gradually curving the planting rows and varying the distance between and within the rows. Another way to create the random look is to locate the planting rows twice as far apart as normal (averaging approximately 24’). Then, plant a second set of rows at some angle approaching 90 degrees to the first set of rows spaced about the same distance apart.

Again competition for soil moisture during dry weather can cause heavy losses of seedlings and waste of planting costs. Where grass is thick, it is best to either herbicide strips as described

above or use a combination planter/scalper to plant the seedlings. The scalper should be set to no more than 2 to 3 inches deep and 18 to 24 inches wide. These settings will minimize soil disturbance and maintain continuity of fuels for future prescribed burns, but the seedlings will have a decent chance of survival.

Soils and Productivity –

The U. S. Department of Agriculture Natural Resource Conservation Service (NRCS) publishes soil series profiles and productivity tables. The following is a summary of the most prevalent soils and an estimate of timber production capabilities for each type.

Boca-Immokalee-Myakka-Pompano soil types predominate in the pine growing areas of EBSBP. Site Index (age 25 years) for South Florida slash pine averages 35 to 45 feet. The table below indicates projected volumes of SFSP on soil types found on EBSBP. These volumes were approximated using the NRCS Woodland Management and Productivity tables and R.L. Barnes' Research Report No. 3, *Growth and Yield of Slash Pine Plantations in Florida.* It assumes a fully stocked even-aged plantation of 400 surviving trees per acre at the age indicated.

Soil Type	SI(25 yrs)	Projected Volume (cords) at Age 20	25	Approximate Age First Thinning*
Boca	55	20	27	20
Immokalee	35	4	8	30+
Myakka	35 4	8		30+
Pineda	45	11	15	25+
Pompano	40	6	10	30
Wabasso	45	11	15	25+

*Assuming that by removing no more than one half of the standing volume approximately 6 to 8 cords per acre would be available for removal in the first thinning. Although growth rates for trees in uneven-aged stands will probably be reduced by a substantial amount. But, good data is not currently available to predict the exact loss. At current market prices 6 to 8 cords would yield revenues of about $35 to $50 per acre.

Of course in natural stands, while the seedlings were growing and encroaching on each other so were their larger neighbors in the stand. As a result to alleviate stress from over crowding and maintain healthy ecosystems, each thinning operation removes some of the more valuable trees at the same time. So proceeds from timber sales could reach $150 to $300 per acre while maintaining intact timber stands.

Salvage Sales –

On occasion, small volumes of wood may need to be removed due to fire, windstorm, insect or other damage. The decision whether or not to harvest the affected timber will depend on the threat to the surrounding stands, risk of collateral ecological damage, and the volume/value of the trees involved. For example, small, isolated lightning-strike beetle kills are a natural part of a healthy ecosystem and normally would not be cut. However, if a drought caused the insect infestation to spread, the infected trees and a buffer zone might have to be removed.

PRESCRIBED FIRE

Florida flatwoods ecosystems are fire dependent. Lightning sparked fires are natural to these communities. Prior to European settlement, wildfire occurred in the flatwoods at regular intervals of one to five years.

Saw palmettos have always been minor components of flatwoods ecosystems. Although the exact mechanism is not know, frequent wildfires kept their numbers under control. However, with the introduction of effective fire suppression in the mid-1900's, saw palmettos and hardwood tree species invaded the flatwoods. Dense shade caused by the proliferation of these hardy species results in the loss of other grassy and herbaceous ground covers. Less fine-fueled ground covers to carry fire resulted in deeper shade.

Fires in saw palmetto-dominated systems tend to be less frequent and more intense than in areas with more grasses. These extreme fires do not adversely affect the palmettos, but most other overstory plants including pines are affected. Hot fires can kill pine trees directly or weaken them enough to enable insects kill them. Lack of mature pines means loss of pine needle leaf litter that normally helps support less severe ground fires.

The intelligent use of prescribed fire is essential to the restoration and maintenance of open healthy, pine-dominated ecosystems. As desirable as burning is, caution must be exercised when reintroducing fire into these systems. It takes a lifetime to grow a mature pine tree. It only takes minutes to kill it with an ill-advised fire. Also, survival of newly established pine seedlings depends on timing and careful execution of burns. To prevent damage to delicate root systems and avoid smoky duff fires, be sure that there is adequate moisture in any organic matter thicker than approximately one inch. In stands with heavy duff layers, try to burn no more than one inch of duff at a time on approximately two to three-year intervals. At least the first burn should be during the dormant season after they have reached at least six feet in height. To reduce seedling mortality, consider conducting the first burn during winter months at night. If ground fuels are not too heavy, succeeding burns can be switched to the growing season.

South Florida slash pine seedlings do not enter a delayed height growth, stem diameter growth, tap root elongation "grass stage" like Longleaf pine (*Pinus palustris*) seedlings. However, the seedlings experience more rapid diameter and bark growth earlier in their development than their North Florida slash pine (*Pinus elliottii*) (NFSP) relatives do. The thicker bark and stem diameters make young SFSP more tolerant of short-term recurring fire than seedling NFSP.

ACCESS

Most blocks of Estero Bay State Buffer Preserve have roads up to the boundary. The only problem with the roads is that some of them are residential streets. The small volumes of wood likely to be harvested on EBSBP should not cause much damage to local roads. However, direct entrances onto feeder roads that bypass subdivision streets may have to be arranged. For the most part, interior roads are lacking. But, the majority of blocks are not so large as to preclude easy access to all timber stands.

SUMMARY

Reestablishment of native pine trees is essential to restoring healthy flatwoods ecosystems to Estero Bay State Buffer Preserve. Reintroduction of periodic fire is another requirement of these systems. The needles, annually shed by native pine trees, are an important carrier of fire in Florida's forests. Success of the prescribed burning program will likely depend on the ability of managers to continue growing pine trees. Timber sales are used to maintain vigorous stands of pine trees and maintain more open canopies. If timber sales are successful on EBSBP, the revenues generated can make a significant contribution toward management expenses.

Elimination of natural fire has allowed hardwood species, saw palmettos, and invasive exotic plants to invade the former grasslands. Once these species became established, they shaded out native grasses that

normally carried fire across the landscape. Without fire, leaf litter and shade build. Fire dependent, sun-loving plants (along with the animal species that rely on them) are lost from the ecosystem.

To restore and maintain a healthy fire dependent flatwoods ecosystem, it is desirable to reestablish a more natural fire regime. Control measures will also have to be implemented for the invasive exotics and saw palmettos. Currently used herbicide treatments of exotic plant pests will have to be continued at least until growing season prescribed fires can be used on a regular basis.

Reduction in the height and density of saw palmettos will reduce the intensity of fires. Fewer palmettos mean more sunlight reaching the ground that results in more native grasses and forbs. The most reliable way to control palmettos is with mechanical treatment such as mowing or roller-drum chopping. This sometimes requires removal of some of the pine trees to allow the heavy machinery to move between remaining trees within the stand. Maintaining at least a medium density of pines assures enough needle cast to help carry essential prescribed fires that will help keep palmettos from dominating the area again.

Appendix K
Fire Management Plan

Estero Bay State Buffer Preserve

FIRE MANAGEMENT PLAN

Prepared by Sherry Furnari, October 2002
Florida Department of Environmental Protection
Office of Coastal and Aquatic Managed Areas
Estero Bay State Buffer Preserve
700-1 Fisherman's Wharf, Ft. Myers Beach, FL 33931
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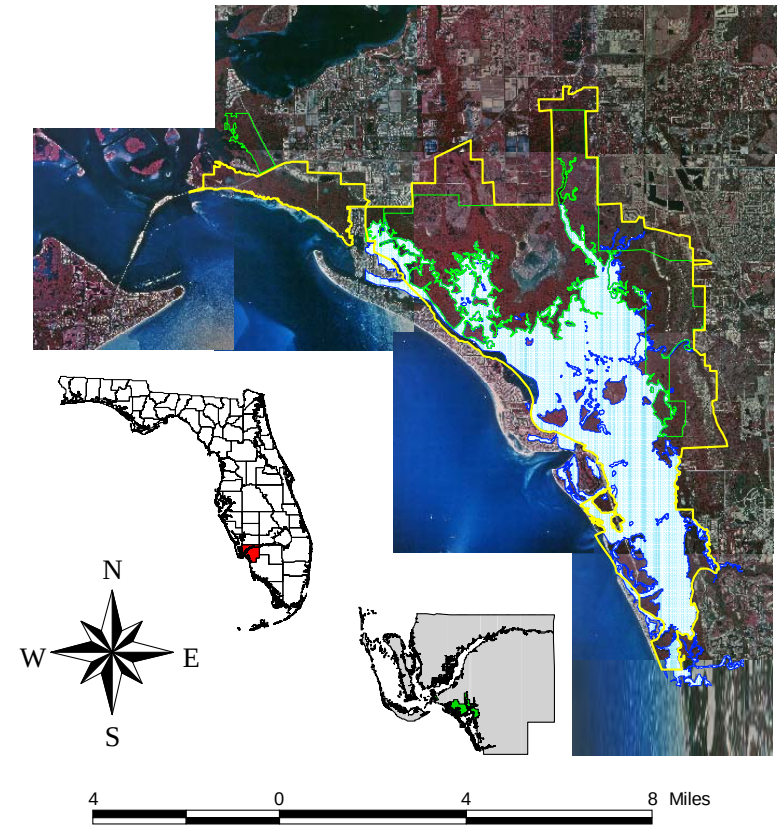
1.0 General Description of Area

1.1 Location

The Estero Bay State Buffer Preserve (EBSBP) is located in the southwestern edge of Lee County. For the remainder of this Fire Management Plan (FMP), the EBSBP will be referred to as the "Preserve." The majority of the Preserve is bordered as such: south of Summerlin Road, west of U.S. 41, east of the barrier islands (Estero, Black, Lovers Key, Hickery) and north of Bonita Beach Road. The Preserve is surrounded by five cities or towns (Ft. Myers Beach, Ft. Myers, San Carlos Park, Estero, and Bonita Springs) and is located in Sections 3 & 10, Township 46 South, Range 23 East; Sections 2, 8, 11, 14-28, Township 46 South, Range 24 East; Sections 19, 30 & 31, Township 46 South, Range 25 East; and Sections 6 & 19, Township 47 South, Range 25 East. The primary purpose for acquisition of Preserve lands is to protect the 9,834 acre Estero Bay Aquatic Preserve (EBAP) from impacts associated with development of land surrounding the bay. The EBAP was the state's first Aquatic Preserve, designated in 1966. Map 1 details the EBASBP boundary.

Map 1. EBASBP Boundary



This map is based on 1995 digital orthoquarter quads from Florida State University Florida Resources and Environmental Analysis Center

Projection UTM
Datum NAD 83
Estero Bay Aquatic & State Buffer Preserves layer map created September 2002 by: Sherry Furnari, DEP EBSBP
Buffer Preserve boundary created by:
Office of Coastal and Aquatic Managed Areas

CARL Project Boundary.shp
EBSBP.shp
EB Aquatic Preserve.shp

1.2 Hydrology

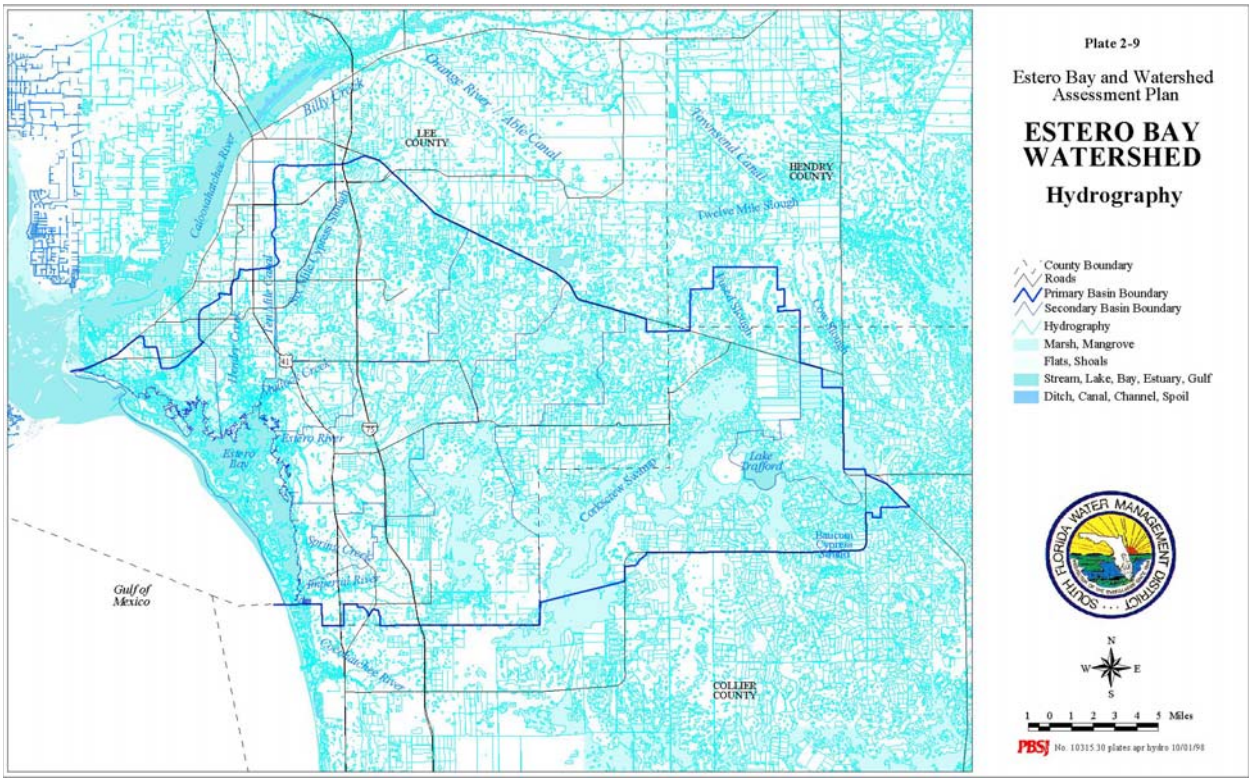
Hydrology is a science dealing with the properties, distribution, and circulation of water on the surface of the land, in the soil and underlying rocks, and in the atmosphere. Fire affects hydrologic processes in Florida's ecosystems. Some short-term effects are:

- Infiltration and percolation rates can be slowed, especially in dry, sandy soils that have good grass cover.
- Surface evaporation rates can be hastened due to higher post fire soil temperatures. This is minor as transpiration rates are decreased as a function of plant reduction.
- Because of reduced infiltration capability, surface runoff can be hastened. This is of little consequence in most areas of Florida.
- In areas of steep slopes, erosion is a possibility. However, plant root structure is unscathed by fire and usually continues to bind soil.

There are also more lasting effects of fire on hydrology:

- Prevention of organic buildup in shallow wetlands impedes succession and permits greater water storage by wetlands.
- Heavy removal of organic soils can re-create wetlands. Under natural conditions muck fires were far less frequent than today because wetlands were not well drained.

Map 2. Estero Bay Watershed Hydrography



1.3 Soils

The effects of soil vary depending on the intensity of the fire, fuel types soil type, topography, and residence time. The most observable measurable effects to soils are:

- The oxidative process of decay is accelerated – nutrients and minerals are more readily available.
- Concentration and mobility of potassium, calcium and magnesium are increased; short-term transfer of phosphorus, potassium, calcium, magnesium and nitrogen occurs from litter to soil.
- Increased soil temperatures after fires enhance nitrification of remaining organics.
- Soil bacteria and insect populations decline immediately but can increase 3-10 times within a month. Bacteria act to break down organics so as to make nutrients available to plants.
- The above factors combined with soil moisture will greatly enhance soil fertility and plant growth.
- Slight elevations in PH may occur for up to two years after some burns. This may influence the types of plants that will grow in the area.

Approximately 60% of the soils in Lee County are coastal and interior flatwoods and sloughs soils of the Hallandale-Boca and Isles-Boca-Pompano complex. They are nearly level, poorly drained, sandy soils with loamy subsoil. The remaining soils are Wulfert-Kesson-Captiva and Peckish-Estero-Isles soils of tidal areas and barrier islands, which are poorly drained, sandy and mucky soils. The four major hydrologic soil groups are:

- Group A (low runoff potential) – soils with high infiltration rates even when thoroughly wetted. Minimum infiltration rate=0.3-0.45 in/hr.
- Group B (low to moderate runoff potential) – soils with moderate " " ". MIR=0.15-0.3 in/hr.
- Group C (moderate to high " ") – soils with slow " " ". MIR=0.05-0.15 in/hr.
- Group D (high " ") – soils with very slow " " ". MIR=0.0-0.05 in/hr.

Table 1. Hydrologic Soil Types in the Estero Bay Watershed

Hydrologic Soil Group	Acres	Percent
A	2,015	1%
B	846	< 1%
C	9,578	3%
D	263,507	95%
Total	**186,161**	**100%**

USDA, Soil Conservation Service, SFWMD.

Within the Preserve, there have been twenty-two (22) soil types identified by the USDA Soil Conservation Service. Peckish Mucky and Wulfert Muck soil types exist on 45% of the buffer lands, while the remaining 55% are distributed within the another twenty (20) soil types.

Table 2. Soil Types

LEE MAP UNIT #	SOIL NAME	% ON BUFFER	TOTAL ACRES
6	Hallendale Fine Sand	4.06	345
7	Matlacha-urban land complex	.46	39.2
8	Hallendale Fine Sand, Tidal	3.61	306.1
10	Pompano Fine Sand	4.99	422.9
11	Myakka Fine Sand	.8	66.4
13	Boca Fine Sand	9.57	812.3
15	Estero Muck	10.07	855.2
16	Peckish Mucky Fine Sand	22.4	1900.4
17	Daytona Sand	2.3	194.7
23	Wulfert Muck	22.5	1912.5
24	Kesson Fine Sand	.6	50
26	Pineda Fine Sand	.12	10.1
27	Pompano Fine Sand, depressional	.25	21.2
28	Immokalee Sand	6.88	583.7
37	Satellite Fine Sand	.25	21.4
39	Isles Fine Sand, depressional	.35	29.7
42	Wabasso Sand, limestone substratum	3.63	308.1
43	Smyrna Fine Sand	.38	32.2
53	Myakka Fine Sand, depressional	.27	22.9
56	Isles Muck	6.41	544
63	Malabar Fine Sand, high	.03	2.3
69	Matlacha Gravelly Fine Sand	.07	5.7
	TOTAL	**100%**	**8486**

USDA, Soil Conservation Service, Soil Survey of Lee County.

1.4 Plant Communities & Response to Fire

Florida accommodates a multitude of plant or natural communities that respond differently to varied environmental elements including fire. Table 3 details the Preserve's diverse natural communities, their estimated acreage, and whether or not they necessitate a fire regime *(italicized).*

Table 3. Natural Communities within EBSBP

EBSBP ACREAGE: 8,486

Natural Communities (As per FNAI)	Acreage
Shell Mound	5
Wet Flatwoods	*1040*
Tidal Marsh	*1213*
Estuarine Tidal Swamp/Forest	5185
Unconsolidated Substrate	442
Coastal Rock Barren	1
Coastal Berm	*9*
Maritime Hammock	*2*
Mesic Flatwoods	*413*
Prairie Hammock	*2*
Depression Marsh	*38*
Scrub	*2*
Scrubby Flatwoods	*61*
Wet Prairie	*4*
Strand Swamp	*5*
Spoil Areas/Ditches/Power Line Rds	64
Fire Dependant Communities: 33% of total EB	***Total Fire Acreage: 2789***
To date Burn Zone Acres Qualified for Fire Management: 385	

Natural communities found within Estero Bay are described below based on the Florida Natural Areas Inventory's Guide to the Natural Communities of Florida. Each community has a different composition of flora, fauna, and fire regime.

Coastal Uplands –substrate and vegetation influenced primarily by such coastal processes as erosion, deposition, salt spray and storms.

Coastal Berm - generally a ridge of storm-deposited marine debris that is parallel to the shore, occasionally occurring in a series with alternating swales, usually found along low-energy coastlines, and are often surrounded by mangrove or salt marsh communities.

Coastal Rock Barren – characterized as flat rocklands with much exposed and eroded limestone and are sparsely vegetated with stunted, xeric and halophytic shrubs, cacti, algae, and herbs. Fire is highly unlikely.

Maritime Hammock – a narrow band of hardwood forest lying just inland of the Coastal Strand community. Mesic conditions and insular locations of well-developed communities inhibit natural fires, which occur no more frequently than once every 26-100 years.

Shell Mound – usually among the biological communities in that it is largely a result of the activities of Indians, instead of natural physical factors. Their coastal location generally protects them from fire, but are subject to marine influences, high winds, salt spray, high insulation, and storm surge.

Xeric Uplands – very dry, deep, well drained hills of sand with xeric-adapted vegetation.

Scrub – old dune with deep fine sand substrate; scrub oaks, rosemary and lichens; occasional or rare fire (20-80 years).

Mesic Flatlands – flat, moderately well drained sandy substrates with a mixture of organic material, often with a hard pan.

Mesic flatwoods – flatland with sand substrate; slash pine with saw palmetto, gallberry, and grass understory; frequent fire (3-7 years).

Prairie hammock – flatland with sand/organic soil over marl or limestone substrate; live oak and cabbage palm; occasional or rare fire (20-80 years).

Scrubby flatwoods – flatland with sand substrate; slash pine with scrub oak and grass understory; occasional fire (8-25 years).

Wet flatlands – flat, poorly drained sand, marl or limestone.

Wet flatwoods – flatland with sand substrate; slash pine and cabbage palm with mixed grasses and herbs; frequent fire (3-7 years).

Wet prairie – flatland with sand substrate; maidencane, beakrush, spikerush, St. John's wort and mixed herbs; annual or frequent fire (1-7 years).

Basin wetlands – shallow, closed basin with outlet usually only in times of high water; peat or sand substrate, usually inundated; wetland woody and/or herbaceous vegetation.

Depression marsh – small rounded depression in sand substrate with peat accumulating toward center; maidencane, fire flag, pickerelweed and mixed emergents; frequent or occasional fire (3-25 years).

Strand Swamp-shallow, forested, usually elongated depressions or channels dominated by bald cypress. Soils are peat and sand over limestone. Fire occurs on a cycle of perhaps 20-300 years (with the largest trees on the deepest peat towards the center of the strand burning least frequently).

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

Unconsolidated Substrate – expansive, relatively open areas of subtidal, intertidal, and supratidal zones, which lack dense populations of sessile plant and animal species. Unsolidified material and include coralgal, marl, mud, mud/sand, sand or shell.

Tidal Marsh – expanses of grasses, rushes and sedges along coastlines of low wave-energy and river mouths; occasional fires.

Tidal Swamp – expansive intertidal and supratidal area occupied primarily by woody vascular macrophytes (mangroves); may include epiphytes and epifauna.

Table 4. Natural Fire Frequency for Estero Bay's Natural Communities

Community	Primary Components	Fire Frequency
Mesic Flatwoods	Slash pine, saw palmetto, gallberry, mixed grasses	1-8 years
Wet Prairie	Maidencane, beakrush, spikerush, St. John's wort, mixed herbs	2-4 years
Wet Flatwoods	Slash pine, cabbage palm, mixed grasses and herbs	3-10 years
Depression Marsh	Maidencane, fire flag, pickerelweed, and mixed emergents	3-25 years
Tidal Marsh	Black needlerush, cordgrass, seashore dropseed, bulrushes, rushes, salwort	Occasional fire (6-10 years)
Scrubby Flatwoods	Slash pine, scrub oak, mixed grasses	8-25 years
Prairie Hammock	Live oak, cabbage palm	20-80 years (light)
Scrub	Scrub oaks, rosemary and lichens	20-80 years
Maritime Hammock	Mixed hardwoods, live oaks, stoppers, gumbo limbo, wild coffee	26-100 years
Strand Swamp	Cypress, willow	30-200 years
Estuarine Tidal Swamp / Forest	Black mangrove, buttonwood, red mangrove, white mangrove	100+ years
Coastal Berm	Cabbage palm, Spanish bayonet, live oak, sea purslane, sea oxeye, prickly pear, snowberry	Rare or no fire
Shell Mound	Gumbo limbo, cabbage palm, marlberry, saffron plum, cactus	Rare or no fire
Coastal Rock Barren	Stunted mangroves, buttonwood, glasswort	No fire
Unconsolidated Substrate	Sessile plant & animal, infaunal organisms	None

Florida Natural Areas Inventory, Guide to Natural Communities of Florida.

1.5 Wildlife & Response to Fire

Fire can directly and indirectly affect animals in many ways, any of which could vary with season. Generally, federal Refuges burn during October through March, but all select the winter months (December-February) when bird-nesting activity is minimal (Myers, 1992). Many one-time nesters breed in winter months or early spring months. Many bird species will re-nest, if a clutch of eggs or nestlings are lost. Moreover, winter burns may be more destructive of reptiles and amphibians. Therefore, it is imperative that the *burner* not only focus on the habitat, but be aware of the inhabitants within all of burn units in order to decide when would be the most optimal time to burn.

Additional seasonal categories are identified as growing-season (mid-March through early September), wildfire season (March-June), wet season (mid-May to October), and dry season (November to mid-May). Fire-caused mortality is by far the most frequently voiced objection to growing-season burns.

The most often overlooked concerns are that the consequences of lack of fire are often long-term:

- Without fires communities become monocultural, grasses grow senescent, trees are crowded, excessive fuels build up, tree and shrub species invade and the resultant habitat will not support diversity of animal life.
- Wildlife, in most cases, declines in both numbers and diversity in the absence of fire.
- Forest communities will be accompanied by a decrease in bird niche diversity and carrying capacity.

1.5.1 Wildlife Surveys

Wildlife surveys and/or plant inventories have been conducted with environmental consultants and DEP staff personnel. These activities are an on-going effort that continues to provide land management personnel with information to guide habitat restoration efforts. Some of the wildlife surveys performed include frog/toad monitoring, small mammal trapping, rookery and bald eagle nesting, and Gopher tortoise burrow location.

1.5.2 Listed Species

The Preserve is home to over 30 known listed plant and animal species, which are identified in Appendix I & II. There are two known pairs of Bald eagles that nest on the Preserve as well as potentially hundreds of Gopher tortoises that reside at the ERS MU and at least one sighting of a docile Indigo snake. Regardless of their official designated status, all habitats and their inhabitants' well being are taken into consideration for all land management activities.

"Gopher tortoise densities are higher in open areas with herbaceous groundcover than in brushy, shaded sites; the former have patches of bare ground needed for nest excavation and also provide abundant herbaceous vegetation for feeding. This type of habitat is promoted by growing-season fires and it has been suggested that growing-season fire might increase the amount of food available in late summer when food quality is declining and would provide good conditions for new hatchlings, which emerge in late summer and early fall" (Myers, 1992).

The Preserve's scheduling of prescribed fires must take into consideration all listed species, where they are located, seasonal direct and indirect impacts, and their fire dependent characteristics. After all, listed species needs may include several of the fire objectives.

2.0 Florida's Fire History

"A Scene from Florida's Past: It was sweltering-a day to make paint blister. The cicadas buzzed incessantly as the thunderheads piled up like cauliflower in the sky. Florida on a summer afternoon. Suddenly a lightning bolt sliced through the oppressive air, shattering the bark of a pine tree. Lightning spiraled down the trunk, leaving a deep gash and hitting the ground with explosive force. A feeble fire flickered in the dry grass and pine needles. A cool breeze blew, but no rain came. The breeze fanned the fire pushing it along. Soon the fire had burned many acres of the grassy pine woods" (SFIFMC, 2001).

Naturally, this scene has probably repeated itself for millions of years in Florida…and it still does. Florida's flora and fauna within several habitats grew accustomed to frequent fires and came to depend on fire for their very survival. Lightning induced or aboriginal set fires were able to burn continuously across uninterrupted community types restricted only by natural firebreaks such as wet communities or waterways (Myers and Ewel 1991). Lightning strikes would start a fire, generally toward the end of the dry season / beginning of the wet season (March-July). This fire would travel through a variety of communities, consuming the existing fuels. This would continue until the fuels were gone, rains stopped the spread or the fire entered a community that was too wet to burn (mangrove forest, cypress swamp, pond).

2.1 Wildfire/Natural vs. Prescribed Fire

Upon discovery of wildfires within the Preserve boundary, immediate assessment will be performed to determine fire behavior. Assessments will be conducted by Preserve staff with the Division of Forestry (DOF) personnel to determine a course of action. If current and predicted weather conditions are favorable, all hazardous factors have been considered including the threat to structures or safety, and the wildfire is determined to be beneficial to the Preserve, provisions will be developed with the approval of DOF to allow the fire to burn itself out naturally. Should the fire be determined to have a potentially detrimental impact on the natural community, produce unacceptable levels or behavior of smoke, or have any potential for escape from the desired burn area, all efforts toward suppression will be taken. In cases where the threat of injury or death, or the loss of property or liability to the State of Florida exists, immediate suppression by any means necessary is acceptable. If required, appropriate action will be taken to obtain a burn permit from DOF. Preserve staff will remain on-site to monitor or otherwise manipulate the fire behavior to meet burn objectives, and to mop-up once the fire is out.

The wildfire response however, should favor the least damaging methods feasible. The use of existing natural and man-made firebreaks, water/foam and soft fire control lines, or the setting of backing fires is preferred over plowing or disking. Preserve staff however, are not always aware of a wildfire within its boundary or the actions that are being taken or have been taken to suppress it. It is, therefore critical to have a good working relationship with the local DOF so that any potential problems associated with fire suppression activities can be addressed prior to on-site action. DOF personnel should be made aware of on-site conditions and any cultural site locations at risk whenever possible to minimize impacts to these areas.

3.0 Fire Environmental Factors

There are three main fire environmental factors: weather, topography, and fuels. These factors determine fire behavior. Of the three, topography is the least important in Florida, since there is only a 350' difference between the highest point in the state and sea level. Moreover, the Preserve's highest elevation within fire dependant habitats is < 7'.

3.1 Fire Weather

The primary weather factors that are pertinent to fire weather and its' behaviors are: temperature, relative humidity (RH), atmospheric stability, wind speed and direction, and precipitation. Additional factors to contemplate are fine-fuel moisture and the Keetch-Byram Drought Index.

- Ambient **temperature** is a measure of the hotness or coldness of the air. Less energy from a fire is necessary to heat a warm fuel to its ignition temperature. Twice the amount of heat is needed to raise a fuel to its lethal threshold of 145°F when the ambient temperature is 45°F as when the ambient temperature is 95°F. *Preferred Temperature: Below 95°F, Preferred Winter Temperature: Below 60°F*

- **Relative humidity** is a measure of the amount of water vapor a parcel of air contains expressed as a percentage of the amount it contains at saturation. The temperature at which saturation of air is reached is called the dew point (RH=100%). Warm air holds more moisture than cold air. Relative humidity can be used to help regulate fuel consumption through its effect on fine-fuel moisture content. As the RH exceeds 60%, a very patchy burn should be expected. Under low RH conditions, the fuels are more flammable. *Preferred Humidity: 30-55 %*

- The **dispersion index** (DI) is a forecast tool that estimates both daytime and nighttime stability. The higher the dispersion index the better the dispersion, but the more unstable the atmosphere (see table). As the DI approaches 80 or higher, the probability of resource damage and fire escape increases. *Preferred Dispersion Index: 61-80* (but may go up to 100 *with caution*)

Table 5: Relationship of Dispersion Index to On-the-Ground Burning Conditions

Dispersion Index	Burning Conditions
> 100	Very good – burning conditions may be so good that fires may be hazardous and present fire control problems. Reassess decision to burn.
61 – 100	Good – preferred range for prescription burns.
41 – 60	Generally OK – climatological afternoon values in most inland-forested areas fall in this range.
21 – 40	Fair – stagnation may be indicated if accompanied by low windspeeds. Reassess decision to burn.
13 – 20	Generally poor – do not burn. Stagnant if persistent, although better than average for a night value.
7 – 12	Poor – do not burn. Stagnant during the day, but near or above average at night.
1 – 6	Very poor – represents the majority of nights at many locations.

- **Surface wind** can result from general large-scale weather patterns or from local effects such as the sea breeze. They may extend for short distances or for distances up to 100 miles. These are the winds (speed and direction) that are frictionally impeded by vegetation and are

measured at a height approximately 20 feet above the average height of the vegetation. This is usually the forecasted winds. *Preferred Surface Wind Speed: 5-15 mph* (This depends upon the site, plant communities and smoke sensitive areas)

- **Transport wind** is the average wind (speed and direction) in all layers below the mixing height. *Preferred Transport Wind Speed: 9-20 mph*

- As the air heated by solar radiation rises, it displaces cooler air that sinks, setting up a vertical circulation pattern. The height to which vigorous mixing due to convection occurs is called the **mixing height**. In general, the more unstable the atmosphere, the higher the mixing height. The minimum mixing height advocated for prescribed burning is 1700 feet. *Preferred Mixing Height: 1,700-6,500 feet*

- **Precipitation (rainfall)** affects both fuel and soil moisture, which can have an impact on prescribed burns. Moist soil protects roots and microorganisms important to regeneration of the ecosystem. Burning should cease during periods of prolonged drought and resume only after a soaking rain of *at least 1 inch.* If recent precipitation has been near average, ¼ - ½ inch of rain followed by sunny skies, brisk winds and low humidities will generally result in several days of good prescribed fire condition with adequate soil protection. Even though there is a methodical evaluation of weather conditions before and during a prescribed fire, there are some weather *Watchout* Factors that can alert firefighters of changing conditions that may effect fire behavior. *Preferred Soil Moisture: Damp*

- **Fine-fuel moisture** is strongly influenced by rainfall, relative humidity and temperature. The preferred range in fine-fuel moisture of the upper litter layer is from 10-20 percent. One simple test that will give a *very rough* estimate of the upper litter layer moisture is to pick up a few pine needles and individually bend in a loop. If the needles snap when the width of the closing loop is about ½ to ¼ inch, their moisture content is between 15 and 20 percent. If they do not snap, they are too wet to burn. If they crumble into small pieces, they are exceedingly dry. The fire may cause damage and be difficult to control. *Preferred Fine-Fuel Moisture: 10-20%*

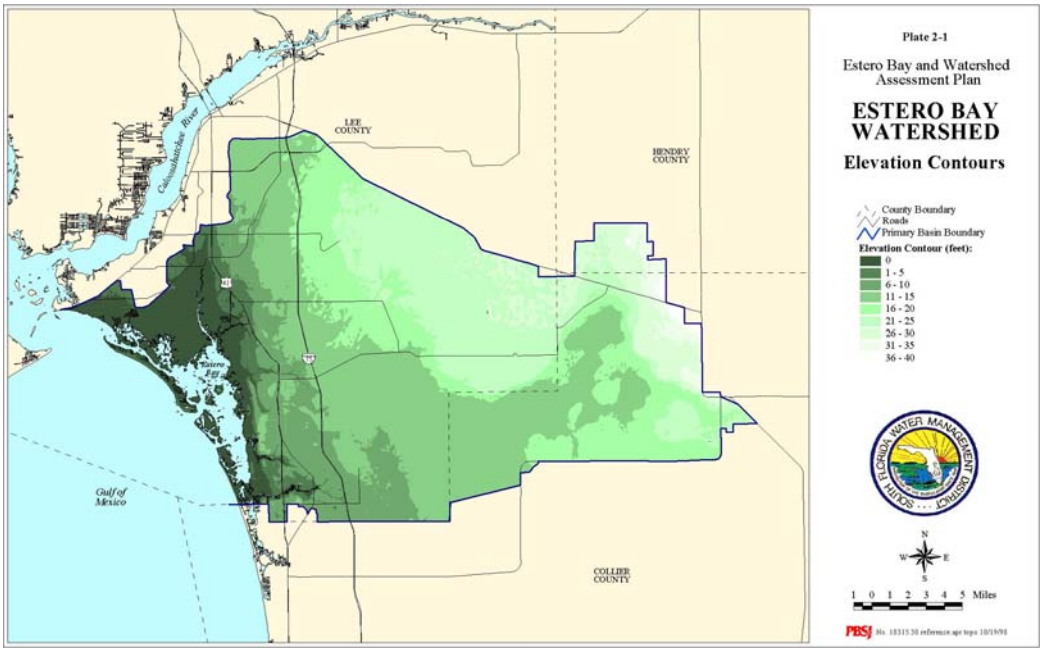
- The **Keetch-Byram Drought Index (KBDI)** is used to determine regional weather affecting or causing dry conditions. A drought index of < 500 is usually best for prescribed fire activities. Prescribed fires can be conducted if the drought index is 500-600, however caution should be exercised. Anything > 650 present a hazardous condition and prescribed fires should not be conducted.

3.2 Topography

Topography is the "configuration of the earth's surface, including its relief and the position of its natural and manmade features" (S290). Topographic features are an important consideration to evaluate fire behavior. These factors include: elevation, position on slope, aspect, shape of the country, and steepness of slope. Southwest Florida is basically flat with little rise in elevation. SW Florida topography is not a factor for creating dangerous or explosive fire behavior as compared to western U.S. topography features. More specifically, all of the Preserve's fire

dependent habitats are less than 7' above sea level. Whereas, Dog Key's elevation is reportedly at 11.5' and the shell midden habitat doesn't support a fire regime.

Map 3. Estero Bay Watershed Elevation Contours



3.3 Fuels

Webster's Dictionary describes fuel as "a material used to produce heat or power by burning." Several fuel characteristics affect fire behavior in Florida and they include:

1. Fuel loading
2. Fuel size and shape
3. Fuel arrangement
4. Compactness
5. Horizontal continuity
6. Vertical arrangement
7. Fuel chemistry
8. Fuel moisture

Fuels have been classified into four groups: grasses, brush, timber, and slash. The differences in fire behavior among these groups are basically related to the fuel load and its distribution among the fuel particle size classes.

3.3.1 Fuel Models

Fuel models are used to predict fire behavior and has become more valuable for controlling fire and for assessing potential fire damage to resources. Thirteen fuel models have been categorized by the USDA Forest Service and the Preserve consist of seven fuel models:

Table 6. Preserve's Fuel Models

Fuel Model	Depth Bed	Vegetation Type
3	>1'	Tall grasses (tidal marsh, ponds)
4	>4'	Scrubby flatwoods, Pine flatwoods, melaleuca stands
5	<6'	Young scrub, scrubby flatwoods
6	2.5'	Palmetto – gallberry w/o overstory
7	<4'	Palmetto-gallberry understory w/ pine overstory. Shrubs generally 2-6' high.
8	<2"	Dead foliage w/ conifer or hardwood litter (Brazilian pepper & Australian pine)
11	<1.0'	Light logging slash from dead melaleuca stands

Fuels Management in the Wildland Urban Interface

4.0 Prescribed Fire Management Operations

Natural communities within the Preserve include scrub/scrubby flatwoods, mesic/wet flatwoods, marshes, and swamps are adapted to and/or dependent on fire to maintain species composition and diversity. Pre-development Florida landscapes lacked the fragmentation caused by highways, canals, trails and other development so natural fires could spread uninterrupted until fuels were consumed and the fire was out. Since most natural communities now interface with residential and urban development, allowing wildfires to grow without restriction to maintain natural communities is not usually possible.

Florida averages 13 lightning strikes/km^2 per year. Last year, there were two lightning initiated wildfires on the Preserve that burned over 88 acres. Several of the Preserve's natural communities are not fire dependent (mangrove forests) or burn infrequently (strand swamp), so lightning induced wildfires are not the norm.

Table 7. Percent of Lightning Fires and Acres Burned in Florida

Year	% Lightning Fires	Year Acres Burned	% of Lightning Acres Burned
1998	31.3%	401,619	79.2%
1999	25.4%	101,798	28.6%
2000	20.8%	46,216	30.9%
*2002	21.0%	40,725	N/A

Fl. Dept. of Agriculture and Consumer Services. DOF Comparison 1998-2000 Wildfires and * DOF WebPages from 1/1/02-10/21/02.

The fragmentation of these pyrogenic communities and suppression of natural fire has resulted in changes to plant species composition and diversity. These changes include high vegetation fuel load, suppression-induced succession and development of near monoculture areas of woody species (e.g. pine and palmetto understory). A program has started where prescriptions are written for fires, so that burning occurs under selected, controlled conditions. Prescribed fires still accomplish the goal of maintaining the natural communities, while protecting life and property from damage.

Prescribed Fire is the controlled application of fire to existing naturally occurring fuels under specific environmental conditions, following appropriate precautionary measures, which allows the fire to be confined to a predetermined areas and accomplishes the planned land management objectives.

4.1 Constraints & Considerations

There are several elements of constraints and considerations to address for Prescribed Fire Management Operations. These include, but are not limited to: accurate weather forecasting, smoke management, fire lines and suppression methods, educating and informing our neighbors, and traffic control and safety.

4.1.1 Weather Forecast

There are several resources to obtain weather forecast for prescribe fire planning, scheduling, and fire behavior prediction purposes. Below are some of the Internet weather forecast web pages that will be utilized by this office:

DOF Fire Weather http://flame.fl-dof.com/fire_weather/nws/
DOF Spot Weather http://flame.fl-dof.com/fire_weather/spot/
Florida Fire Management Information System http://flame.fl-dof.com/fire_weather/wx_maps/
Florida NOAA site, links to NWS stations http://iwin.nws.noaa.gov/iwin/fl/fl.html
Florida Weather Monitor Online http://floridaweather.tierranet.com/
WEST CENTRAL FLORIDA FIRE WEATHER FORECAST
http://www.boi.noaa.gov/FIREWX/MIAFWFTBW.html
National Weather Service Forecast Office in Melbourne, Florida
http://www.srh.noaa.gov/MLB/fireweather.html

4.1.2 Smoke Management

One of the Preserve's largest threats to its' fire management program would be too much smoke on sensitive areas. Several years ago there was a referendum before the Lee County Commissioners to place a moratorium of prescribed fires because too much smoke came into several Estero neighborhoods. Therefore, at least in the short-term, we need to insure that the "*melaleuca* monoculture forests" do not burn until they have had time to "properly cure" and potentially trees may need to be cut down and piled before burning. Within a couple more years, the dead trees should be able to burn without producing too much thick, black smoke.

In general, smoke management problems can be avoided by burning under appropriate wind conditions to keep smoke off sensitive areas. A five mile radius of the Preserve is surrounded by many sensitive areas: many neighborhood developments, major and local roadways (Summerlin Rd., U.S. 41), businesses, a hospital, power lines, schools, and a horse farm. Therefore, smoke management screening procedures will be performed and must pass for every burn on the Preserve. If smoke threatens to cause a safety hazard or public nuisance, then direct, immediate suppression action will be taken regardless of it being a prescribed burn or wildfire. Preserve staff must always keep in mind its' close proximity to the Gulf of Mexico and the timing of the afternoon sea breezes.

4.1.3 Fire Lines & Other Suppression Methodologies

The Preserve will utilize several methods of controlling where a prescribed fire will burn. Natural firebreaks such as mangroves, rivers, water retention areas (cypress, ponds, mosquito ditches), and salt flats will be employed within many of the burn units. Man-made methods include disked lines, mowing, roadways, trails, foam, roller chopping, and wet lining. During 2002, the Preserve had over 13 miles of fire lines created and/or improvements performed on existing trails. We are still in need of another 4.5 miles on property currently under management. As we acquire more lands, these areas will need to be addressed as well. Although we have not roller chopped to date, the Preserve does intend to utilize this method in areas with high fuel loads and along the edges of areas still containing large amounts of standing *melaleuca* trees.

4.1.4 Educating & Informing Our Neighbors

One important educational element on informing our neighbors of our fire management plans and the various necessities for having one will be the relatively new "Fire In Florida" Wildfire Safety Workshop that is sponsored by the Lee County Extension Service and DOF (Appendix III copy of a past program itinerary for "Fire In Florida"). With at least one month's advanced notice, representatives will go to a neighborhood community center and present this program for free. At least one member of EBSBP will be there to provide information on the upcoming burn plans, copies of Dear Neighbor Letters (Appendix IV), and Prescribed Fire Brochures (Appendix V). The workshop reviews the history of fires in Florida, differences between Wildfire vs. Prescribed Burns, and tips for homeowners to prepare their homes/yards against wildfires. Local newspaper press (i.e.: News-Press, Beach Bulletin, Bonita Banner) releases should be given 2-4 weeks prior to the burn and then a press release the day of the burn. Nearby neighborhood Points-of-Contact (POC) or Home Owners Associations (Appendix VI Neighborhood POC List) should be phoned the day before planned burning.

4.1.5 Traffic Control and Safety

Coordinating with local fire departments should help with traffic control and safety. Reportedly, these fire departments are required to perform community outreach services and this would be an applicable activity. The Preserve has purchased two traffic signs (36"x36") with stands to put along nearby roadways during all prescribed burn activities.

4.2 Legal Considerations

A Certified Prescribed Burn Manager (CPBM) must adhere to FS Chapter 590 to be protected from liability for damage or injury caused by fire or resulting smoke, unless negligence is proven. Authorization to conduct a prescribed burn must be obtained by phone from the DOF on the day of the burn and it is good for one day only and must be renewed if the burning is to continue past dark.

4.2.1 Burn Boss Certification

At this time, in the Estero Bay office, only one individual is a CPBM, while another is close to obtaining this certification. Once obtained, the CPBM must maintain their certification by completing several options during a 5-year period (Appendix VII, latest version of certification renewal requirements). The CPBM is required to have their certification number available to provide to DOF personnel to receive the burn permit number, must be present during the burn, have a copy of the Burn Unit prescription during the burn, and operating within the parameters described in the written prescription.

4.2.2 Permits from DOF and/or Fire Districts

Before each burn, a proper Burn Unit Plan must be written and reviewed by a DOF Caloosahatchee District Forest Area Supervisor. On the morning of the burn, the CPBM must phone DOF to get a permit number (authorization) to burn and will have to call the appropriate fire district office for a permit number as well. It is imperative that the CPBM provide the individual that gives the permit number with their Burn Certification Number to be protected under FS Chapter 590.

4.2.3 Florida's Fire Law Statutes

There are several Florida Statutes (FS) that are related to fire. A hardcopy of these FS should be located at all OCAMA offices with FMPs. Updates to FS can be obtained by accessing the DEP web page http://www.leg.state.fl.us/statutes/

- FS Chapter 589 Forestry
- FS Chapter 590 Forestry Protection
- FS Chapter 823 Public Nuisance
- FS Chapter 877 Miscellaneous Crimes
- FS Chapter 403 Environmental Control
- FS Chapter 5I-2 Open Burning Rule
- FS Chapter 62-256 DEP Open Burning and Frost Protection Fires

4.3 Trained Personnel

All personnel on a prescribed burn that are either observers or that have assigned tasks shall be trained (Tables 8 & 9) and equipped (Table 14) for fire duty according to OCAMA standards. Safety of staff, volunteers and property shall always be considered foremost and be thoroughly discussed during planning, briefing, burning, mop-up and debriefing. Escape routes, hazardous conditions, *Watchout* situations and all phases of the burning operation will be discussed with crew on the morning of the burn.

Table 8. Minimum Required Training and Experience for OCAMA Burning

Position	Coursework	Experience
Crew Trainee/Observer (O)	Fire Shelter Deployment	None (refer to volunteer qualifications)

Crew (C)	S130; S190; SFS; *Recommended:* IBPFC (only after some burn experience has been obtained)	Demonstrated knowledge of equipment, i.e. fire weather kit, drip torch, line tools, pump equipment; Participate in three burns as crew trainee/observer
Line Boss (LB)	S130; S190; SFS; IBPFC; *Recommended:* S201; S211; S234	Demonstrated knowledge of equipment; Participates in 10 burns as designated crew member – need a minimum of three burns involving suppression activity (i.e. spot overs, etc.)
Burn Boss (BB)	S130, S190, SFS; IBPFC; FFB; S290; S390; Recommended: RX 340; RX 450; S201; S211; S234; I100; I200	Demonstrated knowledge of equipment; Participates in 20 burns including 10 as line boss – need a minimum of 5 burns involving suppression activity (i.e. spot overs, etc.)

The burn boss shall make all final decisions associated with active certified burn operations including task assignments, personnel selections, and final decisions associated with burn cancellations. It is extremely important that all participating burn personnel be physically and mentally fit for prescribed burn operations. After the pre-burn briefing, all selected burn personnel will be given the opportunity to decline participation in that days burn activities.

All personnel on the burn that are either observers or that have assigned tasks will be equipped with proper personal protective equipment (PPE) according to Department standards. The following is a list of the minimum standards required to participate on a prescribed burn: Nomex shirt, Nomex or 100% cotton jeans, eye protection, head gear, leather boots with 8" tops preferably (substitutes may be approved), leather gloves, deployment safety shelter, and water source. Radios and/or Nextel cell phones will also be used as the primary source of communication during the burn, with all participating personnel to either have communication or be in close proximity to one for updated instructions. Refer to section 5.6.3 Communications Tables 12 & 13.

4.3.1 DEP staff

Table 9. Estero Bay Aquatic and State Buffer Preserves Staff Training List

Course	HS	SF	NA	LE	SM	RM	EM
SFS	2/97	3/97	3/96	9/01	9/01		
S130	2/97	3/97	3/96	9/01	9/01		
S190	2/97	3/97	3/96	9/01	9/01		
IBPFC	2/95	12/99					
CPBM	4/95						
FFB	2/97						
S201							
S211		2/02	5/02				
S214		2/02					

S234							
S290		7/01					
S300							
S390							
RX 340	10/00						
RX 450	6/96						
I100							
I200							
CAMA Crew Position	BB,LB	LB,BB	C	C	C	O	O

Note: (the above table is based on available staff as of 9/01/02) HH= Heather Stafford; SF= Sherry Furnari; NA= Neil Ayers; LE= Laura Estabrook; SM= Stephanie MacKenzie; RM= Robert Monahan; and EM= Erin Maehl.

4.3.2 Caloosahatchee District Division of Forestry

The Division of Forestry's Caloosahatchee District Office is located at 10941 Palm Beach Blvd., Ft. Myers, FL 33905 (SR 80). Currently, the District Fire Chief is Hank Graham and Forest Area Supervisor is Brian McKee. Past discussions with them lead us to believe that they are willing to coordinate prescribed fire efforts with our small staff and their phone is (239) 690-3500.

4.3.3 Local Fire Protection and Rescue Districts

The Preserve falls within six (6) fire districts, but only five (5) of the districts include FMUs. Each has its own set of unique requirements and procedures for prescribed burning. One fire district (Estero) requires that a burn permit (from them) be issued for burning and has waved the $100 burn permit fee for state agencies. Some are equipped with wildfire brush trucks and tools (B), while others are not. Some are willing to participate (P), if available, in our prescribed burning activities in any capacity they can. Regardless, whether or not the Preserve utilizes these fire protection districts personnel or equipment on prescribed burns, we need to keep them informed of our burning schedules and activities, because they will receive phone calls from citizens no matter how much time is spent informing area neighborhoods and the media.

Bonita Springs Fire Control & Rescue District, 27490 Old 41 Rd., Bonita Springs, FL 34135.
Phone (239) 992-3320/7968. Fax (239) 949-4061.
Deputy Fire Chief Kenneth Craft (pager 890-4175)

Estero Fire & Rescue, 19850 Breckenridge Dr., Suite A, Estero, FL 33928
Phone (239) 947-3473. Fax (239) 947-9538.
Battalion Chief Scott Vanderbrook (cell phone 851-2408). (B,P)

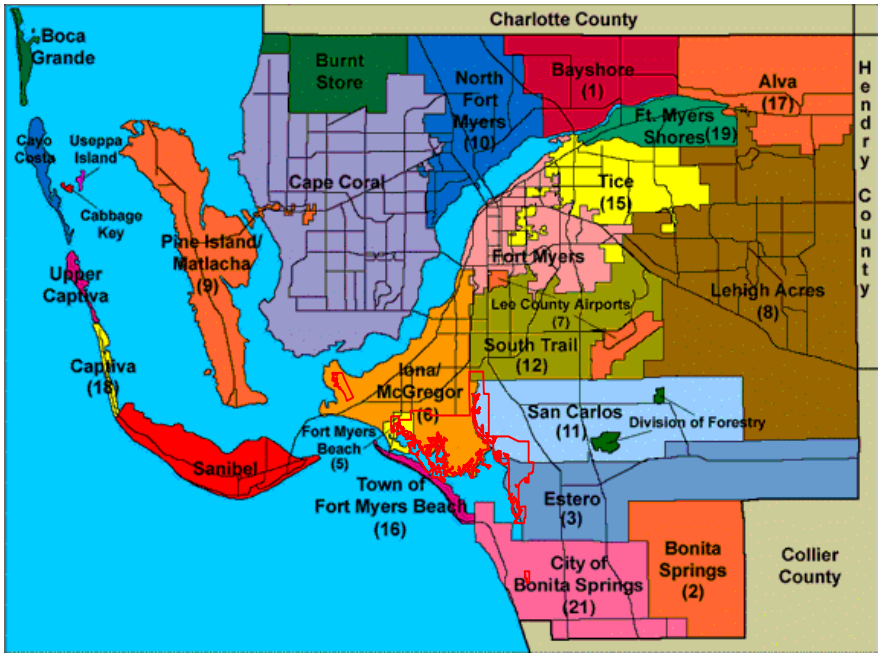
Ft. Myers Beach Fire & Rescue (239) 463-6163.
(Doesn't include any FMUs, but nearby so should still call to inform them).

Iona-McGregor Fire District, 15961 Winkler Rd., Ft. Myers, FL 33908. Phone (239) 433-0660. Fax (239) 433-2673. Chief of Operations Steve Juntikka. (100' aerial platform) (P)

San Carlos Park Fire Protection & Rescue Service District, 8013 Sanibel Blvd.,Ft. Myers 33918 Phone (239) 267-7525. Fax (239) 267-7505. Fire Inspector Thomas Beard. (B,P)

South Trail Fire Protection & Rescue Service District, 5531 Halifax Ave., Ft. Myers 33912. Phone (239) 482-8030. Fax (239) 433-2185. Fire Inspector Larry Williams or Fire Marshal Craig Brotheim. (B,P)

Map 4. Lee County Fire Districts



4.3.4 Assistance from other outside agencies

When possible, the Preserve will coordinate with other agency personnel when assistance is needed and to build partnerships to share resources.

DEP Charlotte Harbor State Buffer Preserve (941) 575-5861.
DEP Rookery Bay National Estuarine Research Reserve (239) 417-6310.

Koreshan State Historic Site (239) 992-0311.
Lee County Parks & Recreation (239) 461-7400.
Lee County Mosquito Control (239) 694-2174.

5.0 Estero Bay's Prescribed Fire Management Plan

This is the Preserve's first Fire Management Plan. Future revisions will be made as necessary.

5.1 Objectives of Fire Management Plan

The primary objectives of fire management within the Preserve are driven by the knowledge that fire has historically played a vital role in creating and maintaining Florida ecosystems, and that the species that occur in these systems are adapted to, and dependent upon, periodic burning. In addition, it is acknowledged that excluding fire from the Preserve would alter successional patterns and create excessive fuel loading which result in wildfires that may negatively impact natural communities and pose serious safety hazards to heavily populated urban locations. All prescribed burns will be conducted with a properly developed burn plan (Appendix VIII), appropriate authorization(s), and with properly trained and equipped staff.

Listed below are some of the primary reasons for benefits from the use of prescribed fire:

1. **Reduction of fuel load/decrease threat of wildfires.**
2. Site preparation for seeding or planting.
3. **Forage and travel corridors for wildlife.**
4. Control of undesired vegetation.
5. Range management.
6. **Forest disease and pathogen control.**
7. Improved access to public (hunting, hiking, etc.)
8. **Improved appearance.**
9. **Ecosystem diversity and restoration.**
10. **Endangered/threatened species.**
11. **Invasive plant control.**
12. **Perpetuates fire-adapted plants and animals.**

The eight highlighted items are relevant to the Preserve's fire management objectives and the burn plans for each zone will be written accordingly.

5.2 Fire Schedule/Timeline

Eventually, the fire schedule will cover all seasons of the year due to the many fire management objectives applicable to the Preserve. However, due to the high fuel load conditions within the Preserve, we will attempt to initially begin burning all zones during the winter season, unless it is determined that a winter burn may be detrimental to a couple of the burn zones. Thereafter, prescribed burns may be conducted during any season of the year as long as it meets the objectives written within the prescription parameters for a particular burn zone.

Table 10. Seasonal Effects of Prescribed Fire on Plant Communities

Season	Canopy	Subcanopy	Groundcover
Winter (Jan.-Mar.)		-favors bird species that prefer shrubbier habitats	-good time for dry prairie burn, don't want rain immediately following burn, can overstress system -decrease in postburn biomass
Spring (Apr.-Jun.)	-burn pines after first flush in early spring to knock them back -top kill of oaks higher during spring fires	-May is not good for scrub jays because could destroy nests -May and June burns good for quail and turkey -delays fruiting of some forage plants	-late spring burn promotes flowering of native grasses -increase in postburn biomass -not good for Gopher tortoise; nesting season
Summer (Jul.-Sep.)		-reduces abundance and dominance of understory -favors birds that prefer open woodlands and grasslands -good for red-cockaded woodpecker habitat -delays fruiting of some forage plants -July and August burns promote oak and blueberry production for bear forage	-promotes flowering of native grasses -increase in postburn biomass -provides forage for Gopher tortoises -increases herbaceous forage for deer
Fall (Oct.-Dec.)	-detrimental to slash pines, dormant stage, no needles for winter, carbohydrate reserves lowest	-favors bird species that prefer shrubbier habitats	-decrease in postburn biomass

Additional information on seasonal burn effects on vegetation:
Short-term:

1. Conducted in rainy, humid weather during the growing season may be patchier than those occurring during drier weather (dormant season or early growing season).
2. Regrows more quickly following growing-season burns.
3. Growing-season burns promote increased flowering of some herbaceous species, but flowering and fruiting may be delayed, particularly by mid to late growing-season fires. Flowering and fruiting of some species may be delayed for a year.

Long-term:

1. Growing-season burns favor herbaceous over woody vegetation; the more frequent the fires, the more pronounced the effect.
2. Early growing-season fires are the most detrimental to understory deciduous hardwoods. Evergreen species may be most affected by late growing-season fires.

5.3 The State of the Preserve's Burn Zones

There are less than 2,800 fire dependent acres within the Preserve in various stages of condition. All of these fire communities have been assigned burn zones and some of the prescriptions written. However, due to a number of resource management issues, only 273 acres are currently qualified for burning within this year's fire management cycle. These resource management issues include limited resources and permanent staff, staff with little to no fire training or experience, a high degree of exotic plant invasion (primarily *melaleuca*), inaccessibility, and insufficient site preparation. Nonetheless, this figure is proposed to include all burnable acreage once these issues are achieved (and weather permitting) over the next five years.

Resource management activities will be ongoing with work proposed over the next 5 years to include the following:

- Construct culvert crossings along patrol boundaries and site access points (if required) to create safer access of equipment and personnel to burn sites. Some sites have limited access through sensitive areas or have access severed by creeks or ditches. Culverts will be required in at least 5 locations within the Hendry Creek MU and one for Estero River Scrub MU.

- Establishment of perimeter boundaries and fire breaks on the Hendry Creek, Cow Point and No Name Point MUs. This may include Spring Creek MU, depending on the results of a MOU with a neighboring privately owned parcel.

- Creation of additional 15'- 20' roller chopped buffer zones along interior portions of firebreak roads/trails to the extent feasible to create a fire control line flank of finer fuels for easier and safer firing during prescribed fire activities. This is also expected to reduce potential fire lane intensity in the event of wildfire suppression activities. Most of the perimeter fire control lines on the Preserve range in width from 10'-20' and some will require additional widening.

- Mechanical means such as roller chopping, mowing, or disking will also be utilized to reduce fuel load densities and fuel heights, and to help maintain existing firebreaks. Roller chopping may be used to control saw palmetto where burning alone is not sufficient. Reportedly, this technique has proven to be successful in thinning out saw palmetto and opening up the under story for competing herbaceous vegetation (Butch Mallett, DOF). In addition, ERS needs several roller chopped strips within some of the burn zones, especially the western edge, where dead *melaleuca* trees need to cure further before burning. Most dense locations with standing *melaleuca* trees (dead or alive) may require cutting down and pile burning to reduce spot over potential.

- Preparation of burn plans for all FMU's and associated zones/blocks that will become under fire management, and for all future burn zones/blocks that are brought into the fire management category over the next 5 years through the land acquisition program. Burn Unit plans currently exist for some zones within the Winkler, Cow, Shell Point, and ERS FMUs.

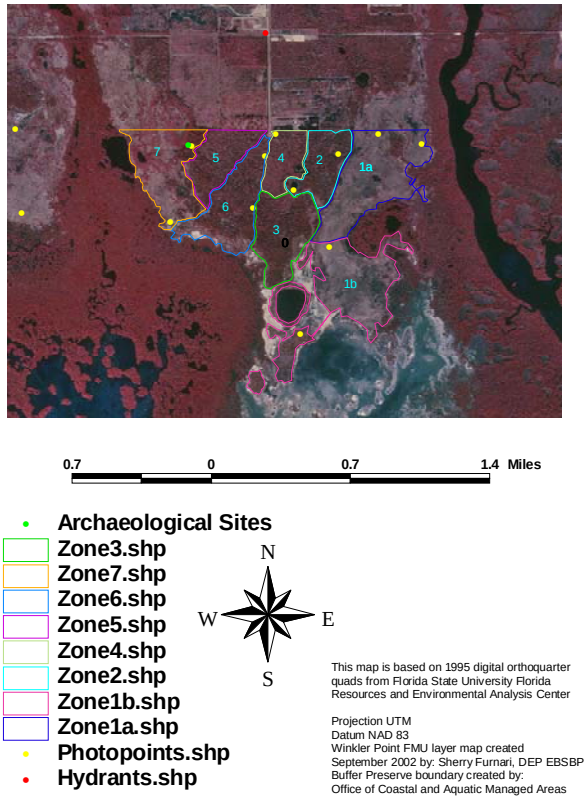
5.4 Description of Estero Bay Management Units

The Preserve has been divided into nine management units and seven contain burn zones. The seven FMUs range from 1 to 739 acres in size and most include a mosaic of habitat types, with the largest at 251 acres (Hendry Creek-tidal marsh) that will best be burned via aerial ignition.

5.4.1 Winkler Point

The Winkler Point management unit has nearly 600 acres of habitat that are fire dependent. It was the first parcel to have public access and contains the largest monoculture of *melaleuca* trees within the Preserve. Although most of the exotics have been aerially treated and are dead, it still requires additional time to dry out and "cure" or may need to be cut down and piled. There is one known archaeological site that must be protected from extreme heat and any potential ground disturbance activities. In addition, the tidal marsh area is a known nesting habitat for birds; therefore care and consideration for wildlife activities need to be addressed, which is the reason the tidal marsh area is divided into two zones. It is also an environment that the Lee County Mosquito Control (LCMC) would like to see burned because of their spraying program. Since the tidal area hasn't burned in over nine years (LCMC reported on 3/16/00), the habitat is thick with dead thatch buildup, which makes it difficult for the mosquito larvicidal treatments to reach its intended moist surface layer target. LCMC's management objective makes them an excellent partner to assist in having potential aerial burns and helicopter flights (during, looking for spot overs or for post burn evaluation).

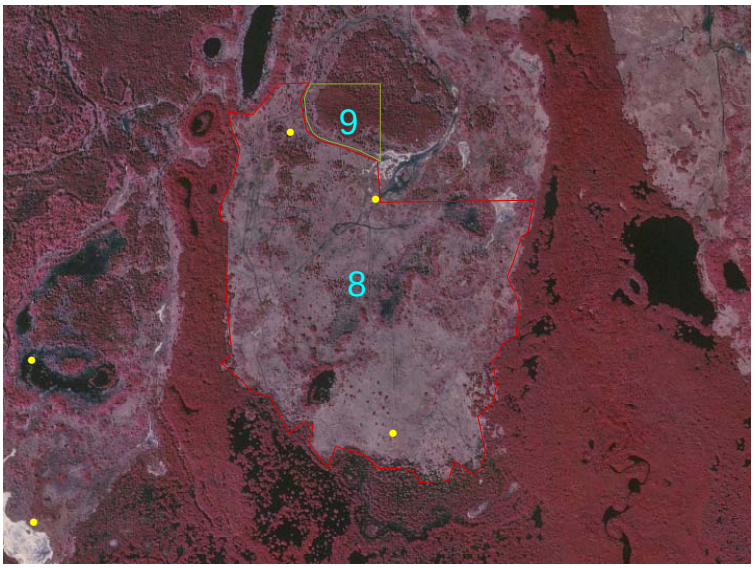
Map 5. Winkler Point FMU



5.4.2 Cow Point

The Cow Point management unit has over 160 acres of fire dependent habitat and also has received an extensive amount of exotic plant control work. Its tidal marsh zone has the same considerations as the Winkler Point FMU. The north and east perimeter boundary still needs to be installed before burning Zone 9, as well as allowing the aerially treated melaleuca curing time. The Preserve is in the process of acquiring the Zemel parcel to the north, so it is possible that the zones may change as well as not requiring the above perimeter lines. Zone 8 is ready to burn.

Map 6. Cow Point FMU



0.3 0 0.3 0.6 Miles

N
W E
S

Archaeological Sites.dbf
Zone9.shp
Zone8.shp
Photopoints.shp

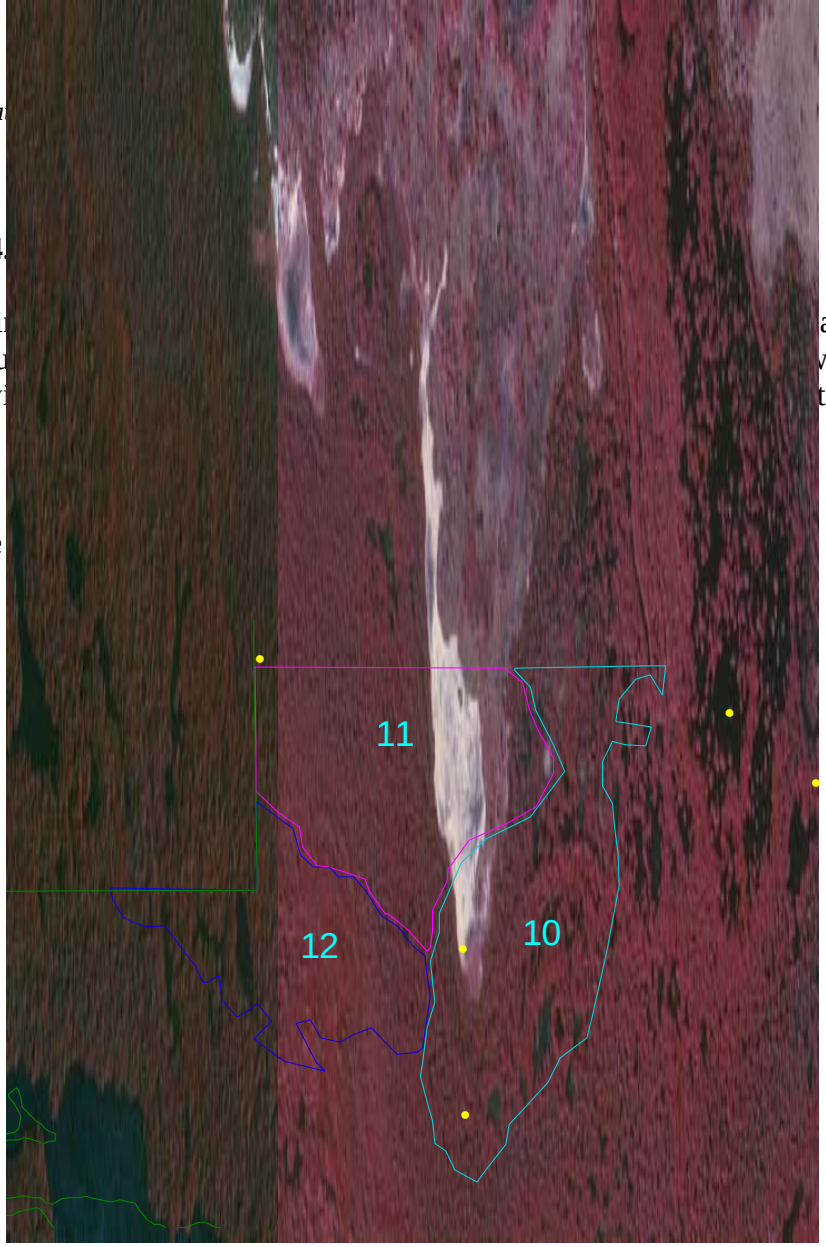
This map is based on 1995 digital orthoquarter quads from Florida State University Florida Resources and Environmental Analysis Center

Projection UTM
Datum NAD 83
Cow Point FMU layer map created September 2002 by: Sherry Furnari, DEP EBSBP
Buffer Preserve boundary created by: Office of Coastal and Aquatic Managed Areas

5.4

The No Name Poi ad) *melaleuca* trees and also requ vould also effect the zones wi ter line. None of its' three zones

Map 7. No Name



0.3 0 0.3 0.6 Miles

N
W E
S

- Archaeological Sites.dbf
- EBSBP boundary.shp
- Zone12.shp
- Zone11.shp
- Zone10.shp
- Photopoints.shp

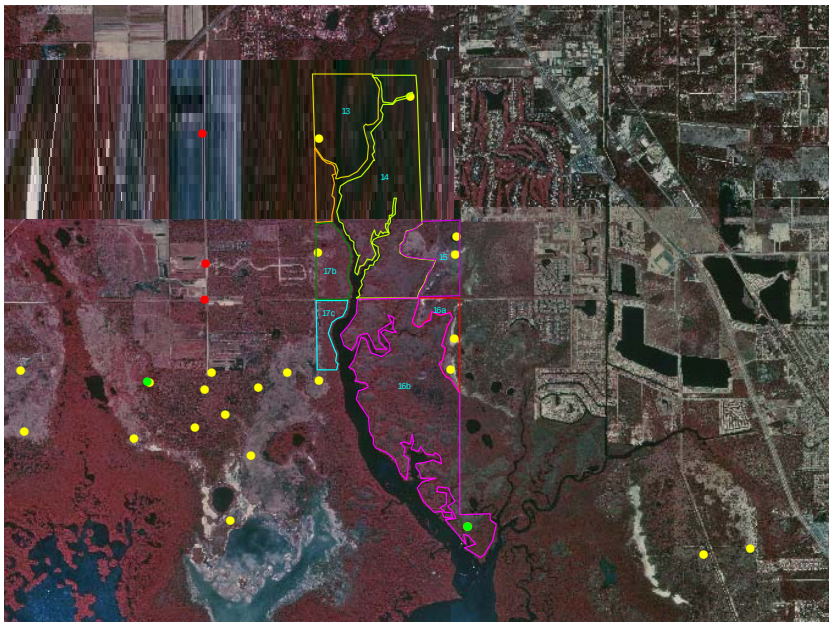
This map is based on 1995 digital orthoquarter quads from Florida State University Florida Resources and Environmental Analysis Center

Projection UTM
Datum NAD 83
No Name Point FMU layer map created September 2002 by: Sherry Furnari, DEP EBSBP
Buffer Preserve boundary created by:
Office of Coastal and Aquatic Managed Areas

5.4.4 Hendry Creek

The Hendry Creek management unit contains third parcels. Two parcels were acquired from The Nature Conservancy (TNC) in 2000 and the Bigelow parcel in 2002. Hendry Creek MU has several land management challenges: live or dead *melaleuca*, inaccessible by vehicles (requires culverts), a remote archaeological site, and perimeter boundaries not completed. Realistically, Hendry Creek will probably be the last of the FMUs to receive prescribed fire, but hopefully within the five-year period. As of yet, none of the eight zones are ready for prescribed burns.

Map 8. Hendry Creek FMU



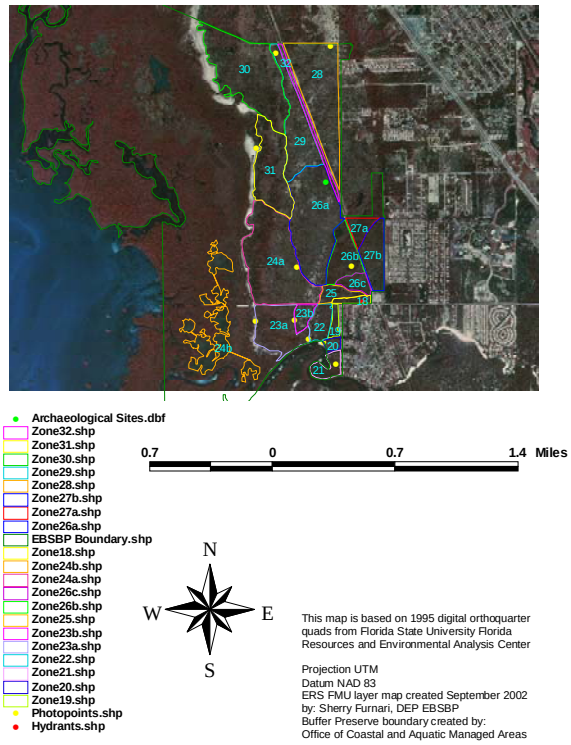
5.4.5 Dog Key & Julies Island

Within the Preserve, Dog Key and Julies Island are the only mangrove islands that contain shell mound habitat with large gumbo limbos, the endangered Geiger trees, various stoppers, Spanish bayonets, *yucca spp*., and other plants typically found within this community. There are several protected archaeological sites that contain scattering of pottery shreds, a Calusa Indian gravesite, Calusa built shell middens, a historical mullet boat graveyard, and an old Florida homestead foundation. It is not a fire dependant community; therefore, there are no plans for prescribed fires.

5.4.6 Estero River Scrub

The Estero River Scrub (ERS) management unit was purchased by the State through eminent domain in March 2000. It is often referred to as the Sahdev parcel and contains 1260 acres. Land acquisition efforts continue for the adjacent Desalvo & Smith parcels. Over half of the ERS contains fire dependant communities and over 2 miles of the property boundary line is shared with adjacent residential neighborhoods and that number continues to grow. Similar to the other FMUs, it has its' share of management challenges: the Seaboard Air Lines old railroad bed is a listed archaeological site, home to potentially hundreds of protected Gopher tortoises, Florida cootie, Indigo snakes, an active Bald eagle's nest, a public access point, and consist of a dwindling and unique scrub and strand swamps habitats. The western edge of the fire dependent habitats contains dense levels of *melaleuca* that are both dead and alive. This FMU has the largest number of burn zones, upland burnable acres and is home to the residents of the "Estero neighborhoods that got smoked out."

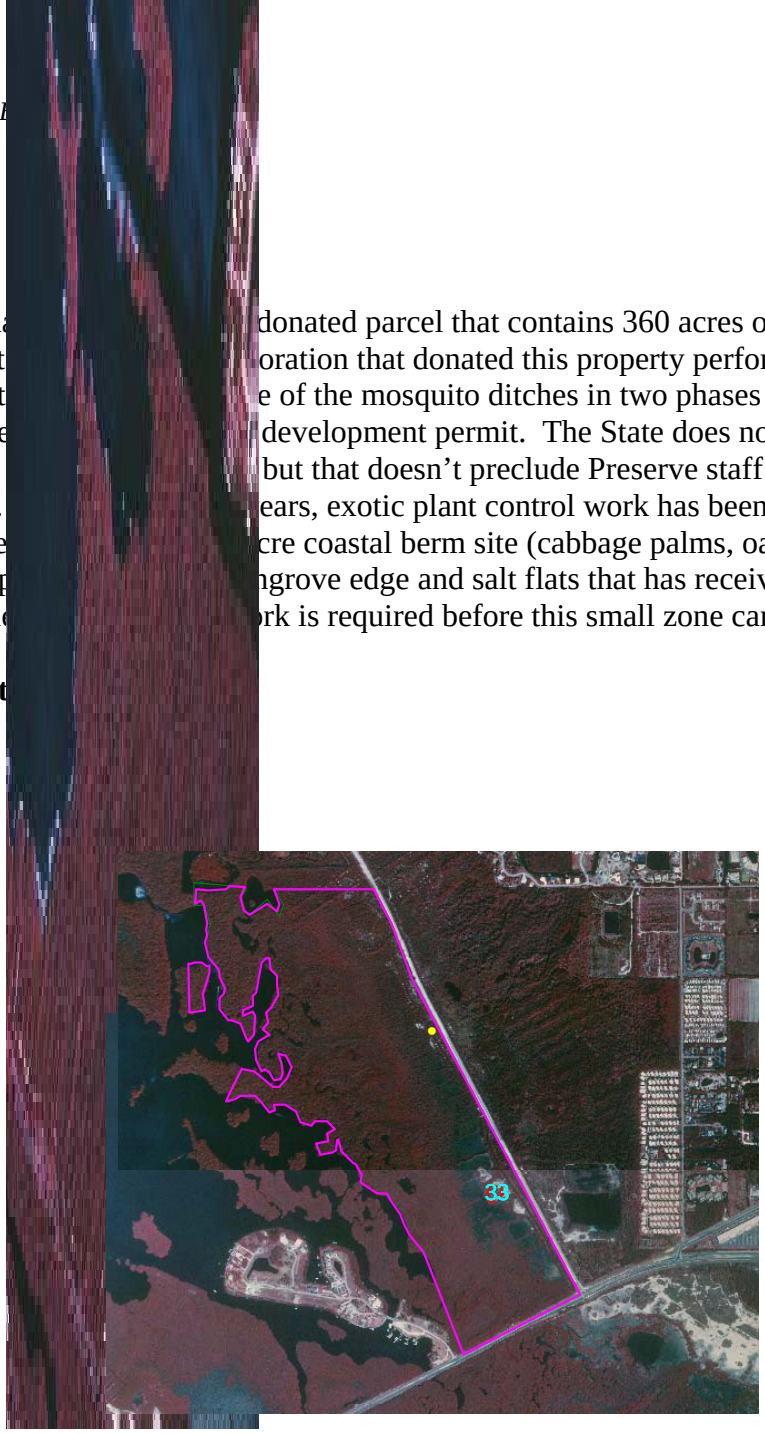
Map 9. Estero River Scrub FMU



5.4.7

The Shell Point mana donated parcel that contains 360 acres of wetland habitats and mosquit oration that donated this property performed hydrological restorat e of the mosquito ditches in two phases (2000 and 2001) as they were obligate development permit. The State does not provide Interim management money but that doesn't preclude Preserve staff from various management efforts. ears, exotic plant control work has been performed within this unit. The cre coastal berm site (cabbage palms, oaks, sedges, grasses, etc.) envelop ngrove edge and salt flats that has received exotic plant treatment. Very littl rk is required before this small zone can be burned.

Map 10. Shell Point



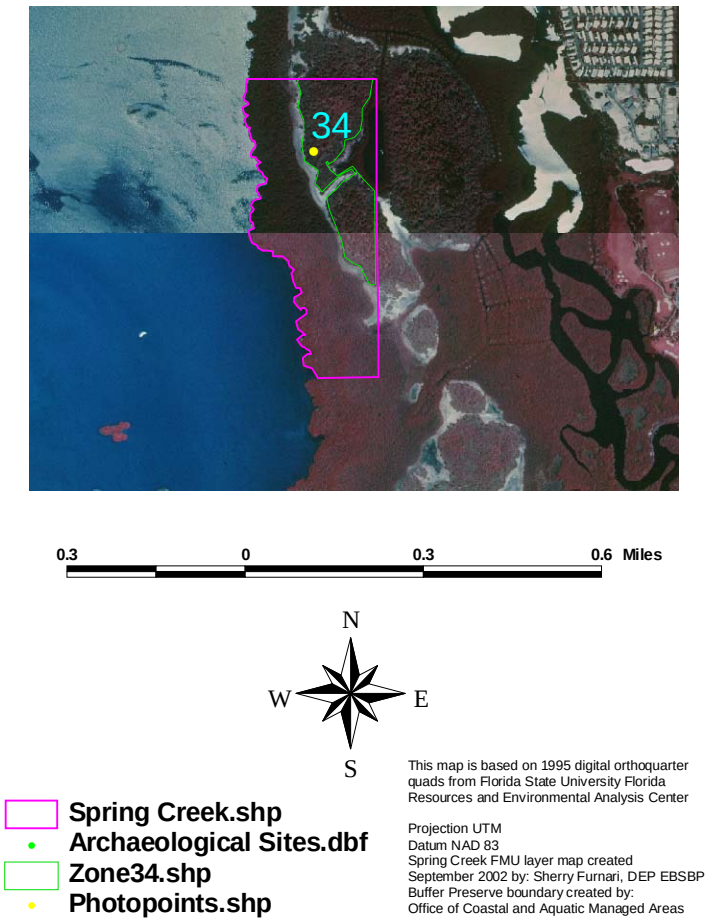
5.4.8 Hurricane Bay

The Hurricane Bay management unit contains no fire dependent plant communities since it only contains Estuarine Tidal Swamp/Forest, spoil areas along navigational channels, and mosquito ditches. Although it has a couple of land management tasks, prescribed fire is not one of them.

5.4.9 Spring Creek

During the last half of 2002, the Hicks parcel (51 ac.) was acquired and is within the Spring Creek area; thus it creates the Spring Creek Management Unit. Within this southeastern Estero Bay area, additional parcels remain on the land acquisition list so it has the potential to increase. Regardless of the fact that exotic plant control efforts haven't been performed, logistically the only two difficulties burning this unit are that we only have access to it by boat and that a small section of burnable acreage is shared with a neighbor that wants to develop the adjacent property. Although, it may be possible to obtain a Memorandum of Understanding (MOU) with this development organization, it is not known when this might happen. The burn zone is similar to Shell Point's where mangroves and salt flats surround it, so depending on the neighbors' willingness to burn; fire lines may not be required.

Map 11. Spring Creek FMU



5.5 Fire Management Units & Burn Schedules

Table 11 identifies all seven of the FMUs, burn zones, acres, intended fire frequency, desired burn schedule and season. As mentioned previously, most units will be initially burned during the winter season. Of course, this schedule will be dependent upon completion of the burn units' preparation and additional critical factors (i.e.: weather, personnel, fire equipment).

Table 11. FMUs & Burn Schedules

FMU & Burn Zone	Unit Name	Plant Community Description	Rx Year Burn Schedule	Intended Fire Frequency	Burn Unit Acres	Total FMU Acres	Desired Burn Season
WP 1a	Tidal marsh N.	Tidal marsh	2003-04	6-10 years	107		F/W
WP 1b	Tidal marsh S.	Tidal marsh & salt flats	2004-05	6-10 years	125		F/W
WP 2	Neil's mud hole	Wet flatwoods	2005-06	3-10 years	45		S/S
WP 3	Mel's forest	Wet flatwoods & tidal marsh	2006-07	3-10 years	69		W/S
WP 4	A new beginning	Wet flatwoods	2004-05	3-10 years	33		S/S
WP 5	Redneck villas	Wet flatwoods	2006-07	3-10 years	48		S/S
WP 6	Mel's pie	Wet flatwoods	2007-08	3-10 years	74		W/S
WP 7	Calusa marsh	Tidal marsh & wet flatwoods	2005-06	3-10 years	68	569	F/W
CP 8	Tidal marsh	Tidal marsh	2003-04	6-10 years	155		F/W
CP 9	Mel's snack	Wet flatwoods	2006-05	3-10 years	9	164	W/S
NNP 10	Tidal marsh	Wet flatwoods, tidal & depression marshes & salt flats	2006-07	3-25 years	110		F/W
NNP 11	Eagles' perch	Wet flatwoods, depression marsh, & pocket of maritime hammock	2010-11	3-25 years	105		S/S
NNP 12	Pepper patch	Tidal marsh, salt flats, & wet flatwoods	2008-09	5-10 years	63	278	W
HC 13	Heather's hell pond	Tidal marsh, salt flats, & wet flatwoods	2010-11	3-10 years	91		S/S
HC 14	Needlerush haven	Tidal marsh	2008-09	6-10 years	251		F/W
HC 15	East pond	Tidal marsh, salt flats, & wet flatwoods	2008-09	6-10 years	68		S/S
HC 16a	Mel's salt flats	Tidal marsh, salt flats, & wet flatwoods	2006-07	6-10 years	48		W/S
HC 16b	Laura's nursery	Tidal marsh	2010-11	6-10 years	216		F/W
HC 17a	Crown's golf	Tidal marsh & wet flatwoods	2006-07	3-10 years	17		F/W
HC 17b	West pond	Tidal marsh, wet flatwoods, & coastal berm	2005-06	6-10 years	37		Su
HC 17c	Southwind	Tidal marsh & salt flats	2004-05	6-10 years	11	739	F
ERS 18	Broadway tortoises	Scrubby/mesic flatwoods	2003-04	5-8 years	5		Su
ERS 19	Armada tortoises	Scrubby/mesic flatwoods	2002-03 2010-11	5-8 years	5		Su
ERS 20	Mederia tortoises	Scrubby/mesic flatwoods	2003-04	5-8 years	4		Su
ERS 21	Riverside tortoises	Mesic flatwoods, coastal berm, & tidal marsh	2004-05	6-10 years	9		Su
ERS 22	Scrubby east	Scrubby/mesic flatwoods w/ freshwater outflow to tidal marsh	2003-04	6-25 years	14		S/S
ERS 23a	Eagles' nest	Scrubby/mesic/wet flatwoods & coastal berm	2008-09	8-25 years	42		S/S
ERS 23b	Scrubby west	Scrub & Scrubby flatwoods	2004-05	8-25 years	9		S/S
ERS 24a	Mellow yellow	Scrubby/mesic/wet flatwoods	2007-08	8-25 years	103		S/S
ERS 24b	Needlerush marsh	Tidal marsh north of Estero River	2010-11	6-10 years	48		F/W
ERS 25	Hidden stream	Mesic/wet flatwoods; hidden freshwater stream	2005-06	3-8 years	10		S/S
ERS 26a	Pinewoods scrub	Scrubby/mesic flatwoods	2007-08	6-25 years	92		S/S
ERS 26b	Cypress south	Wet flatwoods & strand swamp	2010-11	3-10 years (30-200)	29		F
ERS 26c	Snake head	Mesic/wet flatwoods	2004-05	3-8 years	10		S/S
ERS 27a	Cypress north	Strand swamp	-	30-200 years	10		F
ERS 27b	Riverwood	Wet flatwoods	2004-05	3-10 years	26		S/S

ERS 28	Shadowing pines	Mesic/wet flatwoods	2005-06	3-8 years	84		S/S
ERS 29	Pinewoods	Scrubby/mesic flatwoods	2007-08	5-8 years	50		S/S
ERS 30	Mel's salt flats	Tidal marsh, salt flats, wet flatwoods	2009-10	3-10 years	101		S/S
ERS 31	Indigo pit	Wet/mesic flatwoods	2008-09	3-8 years	55		S/S
ERS 32	Seaboard railways	Archaeological site-old railroad bed; altered into scrubby flatwoods (disturbed/ruderal)	2007-08	8-25 years	10	716	S/S
SP 33	Palm isles	Coastal berm	2002-03	Rare	1	1	W
SC 34	Hicks' holdout	Tidal marsh, salt flats, wet flatwoods	2005-06	3-10 years	15	15	W
	Rx Burn Units = 43				**2482**	**2482**	

5.6 Prescribed Burn Planning & Logistics

Great care, coupled with much organization and knowledge, must be given to the planning and logistics of performing prescribed burning at the Preserve. Unfortunately, limited staff, resources and training make this a difficult task to accomplish within seasonal windows of opportunities.

5.6.1 OCAMA "Heads-up" Policy

The Office of Coastal and Aquatic Managed Areas (OCAMA) has recently instituted a SW Florida Fire Coordinator position to our region. Prior OCAMA fire procedures were established to provide the Fire Coordinator with a faxed copy of the Burn Unit Plan/Prescription the day before burning activities are planned. Ms. Judy Haner has been given this position and is stationed at the Rookery Bay NERR, phone (239) 417-6310 and fax (239) 417-6315.

5.6.2 OCAMA Fire Forms

The Preserve has been provided with five forms to be utilized for fire management activities on OCAMA properties and they are as follows:

5.6.2.1 Burn Unit Plan/Prescription

Appendix VIII contains a sample of a Burn Unit Plan/Prescription.

5.6.2.2 Pre-burn Checklist & Crew Briefing

Appendix IX contains the corresponding sample of a Pre-burn Checklist & Crew Briefing.

5.6.2.3 Day of Burn Procedures

Appendix X contains the corresponding sample of a Day of Burn Procedures.

5.6.2.4 Weather Recording Log

Appendix XI contains the corresponding sample of a Weather Recording Log.

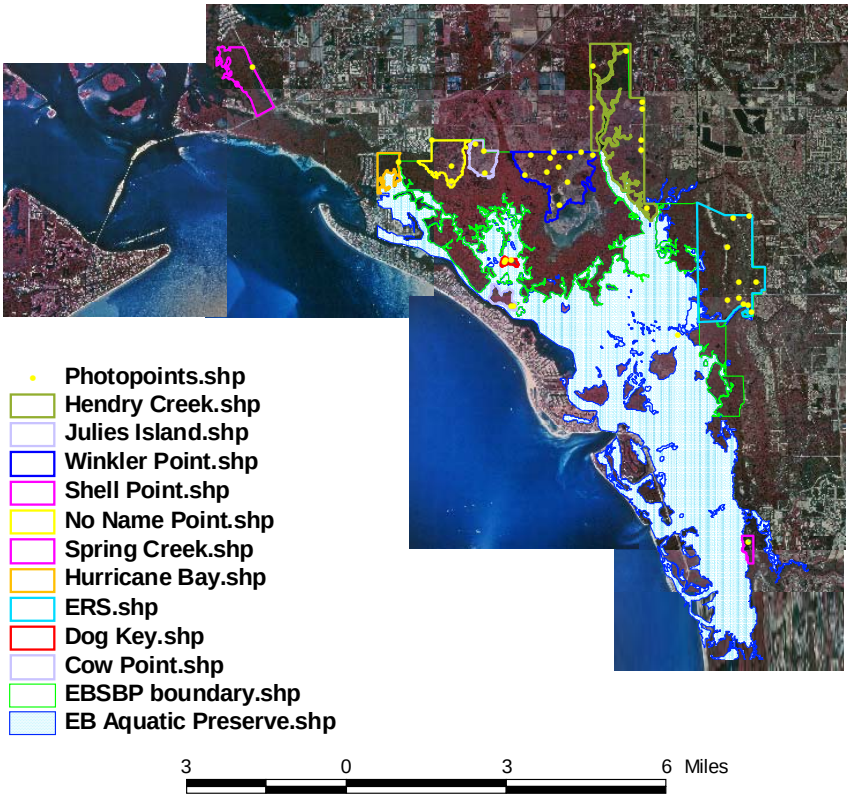
5.6.2.5 Post Burn Evaluation

Appendix XII contains the corresponding sample of a Post Burn Evaluation.

5.6.2.5.1 Photo Point Monitoring Stations

The Preserve contains forty-three (43) photo point monitoring stations within the various habitat types. Of these, thirty-five (35) are located in areas where future prescribe fires will occur. Due to limited staffing resources, there are no plans to undertake detailed scientific fire research projects at the Preserve, but that does not prohibit appropriate pre-burn or post burn monitoring procedures. Photo points should be taken immediately before and after a prescribed burn, at six months, and annually thereafter following the growing season.

Map 12. Management Units & Photo Point Locations



This map is based on 1995 digital orthoquarter quads from Florida State University Florida Resources and Environmental Analysis Center

Projection UTM
Datum NAD 83
Management Units & Photo Points layer map created September 2002 by: Sherry Furnari, DEP EBSBP
Buffer Preserve boundary created by:
Office of Coastal and Aquatic Managed Areas

5.6.3 Communications

EBSBP currently has four (4) VHF radios with fire related frequencies programmed onto 15 of 16 channels (Table 12). If changes need to be made to update the frequencies programmed onto the radios, Spectrum Wireless, Inc. at (239) 267-3222 will be contacted.

Table 12. EBSBP VHF Programmed RFs/Channels

Channel	Rx	Tone	Tx	Tone	Agency
1	164.625	118.8	163.150	118.8	USFWS-rpt
2	168.200		168.200		USFWS-tac
3	159.450		159.450		DOF-HQ Palm Beach BLVD
4	159.315		159.315		DOF-mobile-hand held
5	154.280		154.280		DOF-white-tac (Lee)
6	154.295		154.295		DOF-blue-tac
7	154.010		154.010		DOF-green-tac (Collier)
8	154.600		154.600		DEP RBNERR1
9	154.570		154.570		DEP RBNERR2
10	154.570	CSQ ?	154.570	CSQ ?	DEP RBNERR3
11	154.265		154.265		DOF/Estero/San Carlos-red (Lee)
12	170.000		170.000		AIR/GRND-helicopter
13	-	-	-	-	-
14	151.235		151.235		DOF-tac
15	154.540	118.8	154.540		DEP Estero Bay
16	151.715	118.8	151.715		DEP Estero Bay

As of October 2002, the DEP EB office has 7 NEXTEL radios with cell phone capability (Table 13). When necessary, these may be used in conjunction with VHF radios.

Table 13. NEXTEL Private ID & Phone Numbers

Nextel	Cover Color	Cell #	Private ID#	Assigned To
Unit 1	AQUA	707-5679	(158*31*) 31102	
Unit 2	PINK	707-6738	31075	
Heather	BLACK	707-7621	31081	Heather
Field Cell	RED	707-7985	31093	
Estero Base	N/A	707-5681	31172	Erin
Sherry	YELLOW	707-8035	64351	Sherry
Spare	PURPLE	707-8102	13897	

5.6.4 Fire Equipment Inventory & Needs

All personnel working on Preserve prescribed burns, regardless of agency affiliation, will wear required PPE as outlined under OCAMA policy. Currently, the Preserve has nearly acquired all of the necessary fire equipment needed for prescribed burns (Table 14), with the exception of requiring an extra pump, 4x4 ranger, and accessories (Table 15). If equipment becomes

unreliable, we will ensure that backup equipment is borrowed from another agency until equipment can be repaired or replaced. Hopefully, future-funding opportunities will become available to complete our basic fire equipment requirements.

Table 14. Existing Fire Equipment & CAMA Requirements.

EBSBP Fire Equipment			Last updated: 05-23-02		
Item Description	Qty.	CAMA Required Equip.	Item Description	Qty.	CAMA Required PPE
2001 Dodge 2500 4x4 (not dedicated)	1		Nomex neck protector	8	X
300-gal. pump skid unit 18HP	1	X	Goggles	8	X
Belt weather kit	1	X	Face shields	8	X
Aluminum saw wedge	2		Canteen case	8	X
2-way radios	4	X	1 qt. Canteen	12	X
Battery chargers	4		Fire shelter w/ belt carrying case	8	X
Replacement battery	4		Leather fire gloves	14	X
Flapper/fire swatter	4	X	Equipment belt	8	X
Forest fire rake (McLeod)	2	X	Wildfire helmet	8	X
Council rake	3	X	Nomex shirt	10	X
Pulaski tool	2	X	Nomex jeans	10	X
Fire fighting shovel	2	X	Respro Bandit scarf	8	
Firefighter field pack	1		Radio chest harness	8	
Hand reciprocating, backpack pump	2		Leather boots 8”	7	X
Road caution sign	2		Low side comp tool box	1	
Sign stand	2		20' soft hose supply 2.5"NH	1	
Drip torch	3	X	3/4" garden hose x 100'	1	
15-gal sprayer	2	X	1" NH x 100' hose	2	
Kestrel 3000 weather station	1		1.5" NH x 100' hose	1	
Stihl 036 Pro chainsaw w/ chaps	1		Gated wye valve (1.5" NH x 1" NH)	1	
Fuel bottles 22oz	2		Double male 1.5" NH	1	
10' suction hose 1.5"NH	2	X	Double female 1.5" NH	1	
Foot valve strainer	1	X	Spanner wrench (red head)	3	
Hydrant wrenches	2		Spanner wrench (res-Q)	1	
KnockDown Class A foam	15gal		Cap wrench	1	
1" NH to GHT reducer	1		1" barrel nozzle	2	
1.5" NH to 1" NH reducer	1		1.5" hose clamp	1	
Forester nozzle 1" NH	1		Garden hose nozzle	1	
First aid kit w/ eye wash	1	X	1.5" NH to GHT reducer	1	
5 gal. safety gas can	3	X	Blizzard wizard ¾” NH	1	
Water cooler w/ cups	1	X	Gated wye valve (2.5" NH x 1.5" NH)	1	
ATV (not dedicated)	2				

Table 15. Fire Mgmt. Needs

EBSBP Prescribed Fire Management Needs	**Last updated: 9/01/02**
Item Description	**Cost**
Roller drum chopper (275ac x $35)	$9,625
Polaris 4x4 ranger	$7,905
70 gal. skid unit	$3,500
Foam unit	$800
Winch for ranger	$1,200
Additional fire training for EB staff	$2,700
Fireline improvement	$20,000
Additional PPE & supplies	$1,500
Portable pump	$2,400
TOTAL	**$49,630**

Appendix I. Listed Plant Species Known or Likely to Occur

			Legal Status	
Known	***Scientific Name***	**Common Name**	Federal	Florida
x	*Acrostichum aureum*	Golden leather fern		E
x	*Acrostichum danaeifolium*	Giant leather fern		C
x	*Bletia purpurea*	Pinepink orchid		T
	Calopogon barbatus	Bearded grasspink		T
	Calopogon multiflorus	Many-flowered grasspink	MC	E
	Celtis iguanaea	Iguana hackberry		E
	Celtis pallida	Spiny hackberry		E
	Cereus gracilis	West coast prickly apple		E
	Cereus pentagonus	Dildoe (=barbed wire) cactus		E
	Chamaesyce cumulicola	Sand dune spurge		E
	Cheilanthes microphylla	Southern lip fern		E
	Chrysophyllum olivaeforme	Satinleaf		E
x	*Cordia sebestena*	Geiger tree		E
	Deeringothamnus pulchellus	Beautiful pawpaw	E	E
x	*Encyclia tampensis*	Butterfly orchid		C
	Ernodea littoralis	Beach creeper		T
	Eugenia confusa	Redberry stopper		E
	Eugenia rhombia	Red stopper		E
	Eulophia alta	Wild coco		T
	Gossypium hirsutum	Wild cotton		E
	Jacquinia keyensis	Joewood		T
	Lantana depressa	Pineland lantana	MC	E
	Lechea divaricata	Spreading pinweed		E
x	*Lilium catesbaei*	Pine lily		T
	Myrcinthes fragrans (=Eugenia simpsonii)	Simpson's stopper		T
	Opuntia stricta	Prickly pear cactus		T
x	*Osmunda cinnamomea*	Cinnamon fern		C
x	*Osmunda regalis*	Royal fern		C
	Pinguicula lutea	Yellow butterwort		T
x	*Pteroglossaspis ecristata*	Crestless plume orchid		T
	Scaevola plumeri	Inkberry		T
	Spiranthes brevilabris var. floridana	Florida ladies tresses		T
	Suriana maritima	Bay cedar		E
x	*Tillandsia balbisiana*	Reflexed wild pine		T
x	*Tillandsia fasiculata*	Stiff-leaved wild pine		E
	Tillandsia flexuosa	Banded wild pine		E
	Tillandsia pruinosa	Fuzzy-wuzzy (=hoary) air plant		E
x	*Tillandsia utriculata*	Giant wild pine		E
x	*Zamia floridana*	Florida coontie		C
	Total Likely = 39 species	KEY:		
	Total Known = 13 species	E = endangered		
		T = threatened		
		C = commercially exploited		
		MC = not currently listed, but of management concern		

Appendix II. Animal Species of Special Legal Status Likely to be Found within the EBASBP with notes on FNAI Cover Class Habitats

Known To Occur	*Science Name*	Common Name	LEGAL STATUS		FNAI cover class / EBSBP critical habitat
			Federal	Florida	
	MAMMALS 4 sp.				
	Felis concolor coryi	Florida Panther	E	E	Wet Flatwoods
	Sciurus niger avicenna	Big Cypress Fox Squirrel		T	Wet Flatwoods
X	*Trichechus manatus*	Manatee	E	E	Estuarine / Marine Consolidated Substrates
X	*Ursus americanus floridanus*	Florida Black Bear		T	Wet Flatwoods / Pine Flatwoods / Mangroves / Tidal Flats
	BIRDS 18 sp.				
X	*Ajaia ajaja*	Roseate Spoonbill		SSC	Tidal Marsh / Salt Flats / Tidal Swamp
	Charadrius melodus	Piping Plover	T	T	Tidal Marshes / Salt Flats / Unconsolidated Substrates
	Charadrius alexandrinus var. tenuirostris	Southeastern Snowy Plover	T		Salt Flats / Unconsolidated Substrates
X	*Egretta caerula*	Little Blue Heron		SSC	Tidal Marsh / Tidal Swamp
X	*Egretta rufescens*	Reddish Egret		SSC	Tidal Marsh / Tidal Swamp
X	*Egretta thula*	Snowy Egret		SSC	Tidal Marsh / Tidal Swamp
X	*Egretta tricolor*	Tri-colored Heron		SSC	Tidal Marsh / Tidal Swamp
X	*Endocimus albus*	White Ibis		SSC	Tidal Marsh / Salt Flats
	Falco peregrinus	Peregrine Falcon		E	Tidal Marsh / Salt Flats/ Unconsolidated Substrates
X	*Falco sparverius paulus*	Southeastern American Kestrel		T	Pine Flatwoods
X	*Haematopus palliatus*	American Oystercatcher		SSC	Tidal Marsh / (Oyster Bars)
X	*Haliaeatus leucocephalus*	Bald Eagle	T	T	Wet Flatwoods
X	*Mycteria americana*	Wood Stork	E	E	Wet Flatwoods
X	*Pelecanus occidentalis*	Brown Pelican		SSC	Tidal Swamp
	Picoides borealis	Red-cockaded Woodpecker	E	T	Wet Flatwoods
X	*Rostrhamus sociabilis*	Snail Kite	E	E	Pine Flatwoods
	Rynchops niger	Black Skimmer		SSC	Estuarine / Marine Tidal Marsh
X	*Sterna antillarum*	Least Tern		T	Unconsolidated Substrates
	AMPHIBIANS & REPTILES 10 sp.				
	Rana capito	Florida Gopher Frog		SSC	Wet Flatwoods
X	*Alligator mississippiensis*	American Alligator	T (S/A)	SSC	Tidal Marsh / Tidal Swamp
X	*Caretta caretta*	Loggerhead Sea Turtle	T	T	Estuarine / Marine Consolidated Substrates
	Chelonia mydas mydas	Atlantic Green Sea Turtle	E	E	Estuarine / Marine Consolidated Substrates
X	*Crocodylus acutus*	American Crocodile	E	E	Tidal Marsh / Tidal Swamp
X	*Drymarchon corais couperi*	Eastern Indigo Snake	T	T	Wet Flatwoods
	Eretmochelys imbricata	Hawksbill Sea Turtle	E	E	Estuarine / Marine Consolidated Substrates
X	*Gopherus polyphemus*	Gopher Tortoise		SSC	Mesic Flatwoods
	Lepidochelys kempi	Kemp's Ridley Sea Turtle	E	E	Estuarine / Marine Consolidated Substrates
	Pituophis melanoleucus mugitus	Florida Pine Snake		SSC	Wet Flatwoods

TOTAL = 20 SPECIES (Known on Preserves)

KEY:
E = ENDANGERED (listing category specifics vary by species)
T = THREATENED
T (S/A) = THREATENED BY SIMILARITY of APPEARANCE
SSC = SPECIES OF SPECIAL CONCERN

Appendix III. Sample Copy of Program Itinerary "Fire In Florida"

Lee County

Fire In Florida:

Wildfire Safety Workshop

Lee County Extension Office
at Terry Park
3406 Palm Beach Blvd. (Route 80)

The Wildfire Safety Workshop is designed to educate you on how to manage natural areas and take the necessary precautions to protect yourself from wildfire. You'll be brought up-to-date on the types of fire, the natural role of fire, prescribed burns, and protecting your Florida home from fire.

Program Dates: Two program dates have been scheduled for your convenience. Should you wish to schedule a workshop for a special group please call Shannon Ruby at (941) 338-3232. ***Each of these sessions will be approximately an hour in length.***

Day Session: Monday, March 20, 2000 at 10:00 a.m.
Evening Session: Wednesday, March 22, 2000 at 7:00 p.m.

Hosts: ***Lee County Extension Service and the Florida Division of Forestry***
Shannon Ruby, Natural Resources/Agriculture Agent, Extension
Jerry LaCavera, Wildfire Mitigation Specialist, DOF
Tom Williams, Senior Forester, DOF

Cost: ***FREE. There will not be a charge for the workshop or any of the educational materials distributed***
Educational materials provided by the University of Florida

Topics:

1. ***The Natural Role of Fire.***
   - Geography
   - Florida's Ecosystems
   - Fire Frequency
   - Fire History
   - Benefits
2. ***Types of Fire-Wildfire and Prescribed Fire***
   - Causes of Wildfires
   - Lee County Causes
   - Prescribed Fire
   - Comparison of these Types
   - Process and Effects of Prescribed fire
3. **Protecting your Home**
   - Assess your risk
   - Reduce you risk
   - Firesafe Landscapes-Plants to Use
   - Home Maintenance

SPONSOR:
Nations Rent will provide refreshments at both sessions.

Nations Rent℠

We hope to see you at the workshop.
Shannon Ruby
Shannon Ruby
Lee County Natural Resources/Ag Agent

Appendix IV. Sample Dear Neighbor Letter

700-1 Fisherman's Wharf
Ft. Myers Beach, FL 33931
March 26, 2002

Estero Bay State Buffer Preserve Neighbors

Dear Neighbor:

Since you are in close proximity of the Estero Bay State Buffer Preserve, we would like to keep you informed of upcoming management activities, specifically ecological prescribed burning.

Burning was a natural unchecked process in Florida before settlement. It is up to land managers to re-introduce fire into areas which require it. The plants and animals, which live in these areas, are adapted to fire and need it for survival. As a neighbor of the preserve, you will derive certain benefits from the burn program at Estero Bay. These benefits include the removal of accumulated fuels, which will lessen the possibility of a devastating wildfire damaging your property; improving wildlife habitat; increase sightings of wildlife and wildflowers within view of your backyard; improve Lee Co. Mosquito Control's pesticide effectiveness in tidal marsh areas; and the restoration of scenic vistas across pine flatwoods areas as the undergrowth is reduced.

Within the next month, weather permitting, we plan to burn the tidal marsh areas adjacent to your property. A professional crew of trained individuals will conduct these burns with safety and smoke management as top priorities. If the smoke produced from these, or any upcoming fires, bothers you, we apologize. However, we will make every effort to burn only on days when the smoke will be carried away quickly. We will also make every effort to notify you before we burn so you do not mistake our burn for a wildfire. All prescribed burns will be set and extinguished before the end of the day and will not be allowed to smolder for days on end. We will have an approved burning permit from the Florida Division of Forestry (DOF) before we begin any burn.

We thank you for being an ecologically concerned neighbor and welcome you the opportunity to discuss any questions you may have about our burn program. If your neighborhood association is interested in learning more about the natural role of fire, types of fire (wildfire and prescribed fire), and protecting your home, a program has been developed called *Fire In Florida: Wildfire Safety Workshop* that is presented by the Lee County Extension Service and DOF. Please call the Estero Bay State Buffer Preserve office at 463-3240 from 8am to 5pm if you would like more information.

Respectfully,

Sherry Furnari
Environmental Specialist I

Heather Stafford
Program Manager

Appendix V. Prescribed Fire Brochure

A Scene from Florida's Past

It was sweltering-a day to make paint blister. The cicadas buzzed incessantly as the thunderheads piled up like cauliflower in the sky. Florida on a summer afternoon. Suddenly a lightning bolt sliced through the oppressive air, shattering the bark of a pine tree. Lightning spiraled down the trunk, leaving a deep gash and hitting the ground with explosive force. A feeble fire flickered in the dry grass and pine needles. A cool breeze blew, but no rain came. The breeze fanned the fire pushing it along. Soon the fire had burned many acres of the grassy pine woods.

This scene repeated itself many times each year in Florida. The plants and animals of the pinewoods grew accustomed to these frequent fires and came to depend on fire for their very survival.

Why We Burn

Many private companies, individual landowners, and public agencies manage land where prescribed fires are necessary to improve and protect the resources or rangeland. Fire is a natural force in many plant communities: sandhills, pine flatwoods, pine rocklands and scrub to name a few. Without fire, these communities change into hardwood forests. As they change, the plants and animals unique to the original communities are lost. Fox squirrels, gopher tortoises, scrub jays, and pines are a few species that depend on fire.

To maintain the variety of plant communities, to approximate natural conditions and to reduce the chances of devastating wildfires, the use of prescribed fire or control burning is often used in Florida. Human fear of fire has led us to attempt to control fire by suppressing as many fires as possible. As the dramatic 1998 wildfires in Florida effectively illustrated, long-term fire suppression in plant communities adapted to periodic fires leads to devastating consequences when a fire finally does occur. Periodic prescribed fires are the best means of preventing destructive wildfires.

Excuse our Smoke

Fire is a natural part of Florida's biological heritage. Periodic burning of lands preserves those lands and the plant and animals that call them home. These periodic fires also protect neighboring private property from wildfires but not without some temporary inconveniences. Smoke and ash travel great distances and occasionally they may find their way to your yard. Great care is taken to safeguard against this, but weather changes quickly and a wind shift may cause smoke to travel close to you. This temporary inconvenience should not last long and is a sign that certain lands are being cared for. We welcome you to come see the results of our fire management programs.

Appendix VI. Neighborhood Points of Contact

Estero River Scrub

West Bay Club
Larry Matzick, Property Mgr.
22051 Atlantic Gulf Blvd
Estero, Fl 33928
(941) 498-7770
Cell 565-9430

Mariner Cove
Cinda Leders, Manager?
20700 Basin Dr
Estero, Fl 33928
(941) 992-3533

Riverwoods
Marilyn Donaldson, Manager
4600 Robert E Lee Blvd
Estero, Fl 33928
(941) 992-5798
fax 992-6743
(Most residents gone after Easter)

Sheltering Pines
Fred Dailey Pres. Neighborhood
3650 Unique Cir
Estero, Fl 33928
(941) 466-6170
(gone after July 4th)

Quarter Deck Cove
Bob Morris, Pres. Neighborhood
20605 Armada Ct.
Estero, FL 33928
(941) 495-9120

Estero River Heights
Jeff Wolf
P.O. Box 1023
Estero, FL 33928
H 495-2994
W 513-0200

Shadow Wood Preserve
Grady Miars (sales)
7111 Shadow Creek Blvd
Fort Myers, Fl 33908
(941) 390-1027
(no residents for one year)
Skip Adams (building contractor)
851-3227

Winkler P./Hendry Creek/Cow P./No Name P.

Forest Country Club
Pedro Prado, General Manager
6100 Club Blvd., SW
Ft. Myers, FL 33908
(941) 482-8378

Lexington Community Assn., Inc
Al Kinkle, General Manager
16257 Willowcrest Way
Ft. Myers, Fl 33908
(941) 437-0404
fax 437-1488

Crown Colony
Tom Wegwert, Land Development Mgr
5801 Pelican Bay Blvd Suite 600
Naples, Fl 34018
(941) 598-4145 EXT 217

Timber Run
Richard Falata
(330) 533-8460
fax (330) 533-8460
Bill Gaskin (Coldwell Banker) 939-3336

Lee Health Park
Rafael Ortiz, Security Supervisor
9981 Health Park Circle
Ft. Myers, FL 33908
(941) 574-0250
fax 772-6571
(941) 334-5913

Belle Meade and Woodgate
Winkler Rd.

Winkler Estates
Arvida 415-9300

Colony Lakes
Management Professionals Inc
P.O. Box 1058
Lehigh Acres, FL 33970
368-6741?

Southwind Preserve
Rick Murray, GM
(952) 934-6238
fax (952) 934-2428

Stonebridge
Steve Belcher (resident)
8707 South Lake Circle
Fort Myers, Fl 33908
482-6069

Bayside Estates Home Owners Assn
Randy Woods (maintenance supv.)
17601 San Carlos Blvd
Fort Myers Beach, Fl 33931
872-1973 cell
466-6042 HOA FAX 466-8808

Heritage Farms
Victor Schargorodski, Pres. Homeowners
7373 Lake Dr
Fort Myers, Fl 33908
(941) 454-3699
fax 590-0767

Fernwood
Winkler Rd

Josey' Horse Farm
Frank ? (caretaker)
17561 Winkler Rd.
Ft. Myers, FL 33908
(239) 267-0013

Temple Beth-El
16225 Winkler Rd
Fort Myers, Fl 33908
433-0018

Shell Point

Shell Point Retirement Community
Robert Southern/Julie Chesnut
14200 Woodsong Lane
Ft. Myers, FL 33908
(239) 454-8792/**454-2168**
fax (239) 415-3370
cell (239)707-6596

Port Sanibel Marina
Craig Stewart
14341 Port Comfort Rd.
Ft. Myers, FL 33908
(239) 437-1660
fax (239) 472-3922

Spring Creek

Spring Creek Village
Dennis Waltchack or Betty Haley
24681 Windward Blvd.
Bonita Springs, FL 33134
(239) 992-3800
fax (239) 992-2804

The Colony (WCI) in Estero
Jim O'Donnell
10571Venito Dr.
Ft. Myers, FL 33913
(239) 985-1640
fax (239) 768-6562

Appendix VII. CPBM Renewal Requirements

Florida Department of Agriculture and Consumer Services
CHARLES H. BRONSON, Commissioner
The Capitol • Tallahassee, FL 32399-0800

Please Respond to:
Forest Protection Bureau
Suite A Room 160
3125 Conner Blvd.
Tallahassee, Florida 32399-1650

October 17, 2002

MEMORANDUM

TO: All Center/District Managers
FROM: Jim Karels, Chief, Forest Protection
Ray Geiger, Chief, Field Operations
THROUGH: L. Earl Peterson, Director
SUBJECT: 5I-2.006(2)(d) Certified Prescribed Burn Manager Certification Renewal

Many questions have been recently raised about the deadline for Certification Renewal that went into effect in July of 1999. This memo is being sent to you in an effort to help work through this process this first year. We will accept documentation (must include number of hours the training lasted, copy of certificate or verification by District Manager of attendance, and an agenda for the training) for all courses related to prescribed burning. These include:

Fire Behavior Courses e.g., S-190, 290, 390 and 490.
RX Courses e.g., RX 340 (Fire Effects), RX 450 Smoke Management
Smoke Screening/Smoke Mgt. Sessions e.g., In-District (Need Agenda and Hours)
Aerial Ignition Training
Prescribed Fire Council Meetings
Participation as an Instructor in any of the above

Any district that plans to hold in-district prescribed fire training that they feel will meet this requirement by the end of 2002, should send a copy of the agenda to Ralph Crawford at least one week prior to the session so that both offices can agree on content.

At this time it is not necessary to send in any documentation on training or prescribed burns. We will be reviewing the histories of all Certified Prescribed Burn Managers (CPBM) based on the burning authorization program and the registration forms. (Everyone was encouraged to sign these at the Central and North Prescribed Fire Council Meetings; we have never been able to get the South Florida Council to return our registration forms). We will compile a list of those that do not meet the requirements according to our records. At that time we will send a letter ONLY to those individuals that do not meet the requirements to maintain their certification outlining their options.

If a burner is already aware that they do not meet the training requirement, they should be prepared to respond to this letter in January with the documentation outlined above. This information should be sent to Ralph Crawford in the Forest Protection Bureau.

In the event that the CPBM does not meet the authorization requirement, we will be requesting a signed letter from a current CPBM (one who's certification is not in question) that will list 5 authorized burns that the burner has participated in over the last 5 years and the authorization numbers associated with these burns. The letter must detail that the individual in question was a member of the burn crew, and actively participated in the five documented burns. This letter must be sent to Ralph Crawford in the Forest Protection Bureau in Tallahassee.

We will review any other situations on a case-by-case basis. Our intent here is not to reduce the number of CPBM's in Florida; our intent was always to improve the capabilities of the average burner in our state. We would caution all of those involved that any CPBM that encounters problems in the future will be looked at very closely by the courts. Their burn history and training will come under close scrutiny, as will any documentation concerning this training. We are obligated to do our best to serve all of our customers, and the best way we can do this is to keep this valuable tool available to all responsible burners.

If you have any questions, please contact Jim Karels at 850/488-6111.

cc: M. C. Long Assistant Director
Ray Geiger, Chief, Operations Bureau
Bureau Chiefs
Deputy Chiefs
Rich Gorden, Division Training Officer
Bob King, Coordinator, Forestry Youth Academy

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF COASTAL & AQUATIC MANAGED AREAS

BURN UNIT PLAN/PRESCRIPTION

Preserve _____ County _____
Unit _____ Sec____ Twn____ Ran____
Burn zone(s): _____ Acres to burn _____
Burn window/dates _____ Last date unit burned _____

Unit description (include biological community types, dominant plant species, approx. % woody versus herbaceous growth, average fuel height of understory, average canopy height of overstory, "fuel model"):

Maps must be attached: (1) Burn unit map showing location of all control lines, safe zones, areas of special concern (structures), water sources, and proposed ignition pattern. (2) Map showing desired wind direction and smoke screening information.

Resource management objectives (measurable) _____

Personnel required with assigned positions/responsibility _____

Equipment required _____

Smoke screening system: passed _____ failed _____ (attach map plotting winds and identifying smoke sensitive areas)

Smoke sensitive areas _____

Fire break/site preparation _____

Special precautions (cultural resources, sensitive areas, high flammability, endangered spp.)

Photo point description _____

Intended firing plan _____

Contingency plan _____

People to notify prior to burn _____

WEATHER/FIRE, BEHAVIOR FACTORS

	Preferred	**Actual (fill out day of burn)**
temperature	_____min_____max	_____min_____max
relative humidity	_____min_____max	_____min_____max
20' winds(direction/speed)	dir_____min/max_____	dir_____min/max_____
transport winds(direction/speed)	dir_____min/max_____	dir_____min/max_____
min. mixing height	_____	_____
dispersion index	day_____night _____	day _____ _____
fine fuel moisture	_____	night _____
drought index	_____	_____
days since last 1/2" rain	_____	_____
flame length	_____	_____
rate of spread	_____	_____
starting/ignition time	_____	_____

Prescription prepared by _____date_____

Prescription approved by _____date_____

FILL OUT DAY OF BURN:

Date of burn _____

Pre-burn conference (date/time/participants) _____

Burn Manager (print) _____(sign)_____ DOF cert.# _____

This form requests all information required by Ch. 5 1-2. Rural Open Burning. CAMA 8/22/99

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF COASTAL & AQUATIC MANAGED AREAS

PRE-BURN CHECKLIST AND CREW BRIEFING

Fire Unit _____ Date _____

A. PRIOR TO CREW BRIEFING

Fire Unit is as described in plan.
_____ Required fire lanes complete.
_____ Permits obtained. Give Permit #'s:
_____ Official and neighbor notifications complete.
_____ Required equipment is on-site and functioning.
_____ Planned ignition and containment methods are appropriate.
_____ List of emergency phone numbers are in each vehicle.
_____ Planned contingencies and mop-up are appropriate:

B. CREW BRIEFING

_____ Each crew member has a burn unit map.
_____ Fire Unit size and boundaries discussed.
_____ Fire Unit hazards discussed.
_____ Purpose of burn.
_____ Anticipated fire and smoke behavior.
_____ Review of equipment and troubleshooting.
_____ Check crew qualifications.
_____ Review organization of crew and assignments.
_____ Review methods of ignition, holding, mop-up, communications.
_____ Review contact with the public; traffic concerns.
_____ Location of vehicles, keys, and nearest phone.
_____ Location of back-up equipment, supplies, and water.
_____ Review all contingencies including escape routes.
_____ Review mop-up procedures.
_____ Answer questions from crew.

C. PRIOR TO IGNITION

_____ Weather and fuel conditions are within prescriptions.
_____ Weather forecast, obtained within two hours of ignition, says prescribed weather will hold for two hours past expected duration of burn.
_____ Crew members have required protective clothing.
_____ Crew members have matches.
_____ Conduct test burn.

D. BEFORE LEAVING BURN UNIT

_____ Mop-up completed as described in prescription.
_____ Next morning inspection arranged.

E. NOTE (on back) ANY MODIFICATIONS TO PLAN:

Burn Manager: _____ Date: _____

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF COASTAL & AQUATIC MANAGED AREAS

DAY OF BURN PROCEDURES

Unit _____ Date of burn _____
Burn zones(s) _____ Evaluation due _____
Acres planned to burn _____ Acres actually burned _____

Personnel Contacted

Agency	Name/date/time called	Help/attendance invited?
DOF Landowner # _____		
DOF Authorization# _____		

Attach:
1. **Burn zone map** indicating firing pattern used with numbered arrows & cross hatch burned areas;
2. **"Fire Weather Forecast (Today, Tonight, Tomorrow) Sheet"**
3. **"Weather, Fine Fuel Moisture & Fire Behavior Data Sheet"**
4. **Diagram of crew positions/members and equipment**
5. **"Pre-Burn Checklist & Crew Briefing Sheet"**
6. Remember to fill out **"Actual Weather"** column on **Prescription**

Time started/ignition _____ Time ended (mop-up complete) _____
Smoke dispersal problems _____

Deviations from plan/prescription _____

Problems & general observations _____

Burn Manager (print) _____ (sign) _____ DOF cert.# _____

REMEMBER TO CHECK BURN UNIT TONIGHT & TOMORROW FOR FLARE-UPS

Appendix XI. Weather Recording Log

Page _____ of _____ for this FIRE.

Location of Fire _____

WEATHER, FINE FUEL MOISTURE & FIRE BEHAVIOR

(Recording frequency required by Fire Boss)

Observer(s) _____ Date (s) _____ _____ **Recording Frequency (Circle) Half Hour Hourly**

Time	Dry Bulb	Wet Bulb	R. H.	Wind Speed Range	Wind Speed Ave.	Wind Direct	Cloud Type	State of WX	One Hour Fuel	Fire Dir.	COMMENTS (*)

CODES

CLOUD TYPE =

0 - Cumulonimbus (Thunderhead)
1 - Cumulus (Cauliflower)
2 - Alto Cumulus (Sheepbacks)
3 - Cirrus (High Feathery)

STATE OF THE WEATHER = (WX)

0 - Clear (less than 10% Cloud Cover)
1 - Scattered (10 - 50% Cloud Cover)
2 - Broken (60 - 90% Cloud Cover)
3 - Overcast (> 90% Cloud Cover)
4 - Foggy
5 - Drizzling
6 - Raining
7 - Snowing or Sleeting
8 - Showering
9 - Thunderstorm in Progress

FIRE DIRECTION

B - Backing
H - Heading
F - Flank
SF - Spotfires
SH - Striphead

COMMENTS (*)

INCLUDE NOTATION OF:

Smoke Movement and Spotovers

CAMA 8/22/99

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF COASTAL & AQUATIC MANAGED AREAS

POST BURN EVALUATION

Unit _____ Evaluation date _____
Burn Zone(s) _____ Date of burn _____

State burn objectives and if they were met. _____

Attach copy of **Day-of-Burn/Burn Unit Map,** indicate observations and photo points on map. Sketch pattern of any hardwood (H) and pine (P) overstory kill; describe and comment on reasons for tree kill. _____

General description of understory height changes, species composition changes, shrub top kill or reduction, blooming responses, regeneration, etc. _____

Discuss any vegetation changes attributed to firing technique(s) or weather influences before, during, or after the burn. _____

Wildlife and plant observations _____

Photo plot location _____

Prepared by _____ Title _____

ATTACH TO BURN PLAN/PRESCRIPTION AND ASSOCIATED DOCUMENTS

Literature Cited

Chen, E. & Gerber, J. F. "Climate" Myers, R. L. & Ewel, J. J., eds. Ecosystems of Florida, 14-34. Florida: University of Central Florida Press, 1990.

Ecological Effects of Fire on Flora, Fauna, Water, and Soil. Basic Prescribed Fire Training Manual, December 1999.

Fight Fire with Fire. (2003, January 29). [WWW document]. URL http://www.prescribed-fire.org/

Florida Department of Agriculture and Consumer Services – Division of Forestry. Fire Management Plan for the Welaka State Forest. FDACS – DOF, 1999.

Florida Department of Environmental Protection – St. Sebastian River State Buffer Preserve. Fire Management Plan. Florida: FDEP.

Florida Department of Natural Resources and Florida Natural Areas Inventory. Guide to the Natural Communities of Florida. Tallahassee: Department of Natural Resources, February 1990.

Gardner, Jay. Fire Management Plan. Florida Department of Environmental Protection – Charlotte Harbor State Buffer Preserve. Florida: FDEP, 2002.

Haner, Judy, & Ted Bartareau. Fire Management Plan. Florida Department of Environmental Protection – Rookery Bay National Estuarine Research Reserve. Florida: FDEP, 2002.

Henderson, W.G. Jr. Soil Survey of Lee County, Florida. USDA Soil Conservation Service. December 1984.

Keetch, J. E. & G. M. Byram. A Drought Index for Forest Fire Control. Research Paper SE-38. North Carolina: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station, 1968.

Lee County Community Development. (2002, October 24). [WWW document]. URL http://www.lee-county.com/DCD/images/firedistrictsmaps3.gif

Merriam-Webster's New Collegiate Dictionary. Springfield: Merriam-Webster, 1979.

Myers, R. L. "Scrub and High Pine." Myers, R. L. & Ewel, J. J., eds. Ecosystems of Florida, 150-193. Florida: University of Central Florida Press, 1990.

Myers, Ronald L. and Robbins, Louise E. Seasonal Effects of Prescribed Burning In Florida: Tall Timbers Research, Inc. Miscellaneous Publication No. 8, 1992.

National Interagency Fire Center. Intermediate Wildland Fire Behavior S-290 Student Workbook. Idaho: July 1994, NFES #2378.

National Wildfire Coordinating Group. A Guide for Prescribed Fire in Southern Forests. National Wildfire Coordinating Group, Technical Publication R8-TP 11, 1989.

Prescribed Fire Brochure, Florida: South Florida Interagency Fire Management Council, 2001.

South Florida Water Management District. Estero Bay and Watershed Assessment Plan. Prepared by PBS&J, Inc. Tampa, FL. November 1999.

U.S. Department of Agriculture. A Guide for Prescribed Fire in Southern Forests, NFES #2108. USDA, February 1989.

U.S. Department of Agriculture. Aids to Determining Fuel Models For Estimating Fire Behavior, NFES #1574. USDA, April 1982.

Appendix L

DHR Site Assessment for Archaeological and Cultural Resources

Known Cultural Resources on the Property

Eleven cultural resources are located within the boundaries of the Estero Bay Aquatic Preserve, and one is found within the Estero Bay Buffer Preserve. Of this total, four are new and were recorded by the C.A.R.L. Archaeological Survey. Conditions at two sites, Starvation Key (8LL727) and Julies Island (8LL728), were found to be much the same as originally recorded and it was not necessary to update the files (see Luer and Archibald 1988). Dog Key (8LL726) was not visited.

As previously mentioned, two sites, Mound Key (8LL2) and Mound Key Burial Mound (8LL3), are not managed by Preserve personnel though they are located within the boundaries of the Aquatic Preserve. For this reason, the two sites are not included in this report.

The following list is a summary of the known sites on both Estero Bay Preserves, a description of each, and a synopsis of important details. [redacted]

New Sites:

Cow Slough (8LL1922)
Location: Buffer Preserve, USGS Fort Myers Beach, Fla [redacted]
Site Type: Shell midden
Culture Period Represented: Unspecified Caloosahatchee/Glades
Artifacts (summary): Sand tempered plain sherds and marine shell.
Condition: Some disturbance from exotic vegetation and the removal of this vegetation.
Eligible for Nomination to the National Register? Unlikely.
Management Recommendations: Protection, preservation.

Mullet Boat Cove (8LL1923)
Location: Aquatic Preserve, USGS Fort Myers Beach, Fla [redacted]
Site Type: Historic boat refuse
Culture Period Represented: 20th Century
Artifacts (summary): Numerous fishing boats and associated material culture.
Condition: The boats, while unserviceable, are important to the fish heritage of Estero Bay. Several boat hulls and associated artifacts are present.
Eligible for Nomination to the National Register? As a single nomination it is unlikely that the site is eligible, but as a component in a fishing heritage/Estero Bay land use nomination the site may be eligible.
Management Recommendations: Additional removal of boats and associated debris should be avoided without consultation with the Division of Historical Resources.

Bell P-39 Airacobra (8LL1924)
Location: Aquatic Preserve, USGS Estero, Florida, [redacted]
Site Type: Aircraft

Management Recommendations: No evidence of a prehistoric site was found in the area located on the site files map. The area is very low-lying covered with black mangrove. A natural shell berm was noted along the waterway.

Old Naples Dock (8LL715)

Location: Aquatic Preserve, USGS Bonita Springs, Fla [redacted]

Site Type: Shell midden, historic town and associated dock

Culture Period Represented: Unspecified Caloosahatchee/Glades, 19th and 20th Century

Artifacts (summary): Sand tempered plain pottery, worked shell, faunal remains, historic debris.

Condition: Site has been severely disturbed, but intact portions may remain.

Eligible for Nomination to the National Register? Additional work would need to be done to determine eligibility.

Management Recommendations: The site is privately owned, but a possible underwater component may come under the jurisdiction of the Aquatic Preserve. Prior to disturbance, the Bureau of Historic Preservation should be contacted.

Dog Key (8LL726)

Location: Aquatic Preserve, USGS Fort Myers Beach, Fla [redacted]

Site Type: Shell midden, sand burial mound, historic homestead and refuse.

Culture Period Represented: Unspecified Caloosahatchee/Glades, 20th Century.

Artifacts (summary): Sand tempered plain pottery, shell tools, human remains, historic refuse.

Condition: Some vandalism was reported in 1991. Site was not visited during 1997 C.A.R.L. trip.

Eligible for Nomination to the National Register? Additional work would be needed to determine individual eligibility, but if nominated with other sites in Estero Bay as a district, eligibility is likely.

Management Recommendations: Protection and preservation. Site should be visited on a regular basis to check for site vandalism.

Starvation Key (8LL727)

Location: Aquatic Preserve, USGS Fort Myers Beach, Fla [redacted]

Site Type: Shell midden

Culture Period Represented: Unspecified Caloosahatchee/Glades

Artifacts (summary): Sand tempered plain pottery, shell tools.

Condition: Site is in good condition.

Eligible for Nomination to the National Register? Additional work would be needed to determine individual eligibility, but if nominated with other sites in Estero Bay as a district, eligibility is likely.

Management Recommendations: Protection and preservation.

At least two sites, the Old Naples Dock (8LL715) and Coconut (8LL61) have components that extend into the water, thus coming under the jurisdiction of the Aquatic Preserve. The Division of Historic Preservation should be consulted if any plans are made to disturb these underwater areas.

The three new sites in the Aquatic Preserve are all historic in nature; two mullet boat dumps and one airplane crash site. Disturbance in these areas should be avoided. If this is not possible, the Division of Historical Resources should be contacted as early as possible. Much of the material from the Airacobra site (8LL1924) has been removed and the area disturbed. Mullet Boat Cove (8LL1923) has been impacted by clean-up efforts and many boats removed. The boats and debris at Mullet Boat Graveyard (8LL1928) appear to be intact. Serious consideration should be given to obtaining additional documentation about the two sites. Further study on local fishing history and oral interviews with local fisherman would be beneficial. The sites are important to the fishing heritage of Estero Bay. C.A.R.L. personnel can provide additional information on obtaining funding for such research and documentation.

Appendix M

DHR Management Procedures for Archaeological and Historical Sites

MANAGEMENT PROCEDURES FOR
ARCHAEOLOGICAL AND HISTORICAL SITES AND PROPERTIES
ON STATE - OWNED OR CONTROLLED LANDS
(revised August, 1995)

A. GENERAL DISCUSSION

Archaeological and historic sites are defined collectively in 267.021(3), F.S., as "historic properties" or "historic resources". They have several essential characteristics which must be recognized in a management program.

- First of all, they are a finite and non-renewable resource. Once destroyed, presently existing resources, including buildings, other structures, shipwreck remains, archaeological sites and other objects of antiquity, cannot be renewed or revived. Today, sites in the State of Florida are being destroyed by all kinds of land development, inappropriate land management practices, erosion, looting, and to a minor extent even by well-intentioned professional scientific research (e.g., archaeological excavation). Measures must be taken to ensure that some of these resources will be preserved for future study and appreciation.

- Secondly, sites are unique because individually they represent the tangible remains of events which occurred at a specific time and place.

- Thirdly, while sites uniquely reflect localized events, these events and the origin of particular sites are related to conditions and events in other times and places. Sites can be understood properly only in relation to their natural surroundings and the activities of inhabitants of other sites. Managers must be aware of this "systemic" character of historic and archaeological sites. Also, it should be recognized that archaeological sites are time capsules for more than cultural history; they preserve traces of past biotic communities, climate, and other elements of the environment that may be of interest to other scientific disciplines.

- Finally, the significance of sites, particularly archaeological ones, derives not only from the individual artifacts within them, but also equally from the spatial arrangement of those artifacts in both horizontal and vertical planes. When archaeologists excavate, they recover, not merely objects, but also a record of the positions of these objects in relation to one another and their containing matrix (e.g., soil strata). Much information is sacrificed if the so-called "context" of archaeological objects is destroyed or not recovered, and this is what archaeologists are most concerned about when a site is threatened with destruction or damage. The artifacts themselves can be recovered even after a site is heavily disturbed, but the context - the vertical and horizontal relationships - cannot. Historic structures also contain a wealth of cultural (socio-economic) data which can be lost if historically sensitive maintenance, restoration or rehabilitation procedures are not implemented, or if they are demolished or extensively altered without appropriate documentation. Lastly, it should not be forgotten that historic structures often have associated potentially significant historic archaeological features which must be considered in land management decisions.

B. STATUTORY AUTHORITY

Chapter 253, Florida Statutes ("State Lands") directs the preparation of "single-use" or "multiple-use" land management plans for all state-owned lands and state-owned sovereignty submerged lands. In this document, 253.034(5), F.S., specifically requires that "all management plans, whether for single-use or multiple-use properties, shall specifically describe how the managing agency plans to identify, locate, protect and preserve, or otherwise use fragile non-renewable resources, such as archaeological and historic sites, as well as other fragile resources..."

Chapter 267, Florida Statutes is the primary historic preservation authority of the state. The importance of protecting and interpreting archaeological and historic sites is recognized in 267.061(1)(a), F.S.:

The rich and unique heritage of historic properties in this state, representing more than 10,000 years of human presence, is an important legacy to be valued and conserved for present and future generations. The destruction of

these nonrenewable historic resources will engender a significant loss to the state's quality of life, economy, and cultural environment. It is therefore declared to be state policy to:

1. *Provide leadership in the preservation of the state's historic resources; [and]*
2. *Administer state-owned or state-controlled historic resources in a spirit of stewardship and trusteeship;...*

Responsibilities of the Division of Historical Resources in the Department of State pursuant to 267.061(3), F.S., include the following:

1. Cooperate with federal and state agencies, local governments, and private organizations and individuals to direct and conduct a comprehensive statewide survey of historic resources and to maintain an inventory of such responses.
2. Develop a comprehensive statewide historic preservation plan.
3. Identify and nominate eligible properties to the *National Register of Historic Places* and otherwise administer applications for listing properties in the National Register of Historic Places.
4. Cooperate with federal and state agencies, local governments, and organizations and individuals to ensure that historic resources are taken into consideration at all levels of planning and development.
5. Advise and assist, as appropriate, federal and state agencies and local governments in carrying out their historic preservation responsibilities and programs.
6. Carry out on behalf of the state the programs of the National Historic Preservation Act of 1966, as amended, and to establish, maintain, and administer a state historic preservation program meeting the requirements of an approved program and fulfilling the responsibilities of state historic preservation programs as provided in subsection 101(b) of that act.
7. Take such other actions necessary or appropriate to locate, acquire, protect, preserve, operate, interpret, and promote the location, acquisition, protection, preservation, operation, and interpretation of historic resources to foster an appreciation of Florida history and culture. Prior to the acquisition, preservation, interpretation, or operation of a historic property by a state agency, the Division shall be provided a reasonable opportunity to review and comment on the proposed undertaking and shall determine that there exists historic authenticity and a feasible means of providing for the preservation, interpretation and operation of such property.
8. Establish professional standards for the preservation, exclusive of acquisition, of historic resources in state ownership or control.
9. Establish guidelines for state agency responsibilities under subsection (2).

Responsibilities of other state agencies of the executive branch, pursuant to 267.061(2), F.S., include:

1. Each state agency of the executive branch having direct or indirect jurisdiction over a proposed state or state-assisted undertaking shall, in accordance with state policy and prior to the approval of expenditure of any state funds on the undertaking, consider the effect of the undertaking on any historic property that is included in, or eligible for inclusion in, the *National Register of Historic Places*. Each such agency shall afford the division a reasonable opportunity to comment with regard to such an undertaking.

2. Each state agency of the executive branch shall initiate measures in consultation with the division to assure that where, as a result of state action or assistance carried out by such agency, a historic property is to be demolished or substantially altered in a way which adversely affects the character, form, integrity, or other qualities which contribute to [the] historical, architectural, or archaeological value of the property, timely steps are taken to determine that no feasible and prudent alternative to the proposed demolition or alteration exists, and, where no such alternative is determined to exist, to assure that timely steps are taken either to avoid or mitigate the adverse effects, or to undertake an appropriate archaeological salvage excavation or other recovery action to document the property as it existed prior to demolition or alteration.

3. In consultation with the division [of Historical Resources], each state agency of the executive branch shall establish a program to locate, inventory, and evaluate all historic properties under the agency's ownership or control that appear to qualify for the National Register. Each such agency shall exercise caution to assure that any such historic property is not inadvertently transferred, sold, demolished, substantially altered, or allowed to deteriorate significantly.

4. Each state agency of the executive branch shall assume responsibility for the preservation of historic resources which are owned or controlled by such agency. Prior to acquiring, constructing, or leasing buildings for the purpose of carrying out agency responsibilities, the agency shall use, to the maximum extent feasible, historic properties available to the agency. Each agency shall undertake, consistent with preservation of such properties, the mission of the agency, and the professional standards established pursuant to paragraph (3)(k), any preservation actions necessary to carry out the intent of this paragraph.

5. Each state agency of the executive branch, in seeking to acquire additional space through new construction or lease, shall give preference to the acquisition or use of historic properties when such acquisition or use is determined to be feasible and prudent compared with available alternatives. The acquisition or use of historic properties is considered feasible and prudent if the cost of purchase or lease, the cost of rehabilitation, remodeling, or altering the building to meet compliance standards and the agency's needs, and the projected costs of maintaining the building and providing utilities and other services is less than or equal to the same costs for available alternatives. The agency shall request the division to assist in determining if the acquisition or use of a historic property is feasible and prudent. Within 60 days after making a determination that additional space is needed, the agency shall request the division to assist in identifying buildings within the appropriate geographic area that are historic properties suitable for acquisition or lease by the agency, whether or not such properties are in need of repair, alteration, or addition.

6. Consistent with the agency's mission and authority, all state agencies of the executive branch shall carry out agency programs and projects, including those under which any state assistance is provided, in a manner which is generally sensitive to the preservation of historic properties and shall give consideration to programs and projects which will further the purposes of this section.

Section 267.12 authorizes the Division to establish procedures for the granting of research permits for archaeological and historic site survey or excavation on state-owned or controlled lands, while Section 267.13 establishes penalties for the conduct of such work without first obtaining written permission from the Division of Historical Resources. The Rules of the Department of State, Division of Historical Resources, for research permits for archaeological sites of significance are contained in Chapter 1A-32,F.A.C.

Another Florida Statute affecting land management decisions is Chapter 872, F.S. Section 872.02, F.S., pertains to marked grave sites, regardless of age. Many state-owned properties contain old family and other cemeteries with tombstones, crypts, etc. Section 872.05, F.S., pertains to unmarked human burial sites, including prehistoric and historic Indian burial sites. Unauthorized disturbance of both marked and unmarked human burial sites is a felony.

C. MANAGEMENT POLICY

The choice of a management policy for archaeological and historic sites within state-owned or controlled lands obviously depends upon a detailed evaluation of the characteristics and conditions of the individual sites and groups of sites within those tracts. This includes an interpretation of the significance (or potential significance) of these sites, in terms of social and political factors, as well as environmental factors. Furthermore, for historic structures architectural significance must be considered, as well as any associated historic landscapes.

Sites on privately owned lands are especially vulnerable to destruction, since often times the economic incentives for preservation are low compared to other uses of the land areas involved. Hence, sites in public ownership have a magnified importance, since they are the ones with the best chance of survival over the long run. This is particularly true of sites which are state-owned or controlled, where the basis of management is to provide for land uses that are minimally destructive of resource values.

It should be noted that while many archaeological and historical sites are already recorded within state-owned or controlled-lands, the majority of the uplands areas and nearly all of the inundated areas have not been surveyed to locate and assess the significance of such resources. The known sites are, thus, only an incomplete sample of the actual resources - i.e., the number, density, distribution, age, character and

condition of archaeological and historic sites - on these tracts. Unfortunately, the lack of specific knowledge of the actual resources prevents formulation of any sort of detailed management or use plan involving decisions about the relative historic value of individual sites. For this reason, a generalized policy of conservation is recommended until the resources have been better addressed.

The generalized management policy recommended by the Division of Historical Resources includes the following:

1. State land managers shall coordinate all planned activities involving known archaeological or historic sites or potential site areas closely with the Division of Historical Resources in order to prevent any kind of disturbance to significant archaeological or historic sites that may exist on the tract. Under 267.061(1)(b), F.S., the Division of Historical Resources is vested with title to archaeological and historic resources abandoned on state lands and is responsible for administration and protection of such resources. The Division will cooperate with the land manager in the management of these resources. Furthermore, provisions of 267.061(2) and 267.13, F.S., combined with those in 267.061(3) and 253.034(4), F.S., require that other managing (or permitting) agencies coordinate their plans with the Division of Historical Resources at a sufficiently early stage to preclude inadvertent damage or destruction to known or potentially occurring, presently unknown archaeological and historic sites. The provisions pertaining to human burial sites must also be followed by state land managers when such remains are known or suspected to be present (see 872.02 and 872.05, F.S., and 1A-44, F.A.C.)

2. Since the actual resources are so poorly known, the potential impact of the managing agency's activities on historic archaeological sites may not be immediately apparent. Special field survey for such sites may be required to identify the potential endangerment as a result of particular management or permitting activities. The Division may perform surveys, as its resources permit, to aid the planning of other state agencies in their management activities, but outside archaeological consultants may have to be retained by the managing agency. This would be especially necessary in the cases of activities contemplating ground disturbance over large areas and unexpected occurrences. It should be noted, however, that in most instances Division staff's knowledge of known and expected site distribution is such that actual field surveys may not be necessary, and the project may be reviewed by submitting a project location map (preferably a 7.5 minute U.S.G.S. Quadrangle map or portion thereof) and project descriptive data, including detailed construction plans. To avoid delays, Division staff should be contacted to discuss specific project documentation review needs.

3. In the case of known significant sites, which may be affected by proposed project activities, the managing agency will generally be expected to alter proposed management or development plans, as necessary, or else make special provisions to minimize or mitigate damage to such sites.

4. If in the course of management activities, or as a result of development or the permitting of dredge activities (see 403.918(2)(6)a, F.S.), it is determined that valuable historic or archaeological sites will be damaged or destroyed, the Division reserves the right, pursuant to 267.061(1)(b), F.S., to require salvage measures to mitigate the destructive impact of such activities to such sites. Such salvage measures would be accomplished before the Division would grant permission for destruction of the affected site areas. The funding needed to implement salvage measures would be the responsibility of the managing agency planning the site destructive activity. Mitigation of historic structures at a minimum involves the preparation of measured drawings and documentary photographs. Mitigation of archaeological resources involves the excavation, analysis and reporting of the project findings and must be planned to occur sufficiently in advance to avoid project construction delays. If these services are to be contracted by the state agency, the selected consultant will need to obtain an Archaeological Research Permit from the Division of Historical Resources, Bureau of Archaeological Research (see 267.12, F.S. and Rules 1A-32 and 1A-46 F.A.C.).

5. For the near future, excavation of non-endangered (i.e., sites not being lost to erosion or development) archaeological sites is discouraged. There are many endangered sites in Florida (on both private and public lands) in need of excavation because of the threat of development or other factors. Those within state-owned or controlled lands should be left undisturbed for the present - with particular attention devoted to preventing site looting by "treasure hunters". On the other hand, the archaeological and historic survey of these tracts is

encouraged in order to build an inventory of the resources present, and to assess their scientific research potential and historic or architectural significance.

6. The cooperation of land managers in reporting sites to the Division that their field personnel may discover is encouraged. The Division will help inform field personnel from other resource managing agencies about the characteristics and appearance of sites. The Division has initiated a cultural resource management training program to help accomplish this. Upon request the Division will also provide to other agencies archaeological and historical summaries of the known and potentially occurring resources so that information may be incorporated into management plans and public awareness programs (See Management Implementation).

7. Any discovery of instances of looting or unauthorized destruction of sites must be reported to the agent for the Board of Trustees of the Internal Improvement Trust Fund and the Division so that appropriate action may be initiated. When human burial sites are involved, the provisions of 872.02 and 872.05, F. S. and Rule 1A-44, F.A.C., as applicable, must also be followed. Any state agent with law enforcement authority observing individuals or groups clearly and incontrovertibly vandalizing, looting or destroying archaeological or historic sites within state-owned or controlled lands without demonstrable permission from the Division will make arrests and detain those individuals or groups under the provisions of 267.13, 901.15, and 901.21, F.S., and related statutory authority pertaining to such illegal activities on state-owned or controlled lands. County Sheriffs' officers are urged to assist in efforts to stop and/or prevent site looting and destruction.

In addition to the above management policy for archaeological and historic sites on state-owned land, special attention shall be given to those properties listed in the *National Register of Historic Places* and other significant buildings. The Division recommends that the *Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings* (Revised 1990) be followed for such sites.

The following general standards apply to all treatments undertaken on historically significant properties.

1. A property shall be used for its historic purpose or be placed in a new use that requires minimal change to the defining characteristics of the building and its site and environment.

2. The historic character of a property shall be retained and preserved. The removal of historic materials or alterations of features and spaces that characterize a property shall be avoided.

3. Each property shall be recognized as a physical record of its time, place and use. Changes that create a false sense of historical development, such as adding conjectural features or architectural elements from other buildings, shall not be undertaken.

4. Most properties change over time; those changes that have acquired historic significance in their own right shall be retained and preserved.

5. Distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize a historic property shall be preserved.

6. Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature shall match the old in design, color, texture, and other visual qualities and, where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.

7. Chemical or physical treatments, such as sandblasting, that cause damage to historic materials shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the gentlest means possible.

8. Significant archaeological resources affected by a project shall be protected and preserved. If such resources must be disturbed, mitigation measures shall be undertaken.

9. New additions, exterior alterations, or related new construction shall not destroy materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.

10. New additions and adjacent or related new construction shall be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired. (see *Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings* [Revised 1990]).

Division of Historical Resources staff are available for technical assistance for any of the above listed topics. It is encouraged that such assistance be sought as early as possible in the project planning.

D. MANAGEMENT IMPLEMENTATION

As noted earlier, 253.034(4), F.S., states that "all management plans, whether for single-use or multiple-use properties, shall specifically describe how the managing agency plans to identify, locate, protect and preserve, or otherwise use fragile non-renewable resources, such as archaeological and historic sites..." The following guidelines should help to fulfill that requirement.

1. All land managing agencies should contact the Division and send U.S.G.S. 7.5 minute quadrangle maps outlining the boundaries of their various properties.

2. The Division will in turn identify site locations on those maps and provide descriptions for known archaeological and historical sites to the managing agency.

3. Further, the Division may also identify on the maps areas of high archaeological and historic site location probability within the subject tract. These are only probability zones, and sites may be found outside of these areas. Therefore, actual ground inspections of project areas may still be necessary.

4. The Division will send archaeological field recording forms and historic structure field recording forms to representatives of the agency to facilitate the recording of information on such resources.

5. Land managers will update information on recorded sites and properties.

6. Land managers will supply the Division with new information as it becomes available on previously unrecorded sites that their staff locate. The following details the kind of information the Division wishes to obtain for any new sites or structures which the land managers may report:

   A. Historic Sites

      (1) Type of structure (dwelling, church, factory, etc.).

      (2) Known or estimated age or construction date for each structure and addition.

      (3) Location of building (identify location on a map of the property, and building placement, i.e., detached, row, etc.).

      (4) General Characteristics: (include photographs if possible) overall shape of plan (rectangle, "L" "T" "H" "U", etc.); number of stories; number of vertical divisions of bays; construction materials (brick, frame, stone, etc.); wall finish (kind of bond, coursing, shingle, etc.); roof shape.

      (5) Specific features including location, number and appearance of:

         (a) Important decorative elements;

(b) Interior features contributing to the character of the building;
(c) Number, type, and location of outbuildings, as well as date(s) of construction;
(d) Notation if property has been moved;
(e) Notation of known alterations to building.

B. Archaeological Sites

(1) Site location (written narrative and mapped location).
(2) Cultural affiliation and period.
(3) Site type (midden, burial mound, artifact scatter, building rubble, etc.)
(4) Threats to site (deterioration, vandalism, etc.).
(5) Site size (acreage, square meters, etc.).
(6) Artifacts observed on ground surface (pottery, bone, glass, etc.).
(7) Description of surrounding environment.

7. No land disturbing activities should be undertaken in areas of known archaeological or historic sites or areas of high site probability without prior review by the Division early in the project planning.

8. Ground disturbing activities may proceed elsewhere but land managers should stop disturbance in the immediate vicinity of artifact finds and notify the Division if previously unknown archaeological or historic remains are uncovered. The provisions of Chapter 872, F.S., must be followed when human remains are encountered.

9. Excavation and collection of archaeological and historic sites on state lands without a permit from the Division is a violation of state law and shall be reported to a law enforcement officer. The use of metal detectors to search for historic artifacts shall be prohibited on state lands except when authorized in a 1A-32, F.A.C., research permit from the Division.

10. Interpretation and visitation which will increase public understanding and enjoyment of archaeological and historic sites without site destruction or vandalism is strongly encouraged.

11. Development of interpretive programs including trails, signage, kiosks, and exhibits is encouraged and should be coordinated with the Division.

12. Artifacts found or collected on state lands are by law the property of the Division. Land managers shall contact the Division whenever such material is found so that arrangements may be made for recording and conservation. This material, if taken to Tallahassee, can be returned for public display on a long term loan.

E. ADMINISTERING AGENCY

Questions relating to the treatment of archaeological and historic resources on state lands may be directed to:

Susan M. Harp
Historic Preservation Planner
Telephone (850) 245-6333
Suncom 205-6333
FAX (850) 245-6437

Compliance Review Section
Bureau of Historic Preservation
Division of Historical Resources
R.A. Gray Building
500 South Bronough Street
Tallahassee, Florida 32399-0250

Appendix N
Trail Guides

Some Common Creatures

Cuban Anole
(Anolis s. sagrei)

The small brown lizard seen darting among the saw palmetto or around your home is most likely the brown anole or Cuban anole. It is a very aggressive invasive exotic. Unfortunately it is replacing the native green anole by competing for the same food.

Green Anole
(Anolis carolinensis)

Great Southern White Butterfly
(Ascia monuste)

As the seasons change, you may see masses of small white butterflies fluttering through the preserve. This is the great southern white butterfly. Females lay their eggs on saltwort, which is the host plant for the caterpillar stage of the great southern white.

Be Prepared

Before you head for the trails, you may want to bring the following:

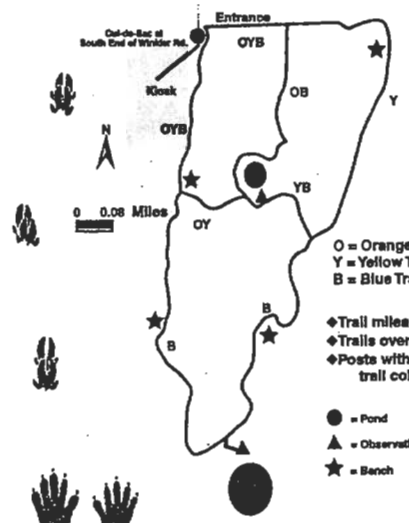
- ☐ Water
- ☐ Sunscreen
- ☐ Bug spray
- ☐ Hat
- ☐ Rain jacket
- ☐ Waterproof hiking shoes
- ☐ Cell phone
- ☐ Flashlight
- ☐ Watch
- ☐ Compass

The best time to visit this area is during the dry season (November – May). Make sure to give yourself plenty of time to walk the trail system. Know what time the sun sets and be prepared for rainy weather.

Because this is an outdoor adventure, animals may be out and about too. Venomous snakes and other creatures live in these woods. Keep in mind that these animals are just as afraid of you as you are of them. If you should encounter a venomous snake, do not try to harm or kill it. Instead, slowly back away and leave the area. The best way to stay safe is to stay on the trails.

Trail Map

Feral Hog
(Sus scrofa)



Raccoon
(Procyon lotor)

Opossum
(Didelphis virginiana)

Provided in support from:

Contact Information

This site is managed by the Florida Department of Environmental Protection (FDEP), Office of Coastal and Aquatic Managed Areas (OCAMA). Are you interested in volunteer opportunities or making a financial contribution to our conservation efforts? Become a member of our citizen support organization, the Estero Bay Buddies, by calling the number below. Thank you for your support.

Estero Bay Aquatic and State Buffer Preserves
700-1 Fisherman's Wharf
Ft. Myers Beach, FL 33931
(239) 463-3240

Winkler Point

Welcome to the Estero Bay State Buffer Preserve. This preserve is about 9,000 acres, but the size continues to grow as we acquire more land. The Aquatic Preserve was established in 1966 and consists primarily of Estero Bay and its tributaries. This public access point is referred to as Winkler Point, and encompasses over 600 acres of flatwoods, salt flats, and transitional tidal marsh.

This natural area is a work in progress. A primary concern is management of invasive exotic species. Invasive exotics are plants and animals that are not naturally found in the United States. They threaten the natural balance of an ecosystem by forcing native plants and animals to compete with them for food and space. Melaleuca is our biggest problem. These tall trees with the white, flaky bark have taken over entire areas of the preserve and many areas throughout south Florida.

For your protection and to show respect for this natural area, please remain on marked trails and remember that all plants and animals are protected within the preserve.

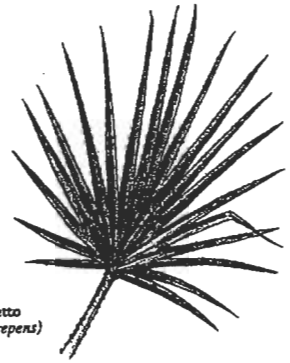
This trail guide provides a basic introduction to the plants and animals you are likely to see along the trails. Please contact us if you would like more information. Thank you and enjoy!

Orange Trail 1.13 miles

Melaleuca
(Melaleuca quinquenervia)

Melaleuca and Brazilian pepper are invasive exotics. These non-native species quickly reproduce and spread, forcing out native species and taking over the landscape. The large areas of standing, dead trees with papery bark are melaleuca trees that have been aerially-treated with herbicide by helicopter. Brazilian pepper is a shrub with red berries and glossy green leaves that smell strongly when crushed. Other invasive exotics include Cuban anoles, feral pigs, and Australian pines.

Brazilian Pepper
(Schinus terebinthifolius)



Saw Palmetto
(Serenoa repens)

ıis common Florida plant
ıminates the understory of
ə pine flatwoods community.
the summer, saw palmettos
oduce berries which are
ɔpular with raccoons, bears,
ıd other animals.

One of the most common trees in south Florida, slash pines are adapted to fire. Their thick bark is resistant to damage.

Slash Pine
(Pinus elliottii)

Red-shouldered Hawk

The red-shouldered hawk is often seen along the road hunting for snakes and frogs. It has rusty-colored wings, barred breast feathers, and noticeable white bands on its tail. Listen for its shrill "kee-yeer" call, but don't be fooled by mimicking blue jays.

Yellow Trail 1.57 miles

Black Needle Rush
(Juncus roemerianus)

The salt marshes are home to black needle rush and sand cordgrass, two plants that can tolerate the high amount of salt, heat and sunlight in this harsh environment. Salt flats are too salty for most plants, but are extremely important water filters. They filter out sediments and nutrients from water coming from the uplands before it reaches the bay.

Sand Cordgrass
(Spartina alterniflora)

Fiddler Crab
(Uca rapax)

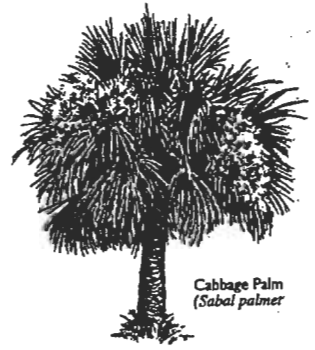
The small fiddler crab lives in a burrow in the sand, which it plugs up when the tide comes in. When the tide recedes the crab emerges to feed, scraping algae and detritus off the grains of sand. "Feeding balls" made of sand are deposited outside the burrow opening as it eats.

Saltwort, sea purslane and glasswort are low growing plants that occur in salt marshes. Saltwort has smooth, succulent leaves and tiny flowers bunched on short spikes. Sea purslane has succulent leaves, a reddish stem and pink flowers. Glasswort has a translucent, beaded appearance with no obvious leaves or flowers.

Sea Purslane
(Sesuvium portulacastrum)

Saltwort
(Batis maritima)

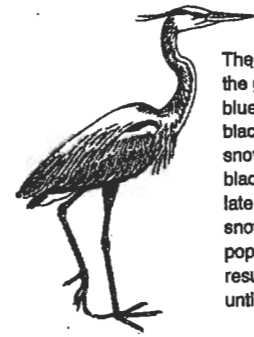
Glasswort
(Salicornia bigelovii)



Cabbage Palm
(Sabal palmet

Cabbage palms and sabal palms are the same species, and are very common throughout Florida. The term "cabbage" comes from the tree's edible heart. Palm berries ripen in the fall and are enjoyed by many wildlife species.

Blue Trail 2.28 miles



Great Blue Heron
(Ardea herodias)

The tallest of the wading birds, the great blue heron is slate blue with a white head and a black stripe above its eye. The snowy egret is white with a black bill and yellow feet. In the late 1800s and early 1900s, snowy egret plumes were very popular on women's hats. As a result, these birds were hunted until they were nearly extinct.

Snowy Egret
(Egretta thula)

Bald Eagle
(Haliaeetus leucocephalus)

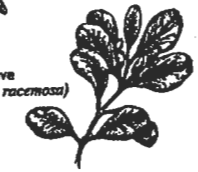
Turkey Vulture
(Cathartes aura)

Black Vulture
(Coragyps atratus)

Bald eagles, black vultures and turkey vultures can all be seen flying above the preserve, although black vultures are the most common. Eagles are usually seen alone or in pairs and soar with their wings flat. Vultures fly with their wings in a "V" shape, and are often seen circling in groups of 3 or more. Bald eagles do not get their white head and tail until they are over five years old.

Red Mangrove
(Rhizopara mangle)

The red mangrove, with its strange alien-like prop roots, occurs close to the shore and in deeper water. The black mangrove grows further inland and its roots look like dark, finger-like projections emerging from the soil. The white mangrove occurs well above the high tide mark and has large, rounded, football-shaped leaves.

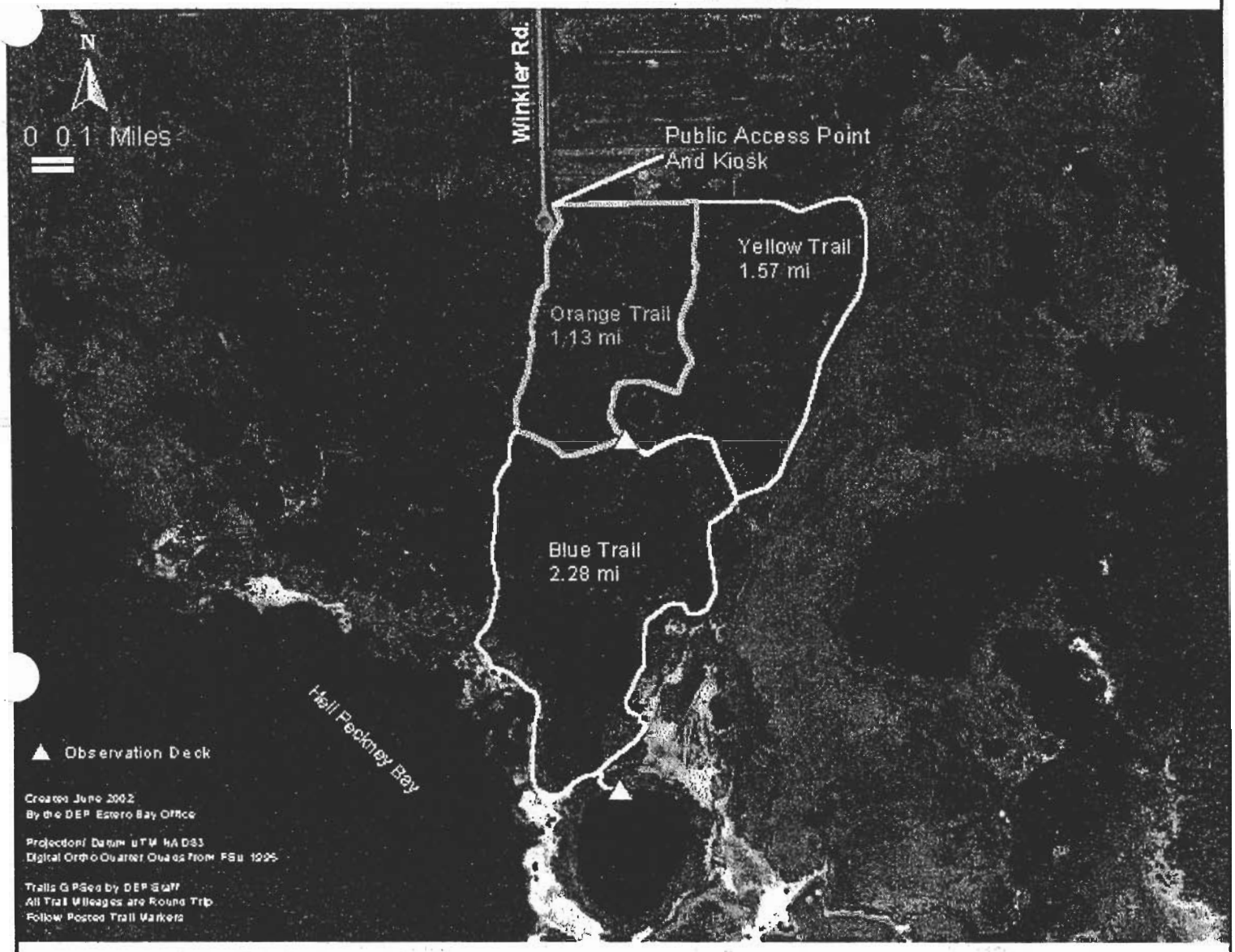


White Mangrove
(Laguncularia racemosa)

Black Mangrove
(Avicennia germinans)

There are three ponds within the preserve. The two northernmost ponds are fresh water, with water levels that fluctuate based on seasonal rains. Wading birds and ducks are common visitors to these ponds. The large pond to the south is salt water and tidally influenced by Hell Peckney Bay, which is a back bay of the Estero Bay Aquatic Preserve.

Estero Bay State Buffer Preserve
Winkler Point



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CHARLOTTE HARBOR
National Estuary Program

Estero Bay Buddies

Welcome to Winkler Point, one of two public access points within the Estero Bay State Buffer Preserve. The Florida Department of Environmental Protection (FDEP), Office of Coastal and Aquatic Managed Areas (OCAMA) manages the preserve. Winkler Point encompasses over 600 acres and was purchased in 1987 and 1988. It was acquired as part of the buffer preserve in order to protect the Aquatic Preserve from the impacts of development in the surrounding uplands. This area was once used for off road vehicles, hunting, and illegal dumping. Much of the area is in need of habitat restoration which requires time, money, and hard work.

Controlling invasive exotic plants is a primary management conern. Melaleuca is our biggest enemy; it can be easily identified by its white, flaky bark. Natural community types found here include flatwoods, salt flats and tidal marsh, as well as mangroves. There are two observation decks which provide excellent opportunities for wildlife viewing. The large pond to the south is tidally influenced. This area can be extremely wet and is best visited November - May, depending on the rains. While you enjoy this natural area please remember to stay on marked trails and that all plants and animals are protected by law. We appreciate your support!

If you have any questions or concerns please call the Estero Bay Aquatic and State Buffer Preserves' Office at (239) 463 - 3240

This sign was created with the support of the Florida Department of Environmental Protection, Charlotte Harbor National Estuary Program, and the Estero Bay Buddies

Pine Flatwoods Loop (Red Trail) 4.4 miles

Sand Live Oak
(Quercus germinata)

The most common oak seen along the trails, the sand live oak is recognizable by its leathery leaves which curl over at the edges. Other oak species in the preserve include myrtle oak, dwarf live oak, and Chapman's oak. If fires occurred here more frequently, oak trees would be less common.

The red-shouldered hawk is often seen along the roads hunting for snakes and frogs. It has rusty-colored wings, barred breast feathers, and noticeable white bands on its tail. Listen for its shrill "kee-yeer" call, but don't be fooled by mimicking blue jays.

Red-shouldered Hawk
(Buteo lineatus)

Bald Eagle
(Haliaeetus leucocephalus)

Turkey Vulture
(Cathartes aura)

Black Vulture
(Caragyps atratus)

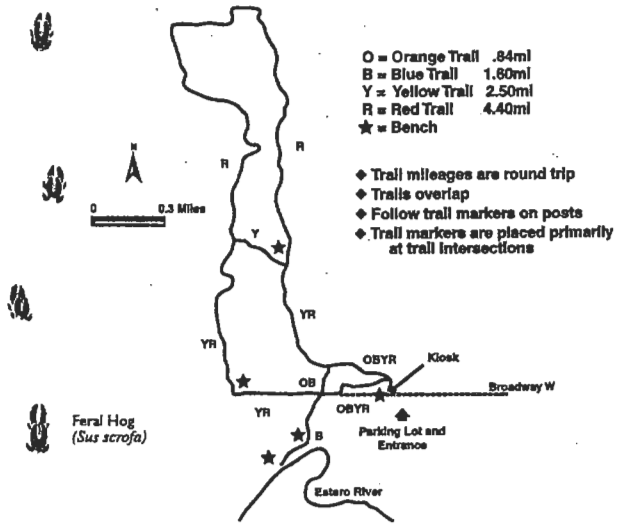
Bald eagles, black vultures and turkey vultures can all be seen flying above the preserve, although black vultures are the most common. Eagles are usually seen alone or in pairs and soar with their wings flat. Vultures fly with their wings in a "V" shape, and are often seen circling in groups of 3 or more. Bald eagles do not get their white head and tail until they are over five years old.

Browny Rose Myrtle
(Rhodomyrtus tomentosa)

Melaleuca
(Melaleuca quinquenervia)

Melaleuca and downy rose myrtle are invasive exotics. Invasive exotics are plants and animals that are not naturally found in the United States. They quickly reproduce and spread, forcing native plants and animals to compete with them for food and space. Downy rose myrtle is a shrub with pretty pink flowers, dark purple fruits and large glossy leaves. The melaleuca tree is recognized by its peeling, papery bark and white "bottle brush"-shaped flowers. Other invasive exotics in the preserve include Cuban anoles, feral pigs, Australian pine, and Brazilian pepper.

Trail Map



Feral Hog
(Sus scrofa)

Opossum
(Didelphis virginiana)

Raccoon
(Procyon lotor)

Provided in support from:

Contact Information

This site is managed by the Florida Department of Environmental Protection (FDEP), Office of Coastal and Aquatic Managed Areas (OCAMA). Are you interested in volunteer opportunities or making a financial contribution to our conservation efforts? Become a member of our citizen support organization, the Estero Bay Buddies, by calling the number below. Thank you for your support.

Estero Bay Aquatic and State Buffer Preserves
700-1 Fisherman's Wharf
Ft. Myers Beach, FL 33931
(239) 463-3240

Estero River Scrub

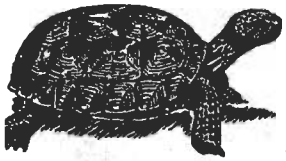
Welcome to the Estero Bay State Buffer Preserve. This preserve is about 9,000 acres, but the size continues to grow as we acquire more land. The Aquatic Preserve was established in 1966 and consists primarily of Estero Bay and its tributaries. This public access point is referred to as the Estero River Scrub (ERS), which includes approximately 1,245 acres along the Estero River.

Formerly destined to be a 1,500-unit housing development project, this parcel of land was purchased by the Florida Department of Environmental Protection in 2000. Its protection is critical to sustaining the native plant and animal communities that exist here.

As you walk the trails you will see scrubby flatwoods, pine flatwoods, salt marshes and salt flats bordering mangroves. For your protection and to show respect for this unique natural area, please remain on marked trails and remember that all plants and animals are protected within the preserve.

This trail guide provides a basic introduction to the plants and animals you are likely to see along the trails. Please contact us if you would like more information. Thank you and enjoy!

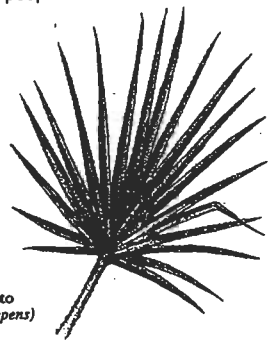
Gopher Tortoise Loop (Orange Trail) .84 mile



Gopher Tortoise
(Gopherus polyphemus)

A commonly seen resident of the scrub and scrubby flatwoods communities, the gopher tortoise is an expert burrower. Their burrows can be 3 to 35 feet long, and are used by at least 80 other species as shelter from the heat, predators and fires. It is illegal to feed, possess or in anyway harass this protected species. There is plenty of vegetation for gopher tortoises to munch on, so please don't share your people food!

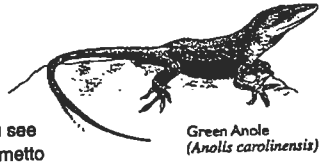
This common Florida plant dominates the understory of the pine flatwoods community. In the summer, saw palmettos produce berries which are popular with raccoons, bears, and other animals.



Saw Palmetto
(Serenoa repens)

Slash Pine
(Pinus elliottii)

One of the most common trees in the area, slash pines are adapted to fire. Their thick bark is resistant to damage. Along the Red Trail, look for evidence of the wildfire that occurred here in 2001. You'll see slash pines with a charred appearance at the base. Scrub, scrubby flatwoods and pine flatwoods are fire-adapted communities, and are healthiest when burned every few years.



Green Anole
(Anolis carolinensis)

The small brown lizard you see darting among the saw palmetto or around your home is most likely the Cuban anole, also known as the brown anole. It is a very aggressive invasive exotic species. Unfortunately, it is replacing the native green anole which must compete with it for the same

Cuban Anole
(Anolis s. sagrei)

Estero River Trail (Blue Trail) 1.6 miles

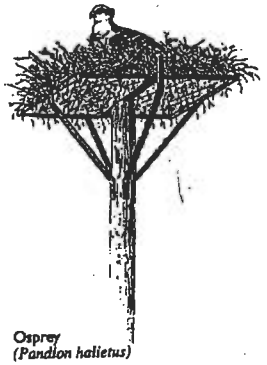
Cabbage palms and sabal palms are the same species, and are very common throughout Florida. The term "cabbage" comes from the tree's edible heart. Palm berries ripen in the fall and are enjoyed by many wildlife species.

Cabbage Palm
(Sabal palmetto)

Tarflower
(Befaria racemosa)

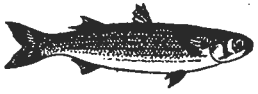
Tarflower bushes are covered with sticky, pinkish-white flowers from March through May. This stickiness is a defense against ants and other insects who try to rob the flowers of their nectar without helping in pollination.

Nicknamed the "fish hawk," the osprey is commonly seen on large, bulky nests high atop trees, telephone poles, or wherever a good fish meal can be found. They are white with a dark back, dark wings, and a distinctive dark eye stripe. Ospreys once experienced a rapid decline, but the banning of DDT and efforts to create nesting platforms have enabled this species to make a comeback.



Osprey
(Pandion halietus)

Striped Mullet
(Mugil cephalus)



Blue-green with silvery sides, the Atlantic needlefish can often be found in the shallows of the Estero River. Its slim build and long slender jaw help it feed on smaller fish. Hear a loud splash but don't see anything? It's likely a striped mullet.

Atlantic Needlefish
(Strongylura marina)

Fiddler Crab Loop (Yellow Trail 2.5 miles

Fiddler Crab
(Uca rapax)

The small fiddler crab lives in a burrow in the sand, which it plugs up when the tide comes in. When the tide recedes the crab emerges to feed, scraping algae and detritus off the grains of sand. "Feeding balls" made of sand are deposited outside the burrow opening as it eats.

Red Mangrove
(Rhizopara mangle)

The red mangrove, with its strange alien-like prop roots, occurs close to the shore and in deeper water. The black mangrove grows further inland and its roots look like dark, finger-like projections emerging from the soil. The white mangrove occurs well above the high tide mark and has large, rounded, football-shaped leaves.

White Mangrove
(Laguncularia racemosa)

Black Mangrove
(Avicennia germinans)

Found in salt marshes, salt flats are so salty that very few plants can grow there. One plant that can handle the high salinity is the sea ox-eye daisy. This low growing succulent has yellow flowers and fleshy, gray-green leaves covered with fine hairs.

Sea Ox-eye Daisy
(Borrichia arborescens)

Saltwort, sea purslane and glasswort are low growing plants that occur in salt marshes. Saltwort has smooth, succulent leaves and tiny flowers bunched on short spikes. Sea purslane has succulent leaves, a reddish stem and pink flowers. Glasswort has a translucent, beaded appearance with no obvious leaves or flowers.

Sea Purslane
(Sesuvium portulacastrum)

Saltwort
(Batis maritima)

Glasswort
(Salicornia perennis)

Estero Bay State Buffer Preserve
Estero River Scrub

FLORIDA

CHARLOTTE HARBOR
National Estuary Program

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Welcome to the Estero River Scrub, one of two public access points within the Estero Bay State Buffer Preserve. The Florida Department of Environmental Protection (FDEP), Office of Coastal and Aquatic Managed Areas (OCAMA) manages the preserve. This area is often referred to as the Sahdev property because it was Sahdev Inc. who previously owned this parcel. During the late nineties, thousands of concerned citizens including surrounding communities, various local environmental groups such as the Estero Bay Buddies, as well as Estero Bay Aquatic and State Buffer Preserves' manager Heather Stafford, and other representatives of the Florida Department of Environmental Protection campaigned to have this land protected, eventually they succeeded and the land was purchased by eminent domain. In 2000, the community enjoyed the grand opening of this unique site. It is one of the few remaining examples of functioning native Florida ecosystems in Lee County, and one of the last undeveloped parcels on the Estero River.

Without this purchase, 1,245 acres of important habitat for wildlife, including gopher tortoises and bald eagles, would have been a 1,598 home development project. Natural community types found here include scrub (a rare and unique upland habitat), scrubby flatwoods, pine flatwoods, a cypress dome, salt marsh and salt flats bordering 500 hundred acres of mangroves. While you enjoy this natural area please remember to stay on marked trails and that all plants and animals are protected by law. We appreciate your support!

If you have any questions or concerns please call the Estero Bay Aquatic and State Buffer Preserves' Office at (239) 463 - 3240

This sign was created with the support of the
Florida Department of Environmental Protection, Charlotte Harbor National Estuary Program, and the
Estero Bay Buddies

Estero River Canoe Trail

Counties: Lee
Mileage: 7
Skill Level: Beginner
Difficulty: Moderate
Usual Current: Slow (0-1 mph)

Notes and Precautions

Know how to use a compass! Be sure to take one to aid in navigating the mangrove islands. Do not attempt to cross Estero Bay if more than light chop is expected. The river current is not strong, so you can paddle upstream to return to Koreshan.

Access

1. Koreshan State Historic Site – Two miles west of I-75, exit 19 at US 41 and Corkscrew Road.
2. Lovers Key State Park – On east side of CR 865, two miles north of Bonita Beach. (7 miles)

There may be access points (both public and private) in addition to those listed here. Please remember that some sites require a fee for launching and/or parking.

CONNECTING FLORIDA'S COMMUNITIES GREENWAYS & TRAILS

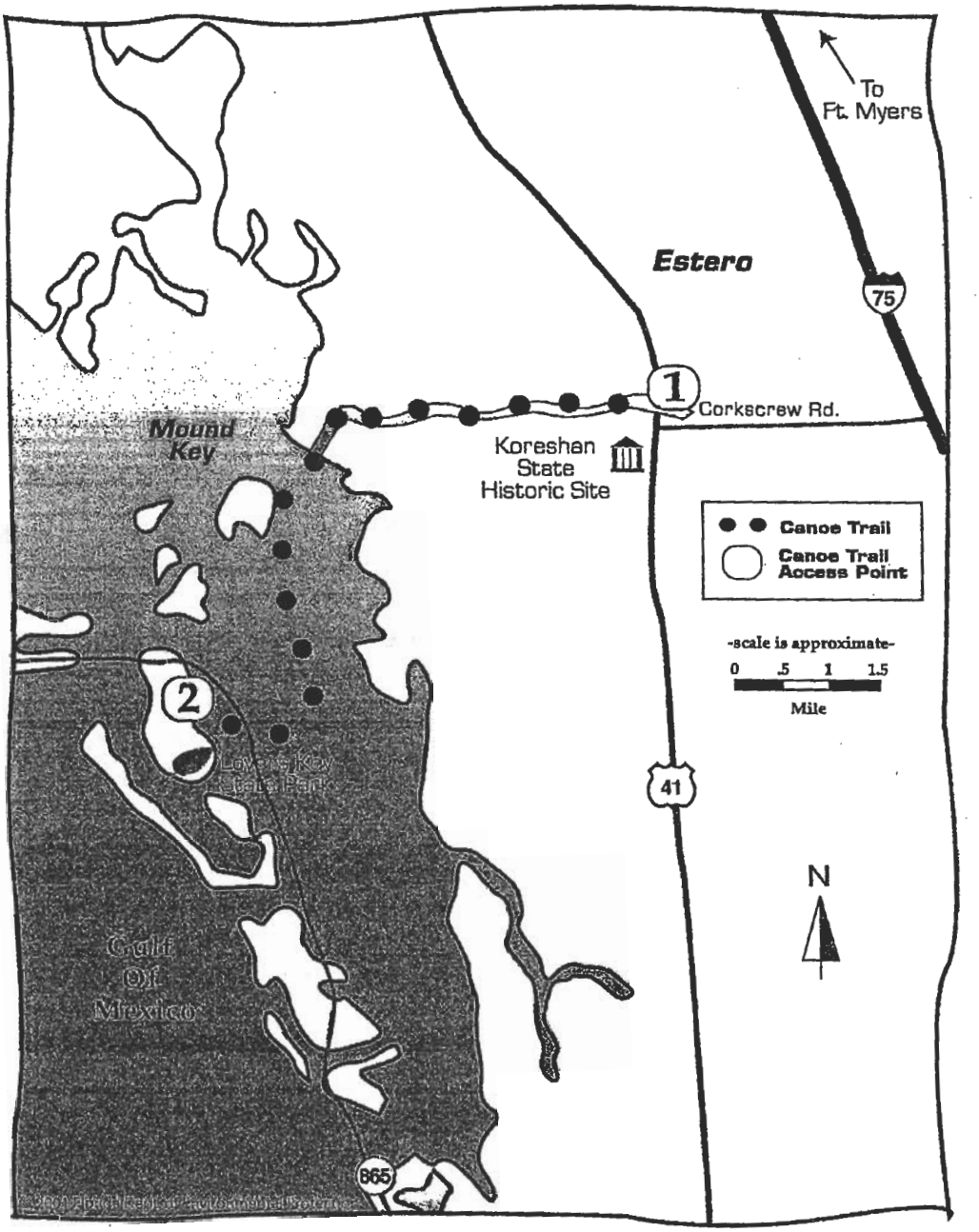
www.floridagreenwaysandtrails.org

This publication is provided as a public service by the Florida Department of Environmental Protection, Office of Greenways & Trails and is intended for general informational purposes only. The Office of Greenways & Trails believed this information to be accurate at the time of publication and assumes no liability arising from its use.

Estero River Canoe Trail

Enjoy a one-day adventure among mangrove islands and coves on the Estero.

The Estero River Canoe Trail is officially designated as part of Florida's Statewide System of Greenways and Trails. This trail begins at Koreshan State Historic Site, the location of a pioneer, turn of the century, religious settlement. The trail leads through subtropical hammocks that give way to mangrove swamps as the water becomes more brackish. The trail makes an interesting and easy one-day trip exploring mangrove coves and islands. Wildlife is abundant, including yellow-crowned night heron, anhinga and cormorant. You can also look for mangrove cuckoo and black-whiskered vireo. When the trail opens into Estero shoals, choose your own route through the mangrove islands. Stop over at Mound Key Archaeological State Park for a picnic lunch or a short walk on the nature trails. The bay is shallow, and the end of the trail at Lovers Key State Park on Black Island is easy to find.



CONNECTING FLORIDA'S COMMUNITIES
GREENWAYS & TRAILS

-continue-

Appendix O
Previous Use of the Property

Previous Use of the Property

The following map details of Appendix N are extracted from:

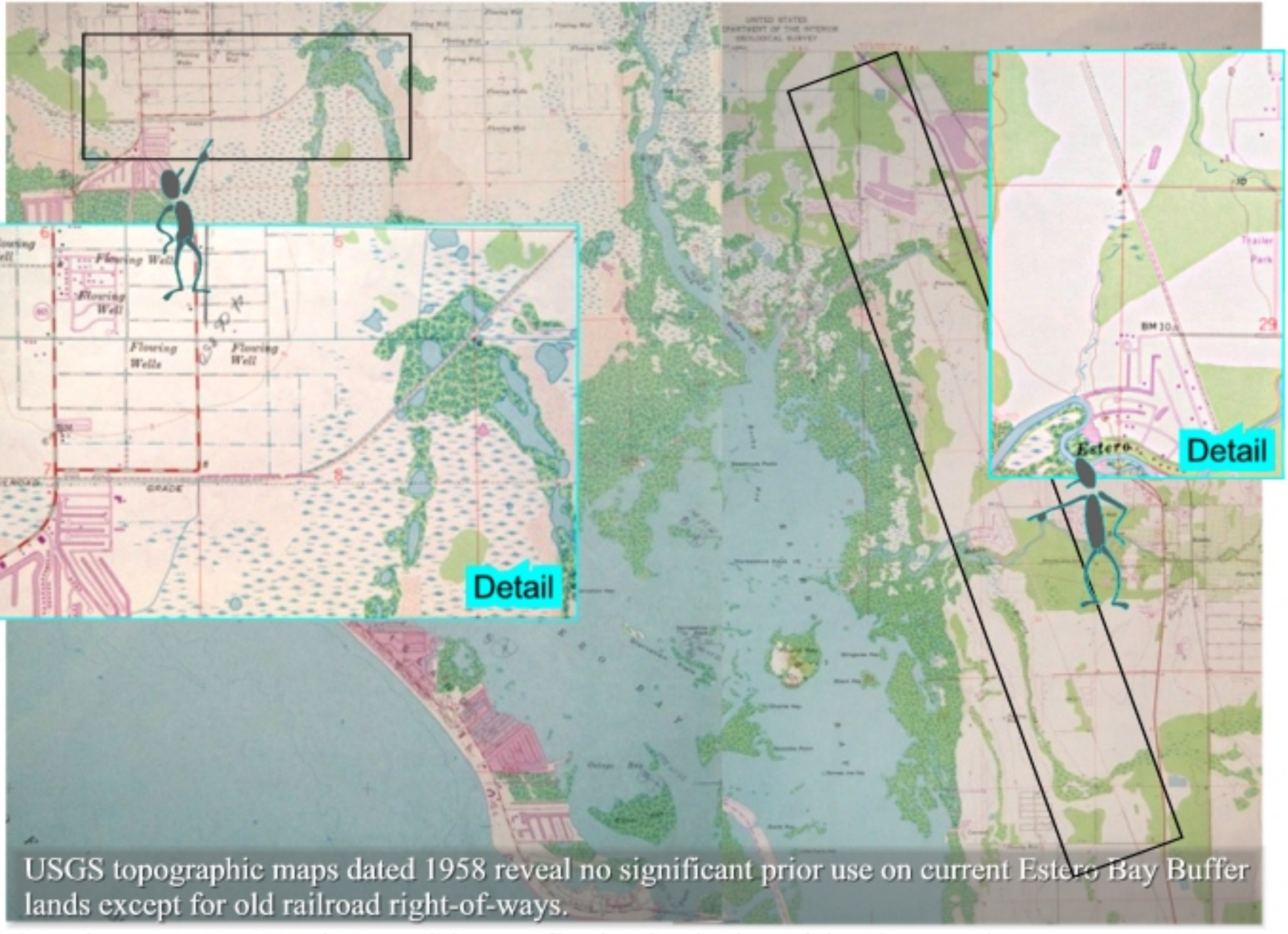
Map of the State of Florida,
Showing the Progress of Surveys
for the Annual Report of the Surveyer General for 1856
Published by Columbus Drew, Bookseller
Jacksonville, FL

New Business Atlas Map of Florida
Published 1900 by
Rand McNally & Co.
Chicago, IL

Fort Myers Beach Quadrangle
Florida—Lee County
7.5 Minute Series (Topographic)
Published 1958, photorevised 1972 by
United States Geographical Survey
Washington DC.

Estero Quadrangle
Florida—Lee County
7.5 Minute Series (Topographic)
Published 1958, photorevised 1972 by
United States Geographical Survey
Washington DC.

1856 map indicated no settlements in current Buffer Preseve lands



(Purple areas are 1972 photo-revisions, reflecting beginning of development.)

1900 map reveals no settlement within Buffer Preserve lands.
Punta Rassa
(Tel. Sta. to Cuba.)
San Carlos B.
Sanibel
Light House
Estero B.
Estero I.
Trout Cr.
Lake Trafford
Surveyors Cr.
Big Carlos Pass
Little Carlos Pass
Big Hickory Pass
Little Hickory Pass
Naples
BIG

Appendix P
Goals and Objectives

Appendix P. Goals and Objectives

Goals and Objectives for Estero Bay Preserve State Park during 2004-2013

The following goals and objectives were developed specifically for the Estero Bay State Buffer Preserve. Goals and objectives of the previous plan were reviewed to determine if they remain meaningful and practical, and should be included in the updated plan. The goals and objectives presented here reflect programmatic goals and the ideas of CAMA personnel in charge of managing and protecting the area, as well as input from cooperative managers, user groups and other stakeholders from outside the DEP. The agency believes the goals and objectives to be consistent with the various forms of guidance provided to managers.

The table portrays all management goals and objectives for the next ten years. The table notes if each goal and objective was included in the previous five-year plan ("Previous Plan"). It also provides the percent of each objective that was complete at the time this plan was drafted ("Percent Complete"). Each objective is marked as to which of the next ten years it will be addressed by preserve staff ("Proposed Timeline"). The cost of each objective, if known, is also provided ("Estimated Cost").

Each year identified under Proposed Timeline represents the fiscal year during which an objective will be addressed, (e.g., "05" means July 2004 through June 2005). These objectives and timelines provide the priority schedule for accomplishing management actions on the preserve, as required by Florida Statutes. Objectives are listed in priority order, from highest to lowest, under each goal. Some objectives address the findings and recommendations of the Management Review Team during their last review of the area, indicated by a "**" following the objective.

The ability to implement the specific goals and objectives identified in this plan will be dependent upon the availability of funding resources for these purposes. Objectives that require funds above the normal baseline appropriation to be completed are indicated by "*" in the estimated cost column.

The objectives are discussed in more detail in the Chapter IV of the plan (and Chapter III for potential land acquisition and surplus).

Appendix P: Goals and Objectives for the Estero Bay Preserve State Park for 2004-2013				
Goal/Objective	**Previous Plan**	**Percent Complete**	**Proposed Timeline by fiscal yr (%) '04 05 06 07 08 09 10 11 12 13**	**Estimated Cost ($)**
Resource Management and Protection				
Soil Management				
Goal 1: Manage soil to reduce erosion by enhancement/restoration efforts in disturbed areas.				
Objective 1A: Identify and obtain funding sources for permit, design, and engineering.		10	20 20 50	$50,000*
Objective 1B: Restore/enhance known areas of dredged spoil pile material. **		0	10 25 40 25	$350,000*
Objective 1C: Implement erosion control measures such as rip-rap, creation of littoral shelves, and/or wetland plants.		0	10 15 50 25	$77,000*
Objective 1D: Create educational signage at restored project locations.		30	30 40	$500
Hydrology/Water Management				
Goal 2: Maintain/restore natural flow ways and protect water quality.	x			
Objective 2A: Restore/enhance known areas of dredged spoil pile material where feasible and appropriate. **		10	30 30 30	$144,000
Objective 2B: Assess corrective measures needed		10	9 9 9 9 9 9 9 9 9 9 9	$2,000

Appendix P: Goals and Objectives for the Estero Bay Preserve State Park for 2004-2013				
Goal/Objective	**Previous Plan**	**Percent Complete**	**Proposed Timeline by fiscal yr (%) '04 05 06 07 08 09 10 11 12 13**	**Estimated Cost ($)**
for ditched areas on the preserve. **				
Objective 2C: Install geo-webbing along FPL easements where feasible and appropriate.		0	25 25 25 25	$118,560
Objective 2D: Continue shoreline stabilization using riprap where needed along the north side of Estero River, at ERS parcel.		30	70	$18,000
Goal 3: Increase knowledge of preserve hydrology and determine needed research and monitoring efforts.				
Objective 3A: Determine the extent of hydrologic needs on newly acquired parcels of the preserve.		ongoing	10 10 10 10 10 10 10 10 10 10	$2,000
Objective 3B: Implement Ground and Surface Water Monitoring Plan on the TNC Parcel, as outlined in the Coastal Engineering report. **		0	100	$13,740
Objective 3C: Maintain water quality testing from and surface water wells on TNC property. **		0	11 11 11 11 11 11 11 11 11	$8,000
Objective 3D: Inventory hydrological changes to the preserve (ditching, plugging, dams, spoil deposition etc.) and their impacts and formulate restoration actions. **		ongoing	10 10 10 10 10 10 10 10 10 10	$2,000
Objective 3E: Seek funding for a comprehensive hydrological restoration plan				unknown
Goal 4: Manage water resources through coordination with other governmental agencies, universities, scientific foundations, and private consultants.				
Objective 4A: Retain familiarity with the jurisdiction, personnel, and monitoring programs of other organizations, as well as with data collected and compiled by those institutions.		ongoing	10 10 10 10 10 10 10 10 10 10	unknown
Objective 4B: Lend cooperative assistance to other agencies monitoring water resources within the preserve and promote coordination among agencies involved in evaluating monitoring data.		ongoing	10 10 10 10 10 10 10 10 10 10	unknown
Objective 4C: Retain familiarity with the activities and users that regularly or potentially contribute pollutants to the preserve.		ongoing	10 10 10 10 10 10 10 10 10 10	unknown
Natural Communities Management				
Goal 5: Identify and document natural communities.	x			
Objective 5A: Research historical photographs and/or other relevant documentation to establish actual natural communities for future habitat restoration projects.		50	25 25	$1,000
Objective 5B: Review any Environmental Site Assessment surveys, environmental consultant reports, DEP site assessment surveys and create GIS overlay maps with pertinent information.		75	25	$2,500
Objective 5C: After securing required funds, hire FNAI field personnel to delineate and create a GIS natural communities inventory map. **		0	0 30 30 30 4 4 2	$30,000
Goal 6: Restore/enhance disturbed areas to promote native plant and animal species.	x			

Appendix P: Goals and Objectives for the Estero Bay Preserve State Park for 2004-2013				
Goal/Objective	**Previous Plan**	**Percent Complete**	**Proposed Timeline by fiscal yr (%) '04 05 06 07 08 09 10 11 12 13**	**Estimated Cost ($)**
Objective 6A: Secure required funds for permit, design, engineering and implement restoration in restored areas with dredged spoil pile material along man-made canals and navigational channels. **		0	10 10 10 10 10 10 10 10 10 10	unknown
Objective 6B: Complete invasive non-native plant removal work in order to restore fire frequencies in fire dependent plant communities.		60	4 4 4 4 4 4 4 4 4 4 4	$869,000
Objective 6C: Restore borrow pit locations, DOF plow lines, FPL roadways, and mosquito control ditch locations where feasible and permitted. **		20	10 10 10 10 10 10 10 10	$50,000*
Objective 6D: Plant native vegetation at locations requiring extra assistance (dense dead exotic plant monoculture locations, littoral shelf reconstruction along canal banks and channels, rip-rapped erosion area, and/or mosquito ditch restoration).		5	10 10 10 10 10 10 10 10 10 5	$457,000
Objective 6E: Continue to educate the public through newsletters, interpretive walks, and educational signage pertaining to areas with completed restoration projects. **		ongoing	10 10 10 10 10 10 10 10 10 10	$55,000
Objective 6F: Remove any remaining trash/debris that may be located within the various management units. **		90	5 5	$500
Goal 7: Continue to review and provide recommendations to minimize impacts associated with planned and existing developments adjacent to the buffer preserve.	x			
Objective 7A: Address impacts associated with existing and future development concerning drainage patterns, retention systems, and drainage easement management.		10	30 20 20 20	$1,000
Objective 7B: Coordinate with permitting agencies and development representatives to address implementation of corrective measures necessary to restore impacted adjacent buffer preserve habitats.		0	25 25 25 25	$3,500
Native Species Management				
Goal 8: Survey, maintain and protect native species and habitats on the EBA&SBP.	x			
Objective 8A: Continue the surveying and inventory of plants and animals found on the preserve and assess their population requirements. **		35	15 15 10 10 10 1 1 1 1 1	$2,000
Objective 8B: Set up partnerships with environmental organizations and recruit volunteers to assist in the surveying of animal species.		0	10 10 10 10 10 10 10 10 10 10	unknown
Goal 9: Restore and maintain NCs for native species.	x			
Objective 9A: Restore/enhance urban encroachment areas.		ongoing	10 10 10 10 10 10 10 10 10 10	$1,367,560
Objective 9B: Conduct prescribed burns to benefit native plant and animal species. **		ongoing	10 10 10 10 10 10 10 10 10 10	$754,560
Objective 9C: Reduce and maintain exotic		ongoing	10 10 10 10 10 10 10 10 10 10	$1,120,000

Appendix P: Goals and Objectives for the Estero Bay Preserve State Park for 2004-2013				
Goal/Objective	**Previous Plan**	**Percent Complete**	**Proposed Timeline by fiscal yr (%) '04 05 06 07 08 09 10 11 12 13**	**Estimated Cost ($)**
species to a low percentage cover level and promote reestablishment of native species.				
Listed Species Management				
Goal 10: Maintain and protect the buffer preserve for listed species.	x			
Objective 10A: Continue to survey listed plant and animal species and assess their population requirements & provide information to FNAI. **		10	10 10 10 10 10 10 10 10 10	$10,000
Objective 10B: Increase size of buffer preserve through land acquisition to provide adequate protection for listed species.		ongoing	10 10 10 10 10 10 10 10 10 10	unknown
Objective 10C: Hire FNAI to conduct a more thorough survey of listed species. **		0	30 30 30 4 4 2	$30,000
Objective 10D: Continue exotic plant and animal removal to benefit endangered species. **		ongoing	10 10 10 10 10 10 10 10 10 10	unknown
Invasive Non-native Species Management				
Goal 11: Continue to enhance natural communities through the removal of invasive non-native plants.	x			
Objective 11A: Continue to search and obtain funding opportunities and/or labor resources to complete initial plant removal efforts as well as long-term maintenance needs.		20	15 15 10 10 10 10 5 5	$4,500
Objective 11B: Complete GIS ArcView database documentation on areas treated and requiring additional treatment.		80	5 5 5 5	$1,500
Objective 11C: Complete 100% initial treatment at all locations of the preserve.		82	5 8 5	$684,000*
Objective 11D: Complete 70% retreatment/ maintenance of dense/monoculture locations.		11	5 5 5 5 20 20 20 9	$250,000*
Objective 11E: Complete 45% 2nd retreatment/ maintenance within various locations.		5	12 12 12 12 12 12 12 11	$160,000*
Goal 12: Identify and implement control measures at locations requiring invasive non-native animal control.	x			
Objective 12A: Continue coordination with state licensed trapper to remove feral hogs.		ongoing	10 10 10 10 10 10 10 10 10 10	$8,000
Objective 12B: Develop effective methods to control Cuban tree frog or other problematic amphibian species.		5	65 15 15	$2,000
Objective 12C: Continue vigilance against other invasive exotic animal species and implement control measures.		ongoing	10 10 10 10 10 10 10 10 10 10	$3,500
Problem Species Management				
Goal 13: Reduce native problem species that impact natural communities and land management activities.				
Objective 13A: Locate and coordinate with appropriate "external" management authorities and/or regulators to reduce high-level nutrient enriched run-off from adjacent developments or local infrastructures.		20	20 20 20 20 20	$2,000

Appendix P: Goals and Objectives for the Estero Bay Preserve State Park for 2004-2013				
Goal/Objective	**Previous Plan**	**Percent Complete**	**Proposed Timeline by fiscal yr (%) '04 05 06 07 08 09 10 11 12 13**	**Estimated Cost ($)**
Objective 13B: Assess various control methods conducted at other locations for problematic species.		5	25 20 20 20 10	$500
Objective 13C: Implement feasible control measures to reduce extent and spread of problematic species.		5	5 5 25 10 10 10 10 10 5 5	$7,500
Objective 13D: Continue to seek creative or less restrictive funding sources that will allow targeting native species.		5	25 25 25 10 10	$750
Forest Resources Management				
Goal 14: Replant wet flatwoods communities after invasive non-native plants have been controlled/removed.	x			
Objective 14A: Complete initial and retreatment invasive exotic control measures within wet flatwoods communities.		60	4 4 4 4 4 4 4 4 4 4 4	$869,000
Objective 14B: Enhance locations with dense dead melaleuca trees by removing biomass via chipping or burning. **		5	10 10 25 25 25	$440,000-$825,000*
Objective 14C: Assess hydrological conditions at all locations that are candidates for replanting efforts.		0	50 30 20	$1,000
Objective 14D: Secure funding source and labor (volunteer?) to replant new slash pine seedlings and other native plants where needed.		0	40 40 20	$25,000*
Fire Management				
Goal 15: Restore and maintain fire-dependent plant communities.	x			
Objective 15A: Complete all written prescriptions for existing burn zones. **		15	25 20 20 20	$1,000
Objective 15B: Assess additional land acquisitions and incorporate into FMP & burn schedule along with written prescriptions.		5	50 25 10 10	$1,500
Objective 15C: Complete required fire line installations/improvements or other proper preparations for relevant burn zones. **		55	10 10 5 5 5 2 2 2 2 2	$15,500*
Objective 15D: Improve "inaccessibility" obstacles through culvert installation, bridge building, or other potential alternatives.		15	9 9 9 9 9 9 9 9 9 4	$280,560*
Goal 16: Increase and improve prescribed fire resources.	x			
Objective 16A: Keep fire equipment/supplies in a "ready-standby" status by requiring regular maintenance, replacing broken or obsolete gear/equipment, and staying aware of the latest technologies and methodologies available. **		ongoing	10 10 10 10 10 10 10 10 10 10	$2,500
Objective 16B: Develop a localized "interagency" burn team through coordination with Lee County, local fire departments, DOF, and other DEP offices.		40	60	$2,500
Objective 16C: Obtain additional fire training courses and experience for personnel. **		50	5 5 5 5 5 5 5 5 5 5	$12,500
Archaeological, Historical, & Cultural Mgmt				

Appendix P: Goals and Objectives for the Estero Bay Preserve State Park for 2004-2013				
Goal/Objective	**Previous Plan**	**Percent Complete**	**Proposed Timeline by fiscal yr (%) '04 05 06 07 08 09 10 11 12 13**	**Estimated Cost ($)**
Goal 17: Monitor, preserve, protect, and restore archaeological and historical resources under management of the preserve.	x			
Objective 17A: Patrol/visit all managed FMSF locations at least on a yearly basis to assess their condition.		ongoing	10 10 10 10 10 10 10 10 10 10	$750
Objective 17B: Report any discernable changes to DHR via "Change in Status" form and/or law enforcement, if appropriate.		ongoing	10 10 10 10 10 10 10 10 10 10	$500
Objective 17C: Search for grant opportunities that aim to preserve, protect, and restore known damaged or impacted FMSF locations.		50	25 15 10	$1,500
Objective 17D: Install interpretive/regulatory signs on isolated islands with archaeologically significant sites.			50 50	$20,000
Goal 18: Investigate potential to locate unknown archaeological and historical sites.	x			
Objective 18A: Retain an archaeologist to conduct archival research, locate and bound the location of cultural sites, conduct site assessments, document and record significance, and prescribe management recommendations with OPS funds, grant funds or other alternative sources. **		50	25 25	$750
Scenic Resources Management				
Goal 19: Enhance visitation opportunities.				
Objective 19A: Investigate the feasibility of creating another public access point through the Zemel Parcel.		0	5 5 90	$14,000
Objective 19B: Establish picnic and discovery sites along Estero River.		0	50 50	$35,000
Security Management				
Goal 20: Establish security measures sufficient to protect the preserve's integrity and to restrict unauthorized access and use.	x			
Objective 20A: Install boundary signs as needed.		75	50 50	$1,000
Objective 20B: Complete necessary fencing of preserve boundaries. **		75	9 8 8	$8,000
Objective 20C: Continue to maintain boundary gates, add others as needed when land is acquired. **		ongoing	20 20 10 10 10 10 10 10	$13,000
Objective 20D: Continue to work in cooperation with Florida Park Police and Lee County Sheriff Department, to assure law enforcement on preserve lands. **		ongoing	10 10 10 10 10 10 10 10 10 10	$1000
Research and Monitoring				
Goal 21: Expand research and monitoring projects to encompass a better understanding of the health and functionality of EBSBP habitats.	x			

Appendix P: Goals and Objectives for the Estero Bay Preserve State Park for 2004-2013				
Goal/Objective	**Previous Plan**	**Percent Complete**	**Proposed Timeline by fiscal yr (%) '04 05 06 07 08 09 10 11 12 13**	**Estimated Cost ($)**
Objective 21A: Locate grants or reliable volunteers/groups/organizations to assist with research and monitoring needs. **		ongoing	10 10 10 10 10 10 10 10 10 10	unknown
Objective 21B: Further expand the inventory of plants found on the preserve.		40	10 10 10 10 10 10	$10,000
Objective 21C: Increase the frequency of bird rookery monitoring dates.		10	9 9 9 9 9 9 9 9 9 9	unknown
Objective 21D: Evaluate needs for research of additional taxonomic groups, hydrological needs, and water quality standards.		20	5 5 10 10 10 10 10 5 5 5 5	$160,000
Objective 21E: Increase frequency of existing monitoring programs and incorporate other management units.		60	5 10 10 10 5	$20,000
Objective 21F: Hire FNAI to conduct a more thorough survey of listed species. **		0	30 30 30 4 4 2	$30,000
Objective 21G: Pursue future research and monitoring projects as opportunities come about.		ongoing	10 10 10 10 10 10 10 10 10 10	unknown
Objective 21H: Setup partnerships with environmental organizations and recruit volunteers to assist in the surveying of animal species.		ongoing	10 10 10 10 10 10 10 10 10 10	unknown
Goal 22: Educate the public and local governments concerning buffer preserve issues and management goals/objectives.				
Objective 22A: Continue existing partnerships with other scientists and pursue additional partnerships for new studies.		ongoing	10 10 10 10 10 10 10 10 10 10	unknown
Objective 22B: Investigate opportunities for partnering with other agencies to assist with monitoring efforts. **		ongoing	10 10 10 10 10 10 10 10 10 10	unknown
Objective 22C: Initiate program with students from local universities to help assist in research and monitoring projects.		5	10 10 10 10 10 10 10 10 10 5	unknown
Objective 22D: Develop a thorough history of the preserve lands' acquisition to include political and community efforts at the time.		ongoing	10 10 10 10 10 10 10 10 10 10	unknown
Education and Training				
Goal 23: Educate the public and local governments concerning issues and management goals/objectives.				
Objective 23A: Coordinate with and provide technical assistance to permitting agencies.		ongoing	10 10 10 10 10 10 10 10 10 10	unknown
Objective 23B: Further interaction with adjacent landowners via phone, mail, and direct contact regarding management issues.		10	10 10 10 10 10 10 10 10 10	$10,000
Objective 23C: Encourage the CSO to create volunteer led guided walks and other new programs to enhance public education. **		ongoing	10 10 10 10 10 10 10 10 10 10	unknown
Goal 24: Provide further education/training opportunities for staff.				
Objective 24A: Increase communication with other agencies to learn of education/training opportunities.		ongoing	10 10 10 10 10 10 10 10 10 10	unknown

Appendix P: Goals and Objectives for the Estero Bay Preserve State Park for 2004-2013				
Goal/Objective	**Previous Plan**	**Percent Complete**	**Proposed Timeline by fiscal yr (%) '04 05 06 07 08 09 10 11 12 13**	**Estimated Cost ($)**
Public Access and Visitor Use				
Public Access/Parking/Handicap Facilities				
Goal 25: Educate the public and local governments concerning issues and management goals/objectives.				
Objective 25A: Encourage the CSO to create volunteer led guided walks and other new programs to enhance public education. **		ongoing	10 10 10 10 10 10 10 10 10 10	unknown
Goal 26: Allow secondary compatible uses where appropriate that do not detract from the conservation and management goals and objectives (single-use concept).	x			
Objective 26A: Look into funding opportunities for the creation of boardwalks at the trail systems that would enhance visitor access, but not impact natural communities or interfere with native species or fire management activities.		5	20 20 40 15	$40,000
Goal 27: Complete acquisitions of Estero Bay Florida Forever project parcels.				
Objective 27A: Assess the management needs of remaining parcels and determine which parcels should be accepted by CAMA for management.		ongoing	10 10 10 10 10 10 10 10 10 10	unknown
Education Facility				
Goal 28: Educate the public and local governments concerning issues and management goals/objectives.	x			
Objective 28A: Create trail signage that identifies plants, natural communities, prescribed fire and life cycles.		5	20 60 15	$15,000
Objective 28B: Develop a brochure for the EBA&SBP that discusses CAMA, the Florida Forever project, buffer preserve land acquisition and the aquatic preserve.		0	10 20 30 40	$8,000
Hiking/Biking				
Goal 29: Allow secondary compatible uses where appropriate on the buffer preserve that do not detract from the conservation and management goals and objectives (single-use concept).	x			
Objective 29A: Continue to provide hiking and bicycling opportunities at the buffer preserve.		ongoing	10 10 10 10 10 10 10 10 10 10	unknown
Goal 30: Complete acquisitions of Estero Bay Florida Forever boundary parcels.	x			
Objective 30A: Assess the hiking/biking opportunities of remaining parcels and determine which parcels should be accepted by CAMA for management.		ongoing	10 10 10 10 10 10 10 10 10 10	unknown
Operations and Facilities				
Cost Est. & Funding Sources for Mgmt				
Goal 31: Increase management capability and efficiency for the buffer.	x			
Objective 31A: Continue to justify and request		50	12.5 12.5 12.5 12.5	$120,000*

Appendix P: Goals and Objectives for the Estero Bay Preserve State Park for 2004-2013				
Goal/Objective	**Previous Plan**	**Percent Complete**	**Proposed Timeline by fiscal yr (%) '04 05 06 07 08 09 10 11 12 13**	**Estimated Cost ($)**
career service positions for the management of the buffer. **				
Objective 31B: Pursue OPS positions through mitigation, grant, or other opportunities. **		25	25 25 25	$75,000*
Objective 31C: Investigate opportunities for locating the office on the buffer, including the purchase of land for this reason.		0	17 17 17 17 17 15	$50,000*
Analysis of Contracting Mgmt Activities				
Goal 32: Consider outsourcing those preserve operations that outside sources can conduct at less cost and with equivalent or better results than preserve staff.	x			
Objective 32A: On a continuing basis, analyze preserve operations and identify those activities for which preserve staff do not have the expertise or that can be completed at less cost with equivalent or better results by outside sources.		ongoing	10 10 10 10 10 10 10 10 10 10	$1,000
Partnerships and Regional Coordination				
Cooperating Agencies				
Goal 33: Increase coordination with existing and new agencies to provide assistance with various land management activities.	x			
Objective 33A: Improve participation, coordination and sharing of resources (equipment and labor) with various fire/land management agencies.		ongoing	10 10 10 10 10 10 10 10 10 10	$750
Objective 33B: Continue to expand attendance at various land management workshops, meetings and present/submit additional projects for latest land acquisitions needs as well as ongoing needs for existing lands.		ongoing	10 10 10 10 10 10 10 10 10 10	$3,000
Objective 33C: Improve protection of resources by increasing law enforcement presence around problem areas of the preserve. **		ongoing	10 10 10 10 10 10 10 10 10 10	$500
Cooperating Organizations				
Goal 34: Continue and improve cooperation with all agencies and organizations that have the protection of the EBA&SBP as a goal.				
Objective 34A: Seek out additional opportunities for cooperation.		ongoing	10 10 10 10 10 10 10 10 10 10	unknown
Land Use Coordination				
Goal 35: Continue and improve coordination with permitting agencies and local governments.				
Objective 35A: Continue appointment on the Fort Myers Beach Marine Resources Task Force.		ongoing	10 10 10 10 10 10 10 10 10 10	$10,000
Objective 35B: Participate in monthly interagency permitting meetings.		ongoing	10 10 10 10 10 10 10 10 10 10	$10,000
Objective 35C: Provide technical assistance, including written comments to permitting agencies when needed.		ongoing	10 10 10 10 10 10 10 10 10 10	$25,000

Appendix P: Goals and Objectives for the Estero Bay Preserve State Park for 2004-2013												
Goal/Objective	**Previous Plan**	**Percent Complete**	**Proposed Timeline by fiscal yr (%)**									**Estimated Cost ($)**
			'04	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	
Objective 35D: Provide input in the Land Use Plan process and zoning issues to local governments when needed.		ongoing	10	10	10	10	10	10	10	10	10	10	$5,000
Prospective Land Acquisitions and Potential Surplus Lands													
Goal 36: Define optimum boundaries for the preserve and facilitate acquisition of lands to achieve these boundaries.	x												
Objective 36A: Facilitate acquisition of remaining parcels in FF Boundary by working with and providing information to DSL and DRP in Tallahassee on a continuous, as needed basis.		ongoing	10	10	10	10	10	10	10	10	10	10	unknown
Objective 36B: Request a FF Boundary amendment to add parcels identified in Chapter 3 and delete developed parcels.		0	100										$1,400
Compliance with Govt. Requirements													
Goal 37: Ensure that use and management of the preserve complies with state and local government requirements.	x												
Objective 37A: Ensure that each planned use of the preserve complies with the State Lands Management Plan adopted by the Trustees.		ongoing	10	10	10	10	10	10	10	10	10	10	$1,000
Objective 37B: Ensure that each planned use of the preserve complies with the Local Government Comprehensive Plan.		ongoing	10	10	10	10	10	10	10	10	10	10	$1,000

* = denotes additional money above baseline funds needed to complete this objective

** = denotes objective addresses the findings and recommendations of the Management Review Team

Appendix Q

Letter of Verification of Compliance with Local Comprehensive Plans

LEE COUNTY
SOUTHWEST FLORIDA

BOARD OF COUNTY COMMISSIONERS

Bob Janes
District One

Douglas R. St. Cerny
District Two

Ray Judah
District Three

Andrew W. Coy
District Four

John E. Albion
District Five

Donald D. Stilwell
County Manager

James G. Yaeger
County Attorney

Diana M. Parker
County Hearing Examiner

JAN 06 2005

Writer's Direct Dial Number: (239) 479-8309

January 3, 2005

Ms. Heather Stafford
Florida Department of Environmental Protection
700-1 Fisherman's Wharf
Fort Myers Beach, FL., 33931

RE: Estero Bay State Buffer Preserve New Ten-Year Plan
Consistency with the Lee County Comprehensive Plan

Dear Ms. Stafford:

Planning Division staff would like to thank you for providing us the opportunity to review the Estero Bay State Buffer Preserve New Ten-Year Plan. Planning staff realizes that the purpose of this management plan is to describe the preserve's setting, natural resources, and the intended management. Lee County staff understands that the Estero Bay State Buffer Preserve is managed to conserve and protect the natural and cultural resources of the preserve. Planning staff finds that the new ten year plan is consistent with and will further the Lee County Comprehensive Plan, the Lee Plan.

If I can be of further assistance to you, please do not hesitate to call me at 479-8309.

Sincerely,

DEPARTMENT OF COMMUNITY DEVELOPMENT

Paul O'Connor

PAUL O'CONNOR, AICP
Planning Division Director

Appendix R
Management Plan Review

Land Management Review of Estero Bay State Buffer Preserve, Lee County (Lease No. 4083): April 27, 2000

Prepared by Division of State Lands Staff

Delmas Barber, OMC Manager
David Petti, Environmental Specialist
Alphonso Craig, Staff

For
The Estero Bay Management Review Team

FINAL Report June 22, 2000

Land Manager:	Ms. Heather Stafford, Office of Coastal and Aquatic Managed Areas
Area:	6,346 Acres
County:	Lee County
Mngt. Plan Approved:	08/27/1997
Mngt. Plan Update Due:	02/22/2002

Management Review Team Members

Agency Represented	Team member Appointed	Team member in attendance
DEP/DRP	Ms. Jeanne Parks	Ms. Jeanne Parks
DEP District	Ms. Annette Nielsen	Ms. Annette Neilsen
DACS/DOF	Mr. Bill Korn	Mr. Bill Korn
FWCC	Mr. Mike Kemmerer	Mr. Mike Kemmerer
Lee County Commission	Mr. Roger Clarke	Mr. Roger Clark
Private Land manager	Mr. Len Howell	Mr. Len Howell
Private Conservation Organization (Audubon)	Mr. John Cassani	Mr. John Cassani
Lee County SWCD	Mr. Tim Eckert	Mr. Tim Eckert

Process for Implementing Regional Management Review Teams

Legislative Intent and Guidance:

Chapter 259.036, F. S. was enacted in 1997 to determine whether conservation, preservation, and recreation lands owned by the state Board of Trustees of the Internal Improvement Trust Fund (Board) are being managed properly. It directs the Department of Environmental Protection (DEP) to establish land management review teams to evaluate the extent to which the existing management plan provides sufficient protection to threatened or endangered species, unique or important natural or physical features, geological or hydrological functions, and archaeological features. The teams also evaluate the extent to which the land is being managed for the purposes for which it was acquired and the degree to which actual management practices, including public access, are in compliance with the adopted management plan. If a land management plan has not been adopted, the review shall consider the extent to which the land is being managed for the purposes for which it was acquired and the degree to which actual management practices are in compliance with the management policy statement and management prospectus for that property. If the land management review team determines that reviewed lands are not being managed for the purposes for which they were acquired or in compliance with the adopted land management plan, management policy statement, or management prospectus, DEP shall provide the review findings to the Board, and the managing agency must report to the Board its reasons for managing the lands as it has. A report of the review findings are given to the managing agency under review, the Acquisition and Restoration Council, and to the Division of State Lands. Also, DEP shall report the annual review findings of its land management review teams to the Board no later than the second board meeting in October of each year.

Review Site

The management review of the Estero Bay State Buffer Preserve considered approximately 6,346 acres in Lee County that are managed by the Office of Coastal and Aquatic Managed Areas. The team evaluated the extent to which current management actions are sufficient, whether the land is being managed for the purpose for which it was acquired, and whether actual management practices, including public access, are in compliance with the management plan. The Division of State Lands approved the management plan on August 27,1997 and the management plan update is due February 22, 2002.

Review Team Determination

Is the land being managed for the purpose for which it was acquired?

After completing the checklist, team members were asked to answer "yes" or "no" to this question. All team members agreed that Estero Bay State Buffer Preserve is being managed for the purpose for which it was acquired.

Are actual management practices, including public access, in compliance with the management plan?

After completing the checklist, team members were asked to answer "yes" or "no" to this question. All team members agreed that actual management practices, including public access, were in compliance with the management plan for this site.

Commendations to the managing agency

The following commendations resulted from a discussion and vote of review team members.

1. The team commends Preserve staff for their progressive use of partnerships and creative funding sources to achieve acquisition goals, exotics removal and other resource management objectives. (8 for/0 against)

2. The team commends Preserve staff for advancing their CSO, public education and community outreach efforts. (8 for/0 against)

Exceptional management actions

The following items received high scores on the review team checklist (see Attachment 1), which indicates that management actions exceeded expectations.

- Cultural resources survey(identify and locate)
- Resource Protection : (boundary survey; gates and fencing)

Recommendations and Checklist Findings

The management plan must include responses to the recommendations and checklist items that are identified below.

Recommendations

The following recommendations resulted from a discussion and vote of review team members.

1. The team recommends that the updated management plan include better defined goals and objectives that address desired accomplishments. (8 for/0 against)

   Response: The updated plan will have better defined goals and objectives for the resource management activities identified in section N.

2. The team recommends that the managing agency seek cooperative opportunities for development of ground water monitoring in critical areas to assess impacts of increased population growth.
   (7 for/1 against)

   Response: We will seek these cooperative opportunities which may involve the South Florida Water Management District, Department of Environmental Protection, US Corps of Engineers, Florida Gulf Coast University, Lee County Hyancinth Control, Charlotte Harbor National Estuary Program, private developments and/or mitigation opportunities. Without cooperation, it is not anticipated that this monitoring and assessment could be accomplished with current staffing, funding, and equipment.

3. The team strongly supports the needs identified in the management plan to provide career service positions, equipment and supplies necessary to restore and manage this property. (8 for/0 against)

   Response: Staffing and funding needs will be identified in the future plan update. Funding is always contingent on DEP/CAMA budget resources and priorities and on legislative action. One FTE position is slotted for this site in the coming fiscal year.

Checklist findings

The following items received low scores on the review team checklist (see Attachment 1), which indicates that management actions were insufficient (*f)* or that the issue was not sufficiently addressed in the management plan (*p*). These items need to be addressed in the management plan update.

1. Restoration of Disturbed Natural Communities (Debris Clean Up) (p)
   Manager's Response:

   Since the Land Management Review, a volunteer clean up workday was held. At this workday approximately one ton of trash/debris was collected. Staff Coordinated with Keep Lee County Beautiful , Inc. to haul the debris away free of charge. Recyclables were separated and recycled by volunteers. Staff and the Estero Bay Aquatic & State Buffer Preserves citizen support organization, the Estero Bay Buddies are considering sponsoring/endorsing at least two clean ups per year enlisting similar cooperation from partners. Staff will also seek increased patrols by authorities to help curb any future dumping. These efforts will be detailed in the updated plan. Certain equipment purchases if approved will also facilitate debris removal from buffer lands.

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2. Hydrological/Geological Function (AG Ditches,Mosquito Ditches,Road Berms/Ditches) (p)
Manager's Response:

Costs for consulting, permitting and labor are extensive for this type of restoration work and therefore limited by the available budget. Staff is working with permitting agencies to attempt to include this type of restoration work as a public interest requirement or mitigation of projects being permitted within the Estero Bay Watershed. Staff will also approach Florida Power & Light Co. about the possibility of bringing sections of their filled road easements down to grade. This item will be addressed in the public meetings and updated management plan. We hope to solicit innovative ideas to obtain funding.

---

3. Listed Species Protection and Preservation (Animals & Plants) (p)
Manager's Response:

Listed species inventories and list will be more complete in the updated plan since conformation and documentation of species by staff has been increased from the last writing. Some newly acquired lands have had species surveys conducted prior to acquisition, so that information will be included. Other lands acquired through federal grants include funding that will provide for species surveys on those lands, so this information will also be included in the updated plan. However, at this point we must make a note that management for the health of the ecosystem as a whole is preferred over management for individual species.

---

4. Surface water Monitoring (Quantity)(p)
Manager's Response:

As the team recommended, we will "seek cooperative opportunities for development of ground water monitoring in critical areas to assess impacts of increased population growth." Without this cooperative element, staffing and funding will be the limiting factor. In addition, adjacent developments are required through permitting to monitor and treat water prior to discharge to insure no net gain over natural flows. We will approach the South Florida Water Management District about the possibility of increased compliance and enforcement .

---

5. Environmental Education Outreach (p)
Manager's Response:

A resource management specialist with an extensive background in environmental education has recently joined our staff. He has begun attending meetings regarding environmental education and outreach in Lee County and will be leading hiking tours focusing on nature appreciation and observation within the buffer. This new member of our staff has numerous outreach ideas, and will assist in the writing of the updated management plan.

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6. Prescribed Fire: Frequency, Quality and no. acres(p)
Manager's Response:

Due to the exotic species (melaleuca in particular) infestation of the buffer's fire dependent communities, fire previously would have caused more harm to the resources than it would help. We have been pursuing an aggressive exotic removal plan that should allow for some burn units to be burned under prescription during 00/01. Also, due to the acquisition of more fire dependent upland communities, this will be a point of focus in the updated management plan

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7. Infrastructure (Equipment, Staff & Funding)(f)
Manager's Response:

Equipment, staff and funding are generally limited and determined by CAMA based on legislatively approved funding. Staff submits identified needs to CAMA in preparation of each year's Legislative Budget Request. But, this office has obtained equipment, funding for land acquisition, restoration and infrastructure, and approval for temporary staff through the submission and ultimate approvals of various grants. We also subsidized our "staffing " needs through the assistance of volunteers, Department of Corrections work crews and DEP/Bureau of Invasive Plant Management contracts. With respect to land management, we will continue to partner with these and other agencies such as Lee County Parks and Recreation, Lee County Mosquito Control, Division of Recreation and Parks, and Division of Forestry. These successes will be identified in the updated plan and we will continue to pursue these alternative funding and "staffing" sources. Mitigation activities also provide alternative means to accomplish planned restoration measures. With the interim management money we will be receiving for the first time due to recent land acquisitions, we will be able to fill more of our significant equipment needs. I have requested additional OPS and FTE positions also, in part to these new acquisitions.

---

8. Resource Protection (Illegal Dumping, Poaching) (p)
Manager's Response:

This was a problem that was not sufficiently addressed in the current plan, but has been significantly reduced through boundary fencing and posting in the last few years. In fact almost all dumping within the boundary of the buffer has been there for many years. Since fencing and posting, little to no dumping has occurred and signs of poaching activities have decreased. In the updated plan we will address increasing security through the use of Park Patrol, Fish & Wildlife Conservation Commission officers, and possibly local deputies to help curb poaching and other illegal activities.
Environmental professionals

Attachment 1

The management review checklist was analyzed as follows: The checklist consisted of two parts: a plan review section that answered whether or not the management plan sufficiently addressed protection/ restoration/ management needs for a series of items; and a field review section that scored to what extent sufficient management actions were being taken for a series of items. For each item in each section the scores for all team members were averaged. Some items received high scores (≥ 4.0) in the field review, which indicates that exceptional management actions are being taken. Some items received low scores (≤ 0.5 for plan review; ≤ 2.0 for field review), which indicates that they were not sufficiently addressed in the plan, or that management practices did not meet expectations. These items must be addressed in the management plan update.

PLAN REVIEW		A	B	C	D	E	F	G	H	
Unconsolidated Substrate/Mudflats	I.A.1	0	1	1	1	0	0	1	1	0.6
Estuarine tidal swamp	I.A.2	1	1	1	1	0	1	1	1	0.9
Estuarine tidal marsh	I.A.3	1	1	1	1	0	1	1	1	0.9
Shell mound	I.A.4	1	1	1	1	0	1	1	1	0.9
Wet Flatwoods	I.A.5	1	1	1	1	0	1	1	1	0.9
Animals	I.B.1	1	1	0	0	0	0	1	1	0.5
Plants	I.B.2	1	1	0	0	0	0	1	1	0.5
Survey	II.A	1	1	1	1	1	1	1	1	1
Protection and Preservation	II. B	1	1	0	1	1	1	1	0	0.8
Area Being Burned(no. acres)	III.A.1.	0	1	0	0	0	0	0	0	0.1
Frequency	III.A.2	0	1	0	0	0	0	0	0	0.1
Quality	III.A.3	0	1	0	0	0	0	0	0	0.1
Vehicles Ruts	III.B.1	0	0	1	1	0	1	1	1	0.6
Debris Cleanup	III.B.3	0		0	1	0	0	0		0.2
Animals	III.D.1	0	1	1	0	0	1	1	1	0.6
Plants	III.D.2	1	1	1	0	0	0	1	1	0.6
AG Ditches	III.E.1.a		0	0	1	0	0	0	1	0.3
Mosquito Ditching	III.E.1.b		0	0	0	0	0	0	0	0
Roads Berms/ Ditches	III.E.1.c		0	0	0	0	0	0	0	0
Quality	III.E.3.a	1		0	1	0	1	0	1	0.6
Quantity	III.E.3.b	1		0	1	0	1	0	0	0.4
Boundary Survey	III.F.1	1	1	1	1	1	1	1	1	1
Gates & Fencing	III.F.2	1	1	1	1	1	1	1	1	1
Signage	III.F.3	1	1	1	1	1	0	1	1	0.9
Law Enforcement Presence	III.F.4	0	1	1	1	0	1	1	0	0.6
Illegal Dumping	III.F.5	0	1	1	1	0	0	1	0	0.5
Poaching	III.F.6	0	1	1	0	0	0	1	1	0.5
ORV Abuse	III.F.7	1	1	0	1	0	0	1	1	0.6
Encroaching development	III.E.3.b	1	1	1	1	0	1	1	1	0.9
Inholdings and additions	III.G.2	0	1	1	1	1	1	1	1	0.9
Parking	IV.1.b	0	1	1	1	1	1	0	1	0.8
Water Access	IV.1.c	1	1	1	1	0	1	0	0	0.6

Recreational Opportunities	IV.2	1	1	1	1	0	1	1	1	0.9
Interpretive Facilities and signs	IV.3	0	1	1	1	0	0	1	0	0.5
Environmental Education/outreach	IV.4	0	1	0	1	0	0	1	0	0.4
FIELD REVIEW		A	B	C	D	E	F	G	H	
Unconsolidated substrate/mudflats	I.A.1	3	3	3	3	4	3	3	3	3.1
Estuarine tidal swamp	I.A.2	3	3	4	4	5	4	3	3	3.6
Estuarine tidal marsh	I.A.3	3	3	3	3	3	3	3	4	3.1
Shell mound	I.A.4	3	3	4	4	4	3	3	3	3.4
Wet Flatwoods	I.A.5	2	3	3	3	2	4	3		2.9
Animals	I.B.1	2		2	3	2	3	3	3	2.6
Plants	I.B.2	3	3	3	3	2	3	3	3	2.9
Survey	II.A	4	3	3	4	4	4	3	4	3.6
Protection and Preservation	II. B	3	4	2	4	4	4	3	4	3.5
Area Being Burned(no. acres)	III.A.1.	2	4	3	3	1	2	3	3	2.6
Frequency	III.A.2	2	3	3	3	1	2	1	3	2.3
Quality	III.A.3	2	3	3	3	1	2	1	3	2.3
Vehicles Ruts	III.B.1	3	3	3	3	3	3	3	3	3
Debris Cleanup	III.B.3	4		2	3	3	3	3	4	3.1
Animals	III.D.1	3	3	2	3	2	3	3	3	2.8
Plants	III.D.2	4	3	4	4	4	4	3	3	3.6
AG Ditches	III.E.1.a	3	2	3	4	4	4	3	4	3.4
Mosquito Ditching	III.E.1.b	3	2	1	3	3	2	3	2	2.4
Roads Berms/ Ditches	III.E.1.c	2	2	1	3	2	2	3	2	2.1
Quality	III.E.3.a	2		1	4	1	3	3	3	2.4
Quantity	III.E.3.b	2		1	4	1	3	2	3	2.3
Boundary Survey	III.F.1	5	4	3	4	4	4	3	3	3.8
Gates & Fencing	III.F.2	3	2	3	4	4	2	3	3	3
Signage	III.F.3	3	4	3	4	4	3	3	3	3.4
Law Enforcement Presence	III.F.4	2	3	2	3	3	3	3	2	2.6
Illegal Dumping	III.F.5	3	3	3	3	4	3	3	3	3.1
Poaching	III.F.6	3	3	2	3	4	3	3	3	3
ORV Abuse	III.F.7	4	3	2	2	3	3	3	3	2.9
Encroaching development	III.E.3.b	3	3	5	3	4	4	3	3	3.5
Inholdings and additions	III.G.2	4	4	5	4	5	4	3	3	4
Parking	IV.1.b	2	3		2	3	2	3	2	2.4
Water Access	IV.1.c	2	3	3	3	3	3	2	2	2.6
Recreational Opportunities	IV.2	3	3	4	3	3	3	3	3	3.1
Interpretive Facilities and signs	IV.3	2	3	3	3	3	3	3	3	2.9
Environmental Education/outreach	IV.4	3	3	5	4	3	3	3	4	3.5
Buildings	V.2.a.	3		1	2	3	2	3	3	2.4
Equipment	V.2.b.	2		1	1	2	2	2	1	1.6
Staff	V.3	2	3	1	2	2	2	2	1	1.9
Funding	V.4	1	3	1	2	2	2	2	1	1.8